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## CHAPTER 6

### 6.000 WATER

#### 6.010 General

Any extension of the Lacey Water System must be approved by the Department of Public Works (DPW), and all extensions must conform to Department of Health (DOH) and the Coordinated Water System Plan, City of Lacey Water System Plan, and the City of Lacey Fire Code Official's requirements.

In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show in the proposed plans how water will be supplied and, as required by the City, whether adequate water pressure and volume will be available to meet fire flow requirements. An analysis of the system shall be required to confirm that fire flow requirements will be met.

All new residences and businesses within the corporate City limits or the City's Urban Growth area shall connect to a public water supply provided that the property lies within 200 feet of a public water main, or when made a condition of project approval. When additional improvements occur to a developed parcel within 200 feet of a public water main, all structures on that parcel shall be connected to water.

Anyone who wishes to extend or connect to the City's water system shall contact the Department of Public Works for appropriate approvals and a connection fee estimate. This fee estimate is an estimate of the costs due the City for a waterline extension or connection. A copy of the estimate form may be found in Appendix C.

Prior to the release of any water meters, all Public Works improvements must be completed and approved including granting of right-of-way or easements and Special Power of Attorney for Annexation if required, and all applicable fees must be paid. For Exceptions to this policy see section 3.080 C.2.

Issuance of building permits for new construction shall not occur until final Public Works approval is given. As an exception to this policy, building permits may be issued upon completion and acceptance of the required fire protection facilities and the requirements as outlined in 3.080 C.2 have been met. **The certificate of occupancy will not be issued until final Public Works approval is given for all improvements.**

#### 6.020 Design Standards

The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Chapters 3.010 and 3.040. Mains and fittings shall be located on the north or east side six feet off of centerline of the roadway, drive aisle, private drive or easement. On boulevards and arterial

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roadways, the location of the watermain and fittings shall be located as directed by the City, see chapter 4 street details.

The layout of extensions shall provide for the future continuation, water quality and/or "looping" of the existing system. Specific looping requirements shall be determined during plan review by the City. Dead end mains shall only be installed if looping is impractical due to topography, geology or as determined by the City. At a minimum, two connection points on separate mains to provide dual feeds for the development shall be required. In addition, main extensions shall be extended as required in Chapter 3.130.

In order to prevent transient water conditions and increased pressure losses, water main velocities shall not exceed 10 feet per second during peak and fire flow conditions.

Maintaining consistent slope of the watermain in design shall take precedence over the storm system design. Exceptions or conflicts shall be reviewed and resolved during the plan review process.

The General Notes on the following page shall be included on any plans dealing with water system design.

#### 6.024 Water Modeling

Water modeling shall be required to adequately size and loop mains in order to achieve fire flow and peak hour demands. Modeling will be completed by the City Water Resources Engineer after a request and adequate information has been received.

Peak hour demand modeling will only be completed when requested by the applicant or required by the City Engineer.

Fire flow (flow and pressure) will be determined through modeling under conditions specified by the City. A physical fire flow test will not replace the requirement for modeling.

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**GENERAL NOTES (WATER MAIN INSTALLATION)**

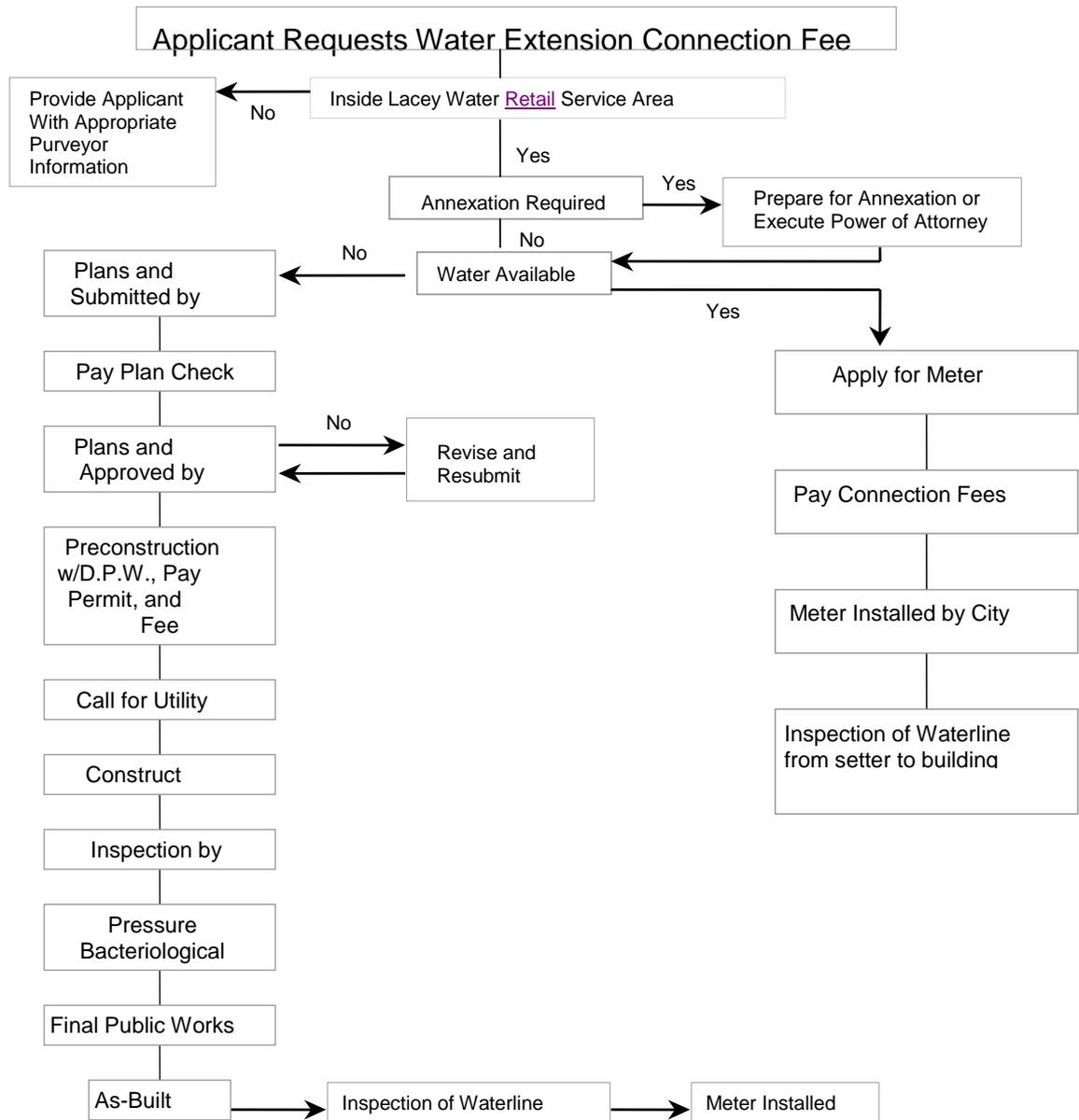
1. Water mains up to 10" shall be AWWA C900 DR14 or ductile iron standard thickness class 52. Water mains larger than 10" shall be ductile iron standard thickness class 52. See Chapter 6.030B for more detailed pipe specifications.
2. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-ring seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA C-515 latest revision. Valves shall be Mueller, M & H, Kennedy, Clow R/W, Waterous Series 2500, EJ Flowmaster or American AVK.
3. **Existing valves shall be operated by City employees only.**
4. Hydrants shall be City approved as specified on the hydrant details and shall be bagged until the system is approved.
5. The contractor with the assistance of the City inspector shall install, chlorinate and fill the water main. Testing shall include the main, valves, service lines and appurtenances. After testing is completed, the newly constructed system shall be flushed. After flushing chlorinated water from disinfected lines, the City shall measure chlorine residual to verify that flushing is complete. This will be completed prior to the City taking microbiological samples.
6. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core backing marked "water" which can be detected by a standard metal detector. Tape shall be 3 inch wide Terra Tape "D" or approved equal. In addition to tracer tape, install direct bury, U.S.E. 12 gauge blue coated copper wire, wrapped around or taped to the pipe, as shown on detail. Low voltage grease-type splice kits shall be used on tracer wire. After the wire nut is used to connect the wire together an overhand knot shall be tied just outside the grease kit to prevent it from coming apart. Continuity testing of the wire will be done by the City.
7. All service line locations shall be marked on the top or face of the curb with an embossed "W" 3 inches high and 1/4 inch into concrete.
8. The City will be given 72 hours notice prior to scheduling a shutdown. Where connections require "field verification", connection points shall be exposed by the contractor and fittings verified 72 hours prior to distributing shut-down notices.
9. Separation between water and sewer shall be maintained per DOE standards. See Development Guideline Chapter 6.130 for more information.
10. A concrete pad per detail shall be installed around all valve boxes and blow-offs that are not in a pavement area.
11. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City standards prior to connection. If an existing

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- valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.
12. The minimum burial depth of all water lines shall be 42 inches. The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers/reclaimed water and water mains. To accommodate crossings, the minimum cover for water main of 42 inches may be reduced to 30 inches upon approval by the City to provide for as much vertical separation as possible. When a reduced depth is allowed, ductile iron piping and/or casings may be required. See 6.080 for casing specifications.
  13. It shall be the contractor's responsibility to field verify the location and depth of the existing main and provide the fittings required to make the connection to the existing main.
  14. The contractor shall install a temporary 2 inch brass blow off for flushing and sampling on the existing and/or new water main. The blow off shall be constructed with a standard 2 inch tapping saddle and Ford brass corporation stop with 2 inch brass pipe extended up to finished grade. When flushing and sampling are completed, the 2 inch pipe shall be removed. The corporation stop shall be shut off and capped tight with a threaded brass cap.
  15. When an existing City water main is to be abandoned, it shall be the developer's responsibility to coordinate and abandon the existing main. It shall also be the developer's responsibility to install and transfer existing water services to the new main.
  16. Sand shall be placed around and under service lines and meter boxes by hand to a height of 6 inches above and 6 inches below the line(s) and boxes. Excavation for the meter box shall be an additional one foot around the entire box and backfilled with sand per City detail.
  17. Meters 3 inches or larger in size must be ordered from City Utility Billing by the contractor/developer a minimum of 10 weeks in advance of installation.
  18. All valve box, blow-off and manhole lids shall be clean and clear of asphalt or concrete before scheduling a walk through.
  19. The water main and appurtenances and service connections to the meter setter shall be tested in sections of convenient lengths under a hydrostatic pressure equal to 150 psi in excess of that under which it will operate. In no case shall the test pressure be less than 225 psi.
  20. All water mains and service lines shall be bedded per detail 6-26 and meeting the pipe bedding specification chart requirements.
  21. All brass pipe and fittings shall be manufactured in the United States of America and comply with public law 111-380 (reduction of lead in Drinking Water Act). Imported brass pipe and fittings shall not be permitted.

22. When using a hydrant meter to fill a tanker truck or portable tank of any kind, an approved permanently installed air gap of at least two times the inside diameter of the fill pipe is required. See detail. Any air gap on tanker trucks or portable tanks used within the City of Lacey water system must be inspected annually by a certified Backflow Assembly Tester (BAT) and a typical backflow prevention test report submitted to the Lacey Cross-Connection Specialist.

Revised: 03/2014

**PROCESS TO OBTAIN WATER SERVICE**



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## 6.025 Wellhead Protection Areas

The wellhead protection area designated for each of the City's wells is an irregular boundary determined by topography, water flow patterns (both above and below ground), soil types, flow rates and other criteria. Please contact the Public Works plan review staff or the Water Resources Department to determine whether your project is situated within a wellhead protection area. In order to protect the public water supply, all applicable portions of the Critical Aquifer Recharge Areas Protection ordinance as specified in LMC 14.36 and the following criteria shall apply to any project or portion of a project which is partially or completely located within a wellhead protection area.

- ◆ Existing private wells within the City of Lacey shall comply with Department of Ecology standards.
- ◆ The drilling of new exempt wells, or redevelopment of existing exempt wells, shall be prohibited within the City's critical aquifer recharge areas except where use of such wells is for the purpose of City of Lacey water supply, or resource protection, environmental monitoring or remediation of contamination.
- ◆ All storm water shall be directed away from the well's 100 foot sanitary setback. Storm water shall not penetrate the same aquifer supplying the well within the well's 1-year time-of-travel zone.
- ◆ A storm and erosion control plan requiring treatment of stormwater is required. Depending on the individual characteristics of the project, and the susceptibility of the particular wellhead to contamination, more stringent treatment requirements than those required in City of Lacey 2010 Stormwater Design Manual will be imposed by the City.
- ◆ If the project is to be platted, it must be noted within the covenants of the plat and in the General Notes of any engineering plans that the project is located within the one, five, or ten year time-of-travel zone wellhead protection area.
- ◆ All garbage bins and dumpsters, except in single family subdivisions, shall be covered in a manner that prevents rainwater from entering the containers. A sanitary drain shall be provided for compaction-style dumpsters that may generate leachate.
- ◆ In commercial projects, where hazardous products are stored or used, a spill and containment plan shall be implemented. Depending on the nature of a project, more stringent spill and containment requirements than those required in the City of Lacey 2010 Stormwater Design Manual will be imposed by the City.
- ◆ Integrated pest management shall be utilized in choosing landscaping. This is required to minimize the use of pesticides, fertilizers, etc. Contact

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Thurston County Environmental Health for the most current Integrated Pest Management standards.

- ◆ Land spreading disposal facilities (as defined by WAC 173-304 and WAC 173-308) are prohibited within the designated one-year time-of-travel zone.
- ◆ Wastewater treatment facilities, including wastewater reclamation facilities, are prohibited within designated one-year time-of-travel zones. Infiltration of reclaimed water for the purposes of disposal or groundwater augmentation, which does not include irrigation at agronomic rates, is also prohibited within designated one-year time-of-travel zones.
- ◆ Animal operations with over 200 animal units shall be prohibited within the designated one-year time-of-travel zone. LMC 14.36.215. Examples of prohibited animal operations within the one-year time-of-travel include, but are not limited to, dairies, stables, horse boarding/training, auction facilities, feedlots, and poultry raising.
- ◆ Gas stations, petroleum products refinement, reprocessing, and storage (except underground storage of heating oil or agricultural fueling in quantities less than 1,100 gallons for consumptive use on the parcel where stored), and liquid petroleum products pipelines are prohibited within the designated one-year time-of-travel zone. LMC 14.36.215. Examples of prohibited petroleum storage within the one-year time-of-travel zone includes maintenance/fueling facilities for municipal, county, state, school district, transit, airports, railroads and buses. Gas stations without an attendant are prohibited within designated one-, five- and ten year time-of-travel zones.
- ◆ Automobile wrecking yards and junk, scrap, or salvage yards are prohibited within the designated one-year time-of-travel zone. LMC 14.36.215.
- ◆ Wood waste landfills shall be prohibited within the designated one-year time-of-travel zone. LMC 14.36.215.
- ◆ Dry cleaners, excluding drop-off only facilities are prohibited within the designated one-year time-of-travel zone. LMC 14.36.215.
- ◆ Landfills (municipal sanitary solid waste and hazardous waste) are prohibited within the designated one-, five-, and ten-year time-of-travel zones. LMC 14.36.215.
- ◆ Hazardous waste transfer, storage and disposal facilities are prohibited within the designated one-, five-, and ten-year time-of-travel zones. LMC 14.36.215.
- ◆ Wood and wood products preserving is prohibited within the designated one-, five- and ten-year time-of-travel zones. LMC 14.36.215.

- ◆ Chemical manufacturing is prohibited within the designated one-, five- and ten-year time-of-travel zones. LMC 14.36.215.
- ◆ For any use proposed within the designated one-, five- and ten-year time-of-travel zones which uses, stores, handles or disposes of hazardous materials, refer to LMC 14.36 for appropriate specifications.

#### 6.030 Main Line

- A. Water mains shall be sized to provide adequate domestic flow plus fire flow at the required residual pressure. Fire flow requirements will be determined by the City of Lacey Fire Code Official however, the quantity of water required will in no case be less than 750 GPM at 20 psi residual pressure for single family and duplex occupancies (IBC R3) and a cumulative 1500 gpm at 20 psi residual for all other occupancies. Check with City of Lacey Fire Code Official for Group U requirements. Fire hydrants shall be located on water mains 6 inches diameter and larger.

The minimum water main size for standard distribution mains shall be 8 inches diameter. The minimum water main size for commercial and industrial applications shall be 12 inch installed in the public right-of-way. On-site water mains shall be looped and sized for the maximum expected fire flow. Larger size mains are required in specific areas as outlined in the Water Comprehensive Plan along existing transmission corridors. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet fire protection requirements or for future service.

Public mains serving cul-de-sacs or non-extendible, dead end areas may not be less than two inches in diameter.

- B. All pipe for water mains shall comply with one of the following types:

Ductile Iron Pipe: Ductile iron pipe may be used on mains up to ten inches diameter. Ductile iron pipe shall be used on mains over ten inches in diameter. Ductile iron pipe shall conform to AWWA C 151 standard thickness class 52 and have a cement mortar lining conforming to AWWA C 104. All pipes shall be joined using non-restrained joints which shall be rubber gaskets, push on type or mechanical joint, conforming to AWWA conforming to AWWA C 111.

Pipes with less than 42 inches of cover shall only be allowed in extreme conditions when topography or design conditions (when the engineer has done the due diligence but still conditions) does not provide ample space for the piping and with the approval of the Director of Public Works, ductile iron pipe shall be used. The thickness class shall be 52.

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PVC Pipe: PVC pipe may be used on mains four inches through 10 inches in diameter with a minimum of 42 inches of cover. All PVC pipe shall conform to the latest revision of AWWA C900 DR 14 standards.

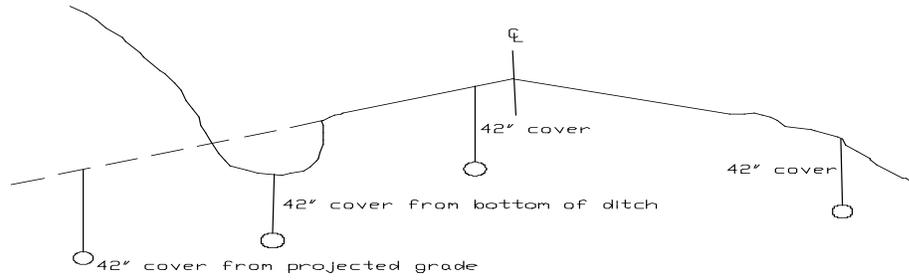
Two inch diameter service lines shall be NSF Approved, PE3408 blue polyethylene pipe manufactured from virgin materials. Pipe shall meet the following specifications:

- ANSI/AWWA C901
- ASTM D1248, ASTM D 3350, ASTM D 2239, ASTM D 3035 and ASTM D 2737,
- Pressure Class 200, SIDR - 7(Standard Inside Dimension Ration-Pressure Rated),
- Cell classification 345464C,

Pipe shall be manufactured by Interstate Plastics, Philips Driscopipe, Eagle Pacific, Superlon Plastics, U.S. Poly or approved equal.

- C. All fittings shall be ductile iron compact fittings conforming to AWWA C 153. All shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain ends. All fittings shall be connected by flanges or mechanical joints. All retaining follower glands shall be ductile iron.
- D. All pipe and services shall be installed with continuous tracer tape installed 12 to 18 inches under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing which can be detected by a standard metal detector. Tape shall be 3 inch wide Terra Tape "D" or approved equal. In addition to tracer tape, install 12 gauge, direct bury, U.S.E. blue coated copper wire, wrapped around or taped to the top of pipe, brought up and tied off at valve body as shown on detail.
- E. The minimum cover for all water mains from top of pipe to finish grade shall be 42 inches. If the pipe is offset to the edge of the road, the actual roadway cross grade shall be projected out and used to measure cover to top of pipe. This will require more fill over the pipe in a fill section but allows the pipe adequate cover in the event of future roadway cuts or widening. If the pipe is located under a ditch, or on the "downhill" slope of the roadway cross section, the minimum cover over the pipe shall be 42 inches regardless of projected grades.
- F. When minimum cover of the water main is in conflict with other utilities, the engineer shall be required to provide the top and bottom elevations of the pipes in conflict. The adjustment of elevation when the minimum cover cannot be met shall be as directed by the City.
- G. When designing a water main through an unimproved area, the engineer shall provide a future design of the area to prevent design/construction of

shallow mains. The design shall include elevations of the top of pipe at 25 foot intervals. All pipe installed in unimproved areas shall be ductile iron.



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#### 6.040 Connection To Existing Water Main

If a tap or cut-in is being made by anyone other than the City, the City Inspector shall have the contractor sign the Verification of Disinfected Equipment Form.

The existing or new valve against the new connection or the tapping valve shall be pressure tested prior to any new connection.

After the contractor installs the new main, the contractor shall be responsible for disinfecting and flushing it per specifications in Chapter 6.200 of the *City of Lacey Development Guidelines and Public Works Standards* and AWWA guidelines.

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. See detail. Cut-in tees may be allowed only with the approval of the Director of Public Works.

The contractor shall install a temporary 2 inch brass blow off for flushing and sampling on the existing and/or new water main. The blow off shall be constructed with a standard 2 inch tapping saddle and Ford brass corporation stop with 2 inch brass pipe extended up to finished grade. When flushing and sampling are completed the 2 inch pipe shall be removed. The corporation stop shall be shut off and capped with threaded brass cap.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connections to the existing mains.

No tap shall be made to an existing main on a Friday without Public Works approval.

**A City representative shall be present throughout the entire connection or tapping procedure.**



PO Box 3400  
 Lacey, WA 98509-3400  
 (360) 491-5600

**Verification of Disinfected Equipment**

Warning: The City of Lacey maintains a chlorinated public water supply. Care shall be taken to reduce the risk of contamination.

Date:		City Representative:	
Location:			Size:
Project Name:		Public Works File Number:	
Type of Connection Being Made Check One: <input type="checkbox"/> Connection/extension <input type="checkbox"/> Tap <input type="checkbox"/> Cut-in			
Contractor or Tapping Company Information Name: _____ Address: _____			
City:		State:	Zip:
Phone Number: _____ (    ) _____			
Contractor: _____			

Only tapping machines equipped with a “flow-through” release bib shall be allowed.

The contractor listed above hereby certifies that the equipment being used to tap or cut into the City of Lacey’s public water supply has been properly disinfected. The contractor listed above also certifies that this equipment, including blades, has only and solely been used on a potable water supply.

Print Name: \_\_\_\_\_

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

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### 6.050 Service Interruption

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins, live taps and extensions. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected by the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

### 6.060 Hydrants

- A. Existing hydrants within the construction project shall be upgraded to current standards or replaced as determined by the City.
- B. The minimum lead from the service main to the fire hydrant shall be three (3) feet as specified on detail.
- C. Fire hydrants shall have two, 2-1/2 inch outlets and one 4-1/2 inch pumper port outlet fitted with a 5 inch Storz adapter. All port threads shall be National Standard thread. The hydrant operating nut shall always open counter-clockwise. The valve opening shall be 5-1/4 inch diameter. The hydrant shall have a positive and automatic barrel drain. Hydrant shall be of the "safety" or break-away style.
- D. Hydrant leads shall not exceed 60 feet. If a hydrant is required 60 feet or more from the main, the main shall be extended, a tee shall be installed and the hydrant lead shall commence from the second tee. The lead from the service main to the fire hydrant up to 17 feet shall be restrained mechanical joint. For installations exceeding 19 feet, either restrained mechanical joint or field lock gaskets shall be required. Hydrant extensions shall use restrained joints from the main to the hydrant.

Approved hydrants are as shown on the hydrant detail. All hydrants shall be bagged by the contractor until system is approved.

- E. The Department of Public Works and City of Lacey Fire Code Official work together to insure that adequate hydrant spacing and installation are achieved.

Unless otherwise required by the City of Lacey, the following guidelines shall apply for hydrant number and location:

1. On arterials or boulevards, hydrants may be required on both sides of the roadway as determined by the Director of Public Works.
2. At least one hydrant shall be installed at all intersections.

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3. Hydrant spacing of 330 feet shall be required in all areas except single family and duplex residential areas.
  4. Hydrant spacing of 660 feet shall be required for single family and duplex residential areas.
  5. A hydrant shall be located at the end of all mains six inches or larger if the end of the line is more than 200 feet from the previous hydrant.
  6. Hydrants located in cul-de-sac or dead end areas which, either by design, topographic or manmade feature, prohibit straight line distance measurement, shall be located to serve no more than 120,000 square feet or have a maximum travel distance of 330 feet. Where a cul-de-sac or dead end exceeds 330 feet, a hydrant shall be required.
  7. When any portion of a proposed commercial building is in excess of 400 feet from a fire hydrant on a public street, on-site hydrants may be required by City of Lacey Fire Code Official. Such hydrants shall be located per City of Lacey Fire Code Official and easements for such hydrants shall be granted to the City.
  8. An additional fire hydrant may be required at a commercial, institutional, industrial, or converted business if an existing structure is enlarged, altered, repaired, or moved when the floor area exceeds 500 square feet and/or when structural additions, alterations and/or repairs to any portion of an existing structure within any 12 month period exceeds 25 percent of the value of the structure over 500 square feet.
  9. Buildings or structures having a water flow requirement of 1,500 gpm or more shall be supplied by adequately sized and looped water mains around the building with hydrants spaced per the International Fire Code. Sizing and looping of water mains will be confirmed by the City using water modeling.
  10. Hydrants shall be a minimum 40 feet from any commercial or industrial building.
  11. A two-way, blue reflective hydrant marker per the striping detail shall be required perpendicular to each hydrant. Hydrant markers shall be placed four inches from the centerline on the same side of the road as the hydrant. The installation and payment of the two-way blue Raised Pavement Markers shall be the responsibility of the owner and/or contractor.
  12. For additional hydrant installation requirements, see Section 14.07, International Fire Code of the Lacey Municipal Code.

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A scaled down plan view of the proposed water system shall be included on the plans. The scale shall be appropriate to show the entire proposed system. This plan view shall show the location of all the proposed hydrants plus the location of the appropriate existing hydrants adjoining the project. If the project only includes the addition of one or two new hydrants, the locations of at least 3 existing hydrants in the project vicinity need to be shown on the plan view.

- F. Fire hydrants shall be set as shown on the hydrant detail.
- G. For requirements regarding use, size and location of a fire department connection (FDC) and/or post indicator valve contact City of Lacey Fire Code Official. Location of FDC shall be shown on water plans.
- H. Where needed, the Department of Public Works or City of Lacey Fire Code Official may require hydrants to be protected by two or more bollards. See detail and per IFC section 508.5.6. The unobstructed area around the hydrant shall be five (5) feet.
- I. Fire hydrants meeting required fire flow must be installed, tested, and accepted prior to the issuance of a building permit.

#### 6.062 Hydrant Meters

Hydrant meters may be obtained by completing the required paperwork with Public Works at the Maintenance Service Center (1200 College St SE). A deposit is required. Once the deposit is made, the meter may be picked up by the applicant. . A rental fee, water usage and utility tax are billed on a monthly basis. Also, any damages incurred and final billing are assessed upon returning the meter to the Maintenance Service Center. Those fees are subtracted from the deposit paid and a refund check is mailed to the applicant.

The contractor shall insure that measures to prevent backflow, cross connections and contamination of the City system comply with AWWA standards.

All water distributed through hydrant meters is considered to be at high risk of contamination due to cross-connection, means of backflow prevention are required.

When using a hydrant meter to fill a tanker truck or portable tank of any kind, an approved permanently installed air gap of at least two times the inside diameter of the fill pipe is required. See detail. Any air gap on tanker trucks or portable tanks used within the City of Lacey water system must be inspected annually by a certified Backflow Assembly Tester (BAT) and a typical backflow prevention test report submitted to the Lacey Cross-Connection Specialist.

Water distributed through a hydrant meter for uses other than tank filling shall be protected from backflow and isolated from the potable water system with an approved Double Check Valve Assembly (DCVA). In circumstances where a High Health Cross Connection Hazard exists, an RPBA shall be required as directed by the City of Lacey.

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Whenever a mechanical means of backflow protection is required (RPBA or DCVA), the contractor shall insure that the assembly is tested by a certified BAT immediately upon installation. Along with the testing, a test report must be submitted to the City of Lacey Public Works Department. A Backflow Prevention Assembly certification tag must be affixed to the hydrant meter while in use.

See section 6.110 Backflow Prevention for additional information on backflow prevention assemblies and their installation requirements.

#### 6.065 Fire Sprinkler Underground Line

For general layout of fire sprinkler underground piping, valves and fixtures, see details. All components of the underground sprinkler system beyond the City isolation valve are the property and responsibility of the facility owner.

In no instance shall domestic or irrigation service connections be made to the fire sprinkler underground piping.

The fire sprinkler underground piping shall not be pressure tested until the distribution main up to the City isolation valve has been tested and approved by Lacey Public Works.

Fire sprinkler underground piping shall be installed and approved in accordance with N.F.P.A. 24 standards. The City of Lacey Fire Code Official will witness testing of the fire sprinkler underground piping and approve the contractor's materials and testing certificate for installation of the underground piping.

The fire sprinkler piping from the City isolation valve to the backflow prevention assembly shall be hydrostatically tested at 225 psi for 15 minutes and flushed.

A Reduced Pressure Detector Assembly (RPDA) shall be used to isolate fire sprinkler systems that inject chemical foam or other fire retardant.

A Double Check Detector Assembly (DCDA) shall be used to isolate fire sprinkler systems that are not designed with the ability to inject chemical foam or other fire retardant.

When a portion of a fire sprinkler system is charged with a chemical to prevent freeze damage, that portion shall be independently isolated with a Reduced Pressure Backflow Assembly (RPBA).

When the DCDA is installed in a vault, drainage and/or other means of water removal must be provided to insure the valve will not become submerged.

When the DCDA is installed in a vault outside the facility, the Fire Sprinkler Underground contractor shall insure the assembly is tested and functioning properly. The satisfactory test and documentation must be performed by a

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Washington State Certified BAT and submitted to the Lacey Cross-Connection Specialist prior to Certificate of Occupancy.

The City isolation valve shall not be permanently opened before all testing has been satisfactorily completed.

See section 6.110, Backflow Prevention, for additional information on DCDA and RPDA installation requirements.

#### 6.070 Valves

All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. **All existing valves shall be operated by City employees only.**

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. There shall be three valves on each tee (excluding hydrant tees) and four valves on each cross. Valves installed with tees and crosses shall be flanged together. All valves shall open counter-clockwise. Additional valves and valve spacing may be required by the City during plan review.

- A. Gate Valves, 2 inch to 16 inch: The design, materials and workmanship of all gate valves shall be Ductile Iron Body resilient wedge valves conforming to AWWA C515 latest revision. Gate valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Kennedy, EJ Flowmaster, Clow, Waterous Series 2500 or American AVK.
- B. Butterfly Valves: Butterfly valves shall only be permitted under special circumstances as determined during review by the Director of Public Works. Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body, O-ring stem seals, geared operator designed for underground installation, and a 2 inch square operating nut. Butterfly valves shall be Mueller, Linseal III, Kennedy, M & H, Pratt Groundhog, or Allis Chalmers.
- C. Valve Box: All valves shall have a standard EJ or an Olympic Foundry VB-950 water valve box set to grade with a 6 inch ASTM 3034 SDR 35 PVC riser from valve to within 4 to 6 inches of valve box top. Valve boxes and lids shall be manufactured in the United States of America and stamped accordingly. If valves are not set in paved area, a concrete pad shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See detail.
- D. Valve marker Post: Valve marker posts shall be 4 inch x 4 inch reinforced concrete or schedule 40 steel posts 5 feet long stamped with "W" and distance to valve in blue. Post shall be painted with 1 base coat and 2 coats white oil base enamel. The need for valve marker posts will be determined during plan review. See detail.

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#### 6.075 Bend Markers

When the direction of the main changes due to a bend, bend markers are required when water lines are located within an easement outside the right-of-way. See bend marker details.

#### 6.080 Casing

The casing shall be as follows: one quarter inch steel casing pipe or ductile iron class 52. In special cases C-900 DR 14 PVC pipe may be allowed. Casing spacers and end seals are required. A minimum of three sets of spacers are required per 20 feet of pipe. Spacers shall be as manufactured by Uni-Flange®, Calpico Inc. or approved equal. No more than one inch of clearance between the top of the casing and to top of the spacer is allowed.

The joints of the transmission pipe within the casing pipe shall be restrained with a Restrained Casing Spacer made by Uni-Flange®, or if using Calpico Inc. insulators, the pipe joints shall be restrained with a restraint system approved by the City of Lacey. Restrained joints shall be required on the transmission line one pipe length past either end of the casing pipe. Additional restraints may be required by the City.

#### 6.090 Air and Vacuum Release Valve

Air and vacuum release valves (ARV) shall be installed on the same side of the street (water north & east) as the main, behind the sidewalk on the property corner (residential applications). For mains up to 12 inches diameter ARV's shall be as shown on the detail. The engineer shall size the ARV for mains 14 inches diameter and larger.

ARV's must be installed so as not to create a cross connection situation. Measures to prevent backflow, cross connections, and contamination of the City system shall comply with AWWA standards.

The installation shall be set at the high point of the line when required. ARV's shall not be installed in areas subject to high ground water or flooding. Where possible, pipes are to be graded to prevent the need for an air release valve.

The ARV unit shall be insulated to keep the unit from freezing during the winter months. Requirements for insulation shall be per the detail.

#### 6.095 Brass

All brass pipe and fittings shall be manufactured in the United States of America and comply with public law 111-380 (reduction of lead in Drinking Water Act). Imported brass pipe and fittings shall not be permitted.

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### 6.100 Blow-off Assembly

For water mains less than 6 inches in diameter a blow-off shall be located at the end of the main. The blow-off assembly shall be as shown on the details at the end of this Chapter. The pressure rating for blow-off assemblies shall be 200 psi. If located in cul-de-sacs, the blow-off assembly shall be placed as shown on the detail. See Chapter 6.060 for hydrant requirements at the end of 6 inch and larger mains.

### 6.110 Backflow Prevention

#### A. General

Real or potential unprotected cross-connection with the City of Lacey water system shall be prohibited under all circumstances. To protect the Lacey water system from any real or potential cross-connection, the City requires either an approved air gap or an approved, testable mechanical backflow prevention assembly.

The installation of appropriate and approved backflow prevention assemblies is required by WAC 240-290-490 and LMC 13.48.070 to protect the City of Lacey's water system from possible contamination. All water system connections to serve newly constructed and existing buildings or properties with domestic potable water, fire sprinkler systems or irrigation systems shall comply with the minimum cross-connection and backflow prevention requirements as established by the Washington State Department of Health (DOH), the American Water Works Association (AWWA), the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research and the City of Lacey's Cross Connection & Backflow Prevention Manual.

Any customer with a real or potential cross-connection as determined by the City of Lacey shall be required to install an approved backflow prevention assembly commensurate with the degree of hazard and hydraulic conditions. Failure on the part of any customer to abide by these standards to properly protect the City of Lacey water system from contamination is sufficient cause for the immediate termination of water service to the premises.

#### B. Definitions Related to Cross Connection Control and Backflow Prevention

“Air Gap” – A physical separation between the free flowing discharge end of a potable water supply pipeline and an open or not-pressurized receiving vessel. An approved air gap shall be at least twice the inside diameter of the supply pipe measured vertically above the overflow rim of the receiving vessel. A minimum one inch air gap is required.

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“Authority Having Jurisdiction” – (formerly known as the Local Administrative Authority) the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted under chapter 19.27 RCW. (City of Lacey water is distributed under two jurisdictions; the City of Lacey Community Development Department and the Thurston County Development Services Department).

“Atmospheric Vacuum Breaker (AVB): -- An un-testable backflow prevention device designed to isolate a Low Cross-Connection Hazard, and protect against back-siphonage only. AVB’s shall be installed only in a vertical orientation at least 6 inches above all downstream piping. A control valve shall not be installed on the downstream side of an AVB. An AVB shall not be pressurized for more than 12 hours in any 24 hour period.

“Backflow” -- The undesirable reversal of flow due to either backpressure or back-siphonage of water or water mixed with other substances through a cross connection into the potable drinking water system.

“Backflow Assembly Tester (BAT)” -- A person holding a valid BAT certificate issued in accordance with chapter 246-292 WAC (water works operator certification).

“Backflow Prevention Assembly (BPA)” -- A testable mechanical backflow preventer relied upon by the purveyor for the protection of a public water system. Any RPBA, RPDA, DCVA, DCDA, PVBA, or SVBA of make, model, and size that is approved by the Washington state DOH for protecting a public water system from contamination due to backflow. Any BPA installed to protect the Lacey water system must be listed on the Washington State Department of Health “Backflow Prevention Assemblies Approved for Installation in Washington State” list.

“Backpressure” – Any elevation of pressure in the downstream piping system (by pump, elevation of piping, steam pressure, air pressure, etc) above the supply pressure at the point of consideration, which would cause or tend to cause a reversal of the normal direction of flow.

“Back-siphonage” – A form of backflow due to a reduction in system pressure which causes a sub-atmospheric pressure to exist in the water system. Most commonly caused by abnormally high usage, as experienced during fire suppression or during main line water breaks.

“Commercial” – For purposes of administering the cross-connection control regulations, any facility other than single family and duplex residential housing is considered to be commercial.

“Cross Connection” -- Any actual or potential physical connection between a public water system or the consumer’s water system and any source of liquid, solid or gas that could contaminate the potable supply by backflow.

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“Cross-Connection Specialist” – A person who is certified by the Washington State Department of Health to administer a cross-connection control program and to conduct cross-connection hazard surveys.

“Degree of Hazard” – For purposes administering the cross-connection control regulation, the degree of hazard posed by a potential contaminant can be defined by one of three categories. See the definitions of Low Cross-Connection Hazard, High Health Cross-connection Hazard, and Severe Cross-Connection Hazard for details.

“Double Check Valve Assembly (DCVA)” -- A BPA composed of two independently acting, check valves, tightly closing shut-off valves at each end and four test cocks located to facilitate testing. This BPA is designed to protect against a Low Cross-Connection Hazard and protects against both back-siphonage and backpressure..

“Double Check Detector Assembly (DCDA)” -- A specially designed BPA composed of a line sized approved double check valve assembly with a factory installed bypass “detector” water meter and a bypass sized approved double check valve assembly. This BPA is designed for use on fire protection services rated as a Low Cross-connection Hazard, (no chemical addition) and protect against both backsiphonage and backpressure.

“High Health Cross-Connection Hazard” -- A cross-connection involving any substance that could impair the quality of potable water and create an actual public health hazard through injury, poisoning, or spread of disease.

“Fixture Isolation or In-Premise Isolation” -- A method of preventing cross-connection contamination an approved air gap or approved BPA or other backflow prevention device within the property lines of the consumer’s premises at, or near, the point of hazard.

“Low Cross-Connection Hazard” -- A cross-connection that could impair the quality of potable water to a degree that does not create a hazard to public health but does adversely and unreasonably affect the aesthetic qualities of potable water for domestic use.

“Potable” – Water suitable for drinking by the public.

“Premises Isolation” -- A method of preventing cross-connection contamination by installing an approved air gap or approved BPA at or near the service connection to isolate the consumer’s entire water system from the public water system.

“Pressure Vacuum Breaker Assembly (PVBA)” – A BPA composed of an independently operating loaded check valve, an independently operating loaded air inlet valve, two test cocks located to facilitate testing and tightly closed shut-off valves at each end. A PVBA shall only be installed in a

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vertical orientation a minimum of 12 inches above the highest downstream piping. A PVBA is designed to isolate a Low Cross-Connection Hazard and protect against back-siphonage only.

“Public Water System” – For the purposes of these standards this refers to the City of Lacey water system.

“Reduced Pressure Backflow Assembly (RPBA)” -- A BPA composed of two independently acting check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves. The assembly shall include tightly closing shut off valves at each end and four test cocks located to facilitate testing. This BPA is designed to protect against a High Health Cross-Connection Hazard and protects against both back-siphonage and backpressure.

“Reduced Pressure Detector Assembly (RPDA)” -- A specially designed BPA composed of a line-size approved reduced pressure backflow assembly with a factory installed bypass “detector” water meter and a bypass sized approved reduced pressure backflow assembly. This BPA is designed for use on fire protection services rated as a High Health Cross-Connection Hazard (with chemical addition) and protect against both back-siphonage and backpressure.

“Severe Health Cross-Connection Hazard” – A cross-connection which could impair the quality of potable water and create an immediate severe public health hazard through poisoning or spread of disease by contaminants, from radioactive material processing plants, nuclear reactors, or wastewater treatment plants.

“Spill Resistant Vacuum Breaker (SVBA)” – A BPA composed of a loaded check valve and a loaded air inlet valve opening to atmosphere on the discharge side of the check valve, including tightly closing shut-off valves at each end, one test cock and one vent valve located to facilitate testing. A SVBA shall only be installed in a vertical configuration a minimum of 12 inches above the highest downstream piping. This BPA is designed to isolate a Low Cross-Connection Hazard and protects against backsiphonage only.

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“Unapproved Auxiliary Water Supply” -- A source of water (other than the City of Lacey water system) on or available to the consumer’s premises that is either not approved for human consumption by the Washington State Department of Health or the Thurston County Department of Health, or is not otherwise acceptable to the City of Lacey.

“Uniform Plumbing Code” -- The code adopted under RCW 19.27.031(4) and amended under chapter 51-46 WAC. This code establishes statewide minimum plumbing standards applicable within the property lines of the consumer’s premises.

### C. Design and Selection Criteria

Any customer with a recognized real or potential cross-connection shall be required to install an appropriate BPA commensurate with the degree of hazard (Sever, High or Low), and the hydraulic conditions (backpressure or back-siphonage) found at the site.

Any required BPA shall be installed at the expense of the property owner or user. It shall occur either at the service connection (Premise Isolation) or within the premises (Fixture Isolation).

Any facility with a “Severe Health Cross-Connection Hazard must be isolated from the City of Lacey water system with an RPBA installed as Premise Isolation used in combination with an approved air gap.

Any “High Health Cross-Connection Hazard” must be isolated from the City of Lacey water system with an approved RPBA or RPDA.

Any “Low Cross-Connection Hazard” must be isolated from the City of Lacey water system with an approved BPA, most commonly a DCVA.

When a 2 inch or larger backflow prevention assembly is required, plans must be submitted to the City of Lacey Public Works Department for review and approval prior to installation.

When a PVBA or SVBA is called for, plans must be submitted to the City of Lacey Public Works Department for review and approval prior to installation.

Situations where a RPBA or RPDA are required as Premise Isolation include, but are not limited to:

- If the newly constructed building or facility is for commercial purposes.
- Whenever a significant change of use or tenant improvement occurs and a building permit is issued for an existing commercial building.

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- Any new or pre-existing facility that is listed in WAC 246-290-490, Table #9 shall be isolated at the service connection, or an alternative location agreed upon in advance by the City of Lacey Cross-Connection specialist.
  - If the nature and extent of any activity on a premises, the materials used in connection with any activity of a premises, or the materials stored on the premises, could in any way contaminate or pollute the City of Lacey water supply.
  - When existing internal cross-connections are not correctable, or intricate plumbing arrangements make it impractical to ascertain whether or not a cross-connection exists.
  - If entry is restricted such that inspections for cross-connections cannot be made in a timely manner when requested.
  - If materials of toxic, objectionable or hazardous nature, either liquids, solids or gases are being used such that, if backsiphonage or back pressure should occur, a health hazard could result.
  - On any mobile or temporary apparatus that connects to or takes water from the City of Lacey water system by way of a fire hydrant or other temporary water connection.
  - When an in-ground permanently plumbed irrigation system is used to distribute fertilized or other toxic materials.
  - When a fire sprinkler system is installed with a chemical fire retardant injection feature or a freeze protection system that includes chemical addition.
  - Whenever any unapproved auxiliary water supply is present or available for use on the premise.

#### D. Installation Standards

- Any BPA installed to protect the Lacey water system must be selected and installed in full compliance with all relevant aspects of WAC 246-290-490.
- Any BPA must be installed in full compliance with all relevant aspects of the uniform plumbing code (UPC).
- Premise Isolation Assemblies must be installed at the point of water delivery, before any branch in the line, downstream of any premise pressure reducing valve, in a location approved by a City of Lacey Cross-Connection Specialist.

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- BPA's shall never be submerged in water, or installed in any area subject to flooding. If installed in a vault or irrigation box, adequate drainage shall be provided.
  - Assemblies must be protected from freezing and other severe weather conditions.
  - If an assembly is to be vertically oriented, the type and model specified shall be approved by the Washington State DOH for vertical installation.
  - All assemblies require a minimum clearance for routine maintenance and testing. Assemblies 2 inches and smaller shall have a least 6 inches clearance on all sides of the assembly. All assemblies larger than 2 inches shall have a minimum clearance of 12 inches on the back side, 24 inches on the test cock side, and 12 inches below the assembly. All RPBA's shall have at least 12 inches clearance below the drain opening.
  - All BPA's shall be installed in a manner that facilitates routine maintenance and testing. Both shut-off valves and all four test cocks shall be operable and accessible.
  - Any vault containing a BPA shall have a bore sighted drain to daylight. In locations where a drain to daylight is not possible, a float switch activated sump pump shall be installed.
  - An RPBA may only be installed in a below ground vault if a bore sighted drain to daylight capable of handling the full rated relief valve flow is installed for drainage purposes.
  - All BPA's shall be suitably supported and braced to prevent movement or strain.
  - The piping and fittings on the inlet side of the BPA shall be rigid brass, copper or schedule 80 PVC. Galvanized piping or fittings shall not be allowed.
  - Field modifications that affect the functioning or ability to test and maintain BPA's are not allowed.
  - When trap primers are required in buildings, an air gap (as defined in section B) is required between the City of Lacey water supply and the sewer connection.
  - When a RPBA is located inside a building or structure, it shall be installed in a location where the occasional spitting from the relief valve and the possible constant discharge in the event of a fouled check valve will not be objectionable. An approved air gap funnel

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assembly, provided by the manufacturer or fabricated for the specific installation, may be installed to handle the occasional spitting of the relief valve due to pressure fluctuations. A line from the funnel assembly may be run to an adequately sized floor drain of equal or greater size. Drains shall be sized to carry the full-rated flow of the assembly. Check with the manufacturer for the relief valve discharge rates to determine the size of drain.

- Any backflow assembly installed more than 5 feet above floor or ground level must have a permanent, solidly constructed platform under it to provide safe access for testing and maintenance. The platform must comply with all applicable safety standards and codes.
- Assemblies may not be installed above electrical panels or motors.
- The access to a BPA located inside a building or structure must have minimum accessible entrance of three feet wide by five feet high. There shall be no obstacles or structures interfering with these dimensions that may prevent access to the assembly.

#### E. Inspection and Testing

All newly installed BPA's must be inspected and the installation approved by a City of Lacey Cross-Connection Specialist. Following the inspection the BPA must be satisfactorily tested by a certified Backflow Assembly Tester. The BPA test results must be submitted to the Lacey Public Works Department prior to receiving Lacey Public Works final approval and/or Certificate of Occupancy.

A list of certified backflow assembly testers (BAT's) who have registered with the City of Lacey Public Works Department and are in good standing, is available upon request. To be included on the list, the tester shall hold a current Washington State Department of Health Backflow Assembly Tester (BAT) Certification, a City of Lacey business license, and possess documentation that confirms their test gauge has been properly calibrated within the preceding 12 months.

Any BAT who knowingly submits false documents or a false test report shall be removed from the City's list of BAT's in good standing. If the City determines the false report was malicious and/or could have resulted in illness or death, a report will be made to the Washington State Department of Health.

All BPA's must be tested on an annual basis and whenever repaired or relocated, to insure proper operation. Any BPA's found not functioning properly shall be promptly repaired or replaced by the owner or user. If any such assembly is not promptly repaired or replaced, the City may deny or discontinue water service to the premise until the correction is made. Following repair or replacement, the BPA shall be re-tested to insure proper

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functioning. All testing and repairs are the financial responsibility of the property owner or user. The results of any testing shall be submitted to the City of Lacey Public Works Department.

Existing backflow assemblies that are no longer on the DOH approved list of assemblies will be allowed to remain in service provided they pass the annual testing requirements. Backflow assemblies that are no longer approved and do not pass the required testing shall be replaced with a currently approved assembly commensurate with the degree of hazard.

The City of Lacey has the authority to perform regular inspections on all backflow assemblies used to protect the Lacey water system and shall be provided reasonable access to the premises for inspection purposes. If reasonable access cannot be provided, a reduced pressure backflow assembly must be installed at the owner/user's expense, at the service connection to that premises.

Please refer to section 6.062 for additional information regarding backflow protection when using a hydrant meter to fill portable or truck mounted tanks, or for temporary use at construction or other sites.

Please refer to section 6.065 for additional information regarding backflow protection for fire sprinkler systems.

Please refer to section 6.210 for additional information regarding backflow protection for irrigation sprinkler systems.

#### 6.120 Service Connection

- A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. Services shall not be connected to a hydrant lead, the extendable section for a future main or the sprinkler underground line. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after the system is inspected and approved. The use of construction bibs or "cheaters" is prohibited.
- B. When water is desired to a parcel fronting an existing main but not served by an existing setter, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the meter, box, and setter. If the main is on the opposite side of the road from the parcel needing service, it shall be the developer's responsibility to provide a casing under the roadway. The contractor installing the casing shall coordinate with the City of Lacey for depth location and size of casing. Each end of the casing shall be capped and marked. The minimum casing size shall be 4 inch polyethylene. For larger casing requirements refer to Chapter 6.080.

When water service connection is required to also serve as a residential fire service, the developer or applicant must submit fire flow calculations and

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requirements to the City for review and approval. Additional fees may be required for upgrading of an existing water service to a residential fire service. Typical design for a residential fire system will be a flow through system for water quality purposes.

Service taps larger than 2 inches, connecting to an existing main, shall be made by the contractor per Chapter 6.040. Service taps that require crossing an arterial street in excess of two lane widths shall be made by the contractor. These types of services shall be denoted on the plans.

Domestic or irrigation meters 3 inch or larger in size must be ordered through the City by the contractor/developer 10 weeks in advance of the installation date.

A casing is required when a new service is to be connected to an existing water main and it crosses the centerline of the roadway. The applicant is responsible for this work. Outside of the Lacey City limits, contact Thurston County for the required right-of-way permit(s) and restoration requirements, if any. If Thurston County allows trenching, a casing shall be required.

- C. Service lines shall be as specified herein. No glued joints will be accepted. Service lines shall be installed perpendicular to and  $22\frac{1}{2}^{\circ}$  above horizontal of the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines. When connecting to an existing system where the roadway cannot be cut, a casing shall be required.

One and one-half to two inch diameter service lines shall be NSF Approved, PE3408 blue polyethylene pipe manufactured from virgin materials. Pipe shall meet the following specifications:

- ANSI/AWWA C901
- ASTM D1248, ASTM D 3350, ASTM D 2239, ASTM D 3035 and ASTM D 2737,
- Pressure Class 200, SIDR - 7(Standard Inside Dimension Ration-Pressure Rated),
- Cell classification 345464C,

Pipe shall be manufactured by Interstate Plastics, Philips Driscopipe, Eagle Pacific, Superlon Plastics, U.S. Poly or approved equal.

Service saddles with stainless steel straps shall be as shown on the details or approved equal. All clamps shall have rubber gasket and iron pipe threaded outlets.

Corporation stops shall be as shown on the appropriate detail or approved equal with iron pipe threads conforming to AWWA C 800. Stainless steel inserts shall be used with pack joints and polyethylene pipe.

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- D. With the exception of public and private school sites, new installation of master meters will not be allowed.
- E. After January 1, 2007, when connection to the public water system is desired by a customer (or required by the City) connected to a well exempt from the provisions of RCW 90.44.050, the “exempt” well must be properly decommissioned per DOE standards prior to making the connection. When connection to the public water system is desired by a customer connected to an existing well that has a water right issued by the Washington Department of Ecology, a physical disconnect between the well and the public water system must be made and maintained. This is necessary to assure that an unapproved auxiliary water supply (the customer’s well) will not contaminate the City’s water supply. Provided it is in compliance with DOE setback standards and purpose of use restrictions on the customer’s water right for said well, the customer’s “permitted” well may be kept serviceable for irrigation purposes only. In addition, if a well is to be used for irrigation, an RPBA shall be required and installed as premise isolation at the public water supply service connection. If an existing well is not to be used for irrigation purposes, it must be decommissioned per DOE standards. No water meter will be installed until the RPBA is installed and a cross connection inspection has been completed to the satisfaction of the City.
- F. Lots or pads created by plats, re-plats, short plats, or binding site plans shall have a water service installed as required below.

In single family subdivisions, (including mobile home and manufactured home subdivisions) a service shall be provided to each lot or pad, including open tracts and landscaping in the right-of-way. If a domestic and an irrigation meter are desired at a particular lot or tract, additional services shall be installed.

Duplexes shall have a separate service installed for each living unit regardless of how many duplexes are on a single lot. Example: One duplex on one lot shall have two services; two duplexes on one lot shall have four services and so on. A subdivision of duplexes shall have at least one service installed at all open tracts.

Multi-family and commercial complexes shall have at least one meter installed per separate building and a separate irrigation meter(s) if an irrigation system is installed. Additional meters to a multi-family or commercial building may be installed if desired. At least one service shall be installed to provide service to the open tracts.

- G. Sample stations may be required per the City detail. The requirement for the location and type of the sample station will be determined by the City during the plan review. Sample stations shall be located behind the walk on a property line, in an open space, or in a utility easement whenever possible

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and shall generally be centrally located in the project at a low point if possible.

H. Service configuration shall be as shown on details at the end of this Chapter. Meters 3 inches and larger shall not be placed in a traffic bearing location. For services larger than 3 inches, the engineer shall submit a detail for approval that addresses the following:

- meter type (turbine, compound, etc.) and size,
- a valve shall be located on both sides of the meter,
- a lockable bypass is required,
- check valves shall be required on the bypass and the meter,
- supports (jack stands) are required under the meter and bypass,
- the vault specified shall provide an 18" clear space from the vault wall to the closest edge of the meter, valves, or pipe,
- the vault shall have a double lid with a reader lid insert,
- the distance from the top of the meter to the bottom of the lid shall be 24 inches minimum and 30 inches maximum,
- a ladder shall be provided in the vault,
- drainage must be provided for the meter pit.
- the inside depth of the vault shall not exceed four feet from the top finish grade to the inside floor elevation.

#### 6.121 Water Meter Purchasing

In an effort to eliminate unaccounted water, the use of construction bibs or other devices used to obtain water without a water meter shall not be permitted. Water meters shall be purchased and installed prior to building permit issuance.

The following requirements shall apply to projects located within the Lacey water service area.

##### Residential and Commercial Projects:

1. The installation of a domestic water meter prior to issuing the residential or commercial building permit is required. Irrigation meters must be purchased with the payment of plan check and inspection fees.
2. The Building Official will ensure a meter is in place at the time of the first inspection. Public Works Inspectors, Meter Readers and the Operations staff will report any construction bibs or connections other than City of Lacey meters as they transit construction projects. Utility Billing staff will monitor AMR (automated meters) to detect abuse/damage through the use of error reports.

##### Irrigation Meters:

1. Irrigation meters must be purchased with the payment of plan check and inspection fees.

2. Operations staff will be responsible to verify that irrigation meters are installed at the time of the walk through inspection.

General Water Meter Requirements:

1. For all projects that receive City of Lacey water, builders/developers will be billed for the cost of replacement or repair of all damaged meters.
2. When devices other than City of Lacey water meters are found in violation of City policy, violators shall be charged with a misdemeanor.
3. Any project that has received a building permit prior to the 2009 Development Guidelines approval are vested and allowed to utilize construction water (for 90 days) as previously permitted; however all are encouraged to purchase their meters at the earliest date possible.

6.125 Marking Service Lines

The location of all service lines shall be marked on the face or top of the cement concrete curb with a "W" 3 inches in height and 1/4 inch into the concrete.

6.130 Water Main/Sanitary Sewer and Reclaimed Water Crossings

The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers/reclaimed water and water mains. To accommodate crossings, the minimum cover for water main of 42 inches may be reduced to 30 inches upon approval by the City to provide for as much vertical separation as possible. When a reduced depth is allowed, ductile iron piping and/or casings may be required. See 6.080 for casing specifications. The water system shall not be intentionally designed with burial depth less than 42 inches to accommodate separation requirements.

Pressure sewers/reclaimed water shall only be installed under water lines. The vertical separation of 18 inches shall be at a minimum of 10 feet on either side of the crossing. The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or the sewer/reclaimed water service per Section 6.080.

6.140 Water Main / Sanitary Sewer / Reclaimed water in Parallel

Refer to the City of Lacey details for water main/ reclaimed water and sanitary sewer in parallel installation.

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### 6.190 Hydrostatic Tests

After the water main and appurtenances and service connections to the meter setter have been installed, filled and sterilized, the system shall be tested in sections not to exceed 1,500 feet in length. Testing requirements shall include existing water mains that are taken out of service and/or modified for development.

The tests shall be conducted under a hydrostatic pressure equal to 150 psi in excess of that under which it will operate. In no case shall the test pressure be less than 225 psi for 15 minutes. Any leaks or imperfections developing under said pressure shall be remedied by the contractor. All valves within the system shall be tested. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. The test pump shall be clean and disinfected and shall only be used on potable water supplies. Tests shall be made after all connections have been made and the roadway section is constructed to subgrade. This is to include any and all connections especially the water meter setters as shown on the plan. The contractor shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

### 6.200 Sterilization and Flushing

- A. Prior to the acceptance of the work, sterilization of water mains shall be accomplished by the contractor in accordance with the AWWA standard for disinfecting water mains. Testing and sampling shall take place after all underground utilities are installed and compaction of the trench to subgrade or finish grade is complete. The following testing requirements shall include existing water mains that are taken out of service and/or modified for development.
  1. The City inspector will open the water valves to fill the new main at the request of the contractor. The contractor shall use the appropriate chlorine testing equipment to test and verify that a minimum chlorine concentration of 50 mg/L shall be established throughout the line. The contractor shall take a minimum of three chlorine samples on any new section of main that is filled. One at each end and one sample near the middle of the new main to verify the uniform distribution of chlorine. After the main is filled, the valves shall be closed by the City inspector and the line left undisturbed for 24 hours. A minimum free chlorine residual of 10 mg/L shall remain following this period. Prior to flushing out the super chlorinated water the City will take samples to verify the 10 mg/L chlorine residual has been achieved. If the

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sample results are weak (less than 10 mg/L) or no chlorine is detected above the City's standard drinking water level the contractor shall re-chlorinate the main and repeat the 24 hour sterilization period.

2. After the main has been filled, hydrostatic pressure testing shall be conducted by the contractor in the presence of the City inspector.
  3. After the 24-hour contact time has passed, the contractor shall request that the City flush the disinfected water main. The contractor shall assist the City crew with flushing operations. The contractor shall be responsible to locate or provide an acceptable area to discharge the super chlorinated water. The contractor may be required to provide a tank truck to discharge the water into and to be hauled away to a safe disposal location approved by the City. At no time shall chlorinated water from a new main be flushed directly or indirectly into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, and any and all other waters where fish or other natural aquatic life can be expected.
  4. After the main has been thoroughly flushed, water samples shall be taken. Only City staff will close the water valves to ensure that the new section is isolated. The City inspector will request microbiological samples to be collected by City staff and samples will be collected by the City no sooner than 24 hours after flushing is completed. The valves are to remain closed until microbiological samples for all the connections are satisfactory.
- B. Subsequent action will be taken based on initial results of microbiological tests.
1. If coliform bacteria are absent in all new main samples, the City will open valves to the new and the existing system. At that time, the testing process for the new section of main shall be considered complete.
  2. If coliform bacteria are present in one new main sample, but there is absence of fecal coliforms or E. Coli., the contractor shall take action as directed by the City inspector, including re-flushing the water main. The City shall then re-sample the new main to ensure that the entire section was adequately sterilized as determined by the results of microbiological sample (s) collected following the process above.
  3. If coliform bacteria are present in more than 1 sample collected from the new section, or from a second sample collected under step B.2., or if fecal coliforms or E. Coli were detected in any of the new main samples, the City shall ensure that a microbiological sample is collected from the existing water system "upstream" of the project. If the "upstream" sample(s) indicate(s) that coliforms are present in the City water system, go to "C" below. If the "upstream" sample

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indicates an absence of coliforms in the City water system, the contractor shall re-disinfect the new mains with sodium hypochlorite solution using the continuous feed method as described in the AWWA Standard for Disinfecting Water Mains, and then proceed with steps A.1., A.2 and A.3 above. To demonstrate that the new water main was adequately sterilized, two sets of microbiological samples, collected at least 24 hours apart with no flushing in between must indicate an absence of coliform bacteria in the new main.

- C. If an “upstream” sample indicates the presence of coliform bacteria in the City water system, the City shall follow State Department of Health regulations and guidance for addressing the presence of coliforms in the distribution system. The City will calculate system compliance for coliform bacteria and take appropriate action per the City of Lacey Coliform Monitoring Plan under the supervision of the City of Lacey Water Resources Division. Follow-up actions may include, but are not limited to: identifying and correcting the likely source(s) of contamination, flushing, testing, and/or public notification. Disinfection and testing of the new main(s) shall not resume until the City water supplying the project tests free of coliforms. At that time, the contractor shall take action as directed by the City inspector, including re-flushing the water main prior to the City requesting another set of microbiological samples.

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## 6.210 Irrigation

All irrigation systems located within the public right-of-way shall be designed by a State of Washington registered landscape architect or City approved design firm. Parts lists shall be submitted with each project.

Prior to submitting the design, the contractor/engineer/landscape architect shall hire an independent Certified Landscape Irrigation Auditor, as certified by The Irrigation Association, to review and approve the proposed design.

After the irrigation system is installed, the contractor shall provide an irrigation audit to be performed on the new system by an independent Certified Landscape Irrigation Auditor (CLIA), as certified by the Irrigation Association, prior to final field observation by the Engineer. The CLIA shall test for proper coverage as determined by the Landscape Irrigation Auditor Handbook, most recent edition. The CLIA shall provide written certification that the irrigation system installed provides proper coverage as provided in the handbook.

The General Notes on the following pages are required on all plans for City operated or maintained irrigation systems or on any owner association operated or maintained irrigation systems located within the public right-of-way.

Irrigation systems shall be designed and installed with an approved backflow prevention assembly in accordance with Chapter 6.110 of this manual.

A separate irrigation meter shall be provided for each irrigation system and median. Residential irrigation may be exempt. The City Engineer shall review and approve the irrigation design. The irrigation system shall be installed after the area has been properly prepared. See Chapter 4B.125 for soil preparation requirements. The pipe trenches shall be no wider than is necessary to lay the pipe or install equipment.

Systems shall be in compliance with City of Lacey water conservation policies.

The median system shall be a completely separate system with its own separate appurtenances.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk. Spray heads shall not be used in planters less than 3 feet wide. Drip irrigation methods shall be employed in areas less than 3 feet wide to prevent overspray. Turf heads shall be placed at finished grade as measured from the top of the sprinkler. Shrub heads shall be 12 inch pop up type placed at finished grade unless otherwise specified. Drip irrigation emitters shall be installed in accordance with the manufacturer's recommendations.

Installation and maintenance of irrigation systems in roadway planter strips shall be as shown in the table below. The system owner shall be responsible for the on-going utility expenses and annual backflow prevention assembly testing.

	<b>Single Family Residential Zones</b>	<b>Multi-Family &amp; All Other Zones</b>
<b>Arterial Boulevard</b>	Developer installs, Homeowners Association maintains or a Community Facilities District may be established per LMC 3.46	Developer installs. Owner or Owners Association maintains or a Community Facilities District may be established per LMC 3.46
<b>Arterials</b>	Developer installs, Homeowners Assn. maintains. If the association doesn't maintain, a Community Facilities District may be established at the City's discretion per LMC 3.46.	Developer installs. Owner or Owners Association maintains (the City will maintain where existing covenants don't address this issue)
<b>Collectors</b>	Developer installs, Homeowners Assn. maintains	Developer installs, Owners Association maintains
<b>Residential</b>	Developer installs & Homeowners Assn. maintains	Owner installs, owner maintains

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**GENERAL NOTES (IRRIGATION SYSTEMS)**

1. It shall be the responsibility of the contractor to have a copy of an approved set of the landscaping plans signed by the Director of Public Works on the construction site at all times.
2. Temporary erosion control/water pollution measures shall be required in accordance with section 1-07.15 of the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction* and the *Drainage Design and Erosion Control Manual for Lacey*. At no time will silts and debris be allowed to drain into an existing or newly installed facility unless special provisions have been designed.
3. Electrical permits and inspections are required for all irrigation services within the City of Lacey. The contractor is responsible for obtaining permits prior to any type of actual construction. Prior to installation of any materials, the irrigation contractor shall submit for approval by the City, five copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the contractor's own risk.
4. A clearly marked service disconnect shall be provided for every automatic irrigation installation unless otherwise stated on a City approved set of plans. The location and installation of the disconnect shall conform to the National Electrical Code (NEC) and City of Lacey standards. The service disconnect shall be City approved.
5. All low voltage wire shall be a minimum size of #14 UF from each control valve to the terminal interface.
6. All low voltage splices shall be of a type equal to a Spears DS 400 or a City approved equal. All splices shall be done in valve control boxes. Direct burial splicing will not be allowed.
7. The automatic controller components shall be as specified in Chapter 6.210 section H of the Development Guidelines.
8. The City shall be given 72 hours notice prior to scheduling a shutdown. Where connections require "field verification", connection points shall be exposed by the contractor and the fittings verified 48 hours prior to distributing shut-down notices.
16. All materials specifications from Section G Material Specifications of this paragraph shall be shown on the plans.
17. A separate irrigation meter shall be provided for each irrigation system and median. Residential irrigation may be exempt. The City Engineer shall review and approve the irrigation design. The irrigation system shall be installed after the area has been properly prepared. See Chapter 4B.125 for soil preparation requirements. Pipe trenches shall be no wider than is necessary to lay the pipe or install equipment. The top 18 inches of topsoil shall be kept separate from the subsoil and shall be replaced as the top layer when backfill is made.

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18. The median system shall be a completely separate system with its own separate appurtenances for City owned medians.
  19. All irrigation lines to be installed under existing pavement or areas to be paved shall be installed within a casing. The casing shall be a minimum 4 inch diameter or twice the diameter of the encased pipe. The casing shall be steel casing (minimum schedule 40), ductile iron thickness class 52 or C900 Class DR 14 PVC pipe. The irrigation casing shall extend a minimum of 1 foot beyond the structure under which casing is being jacked or bored. Any time an irrigation line is located within the right of way, a locate wire (12 gauge U.S.E. purple coated copper wire) shall be installed. Locate wires shall originate in the DCVA box and terminate at the end of the system.
  20. Upon final acceptance of the work, the contractor shall submit two as-builts per Chapter 3.065.
  21. Privately owned sprinkler heads built along slopes in excess of 2 percent shall contain check valves.

Revised: 03/2014

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A. Layout of Irrigation System

The contractor shall stake all irrigation heads and mark all proposed trenches within the irrigation system per the approved plans prior to installing the system. Alterations in layout may be expected, i.e., to conform to ground conditions and to obtain full and adequate coverage to the landscaping. However, no alterations shall be made without prior authorization by the City.

B. Excavation

All soil shall be prepared as specified in 4B.125 prior to trenching. Trenches shall be no wider at any point than is necessary to lay pipe or install equipment. Trench bottoms shall be of relatively smooth sand 4 inches below and 6 inches above the pipe.

Detectable marking tape shall be placed in the trench 6 inches directly above, parallel to, and along the entire length of all nonmetallic water line and nonmetallic conduit. The width and depth of the tape shall be as recommended by the manufacturer or the City.

C. Piping

The irrigation main line is the line containing the supply usually situated between the irrigation meter and the irrigation control valves. The irrigation lateral lines are the lines between the irrigation control valves and the connections to the irrigation heads. Swing joints, thick walled poly pipe, flexible risers, rigid pipe risers, and associated fittings are not considered part of the lateral line but incidental components of the irrigation heads.

All water lines shall be a minimum of 18 inches below finished grade as measured from the top of the pipe. Where possible, mains and laterals or section piping shall be placed in the same trench.

All irrigation lines to be installed under existing pavement or areas to be paved, shall be installed within a minimum 4 inch diameter or twice the diameter of the encased pipe. The casing shall be steel casing (minimum schedule 40) or C900 DR 14 PVC pipe. The irrigation casing shall extend a minimum of 1 foot beyond the structure under which casing is being jacked or bored.

D. Backflow Prevention Assembly

Most irrigation systems shall be designed and installed with a DOH approved Double Check Valve Assembly (DCVA) to prevent backflow. If the irrigation system is designed with the ability to provide fertilizer or other chemical injection, or if a booster pump is required, a DOH approved Reduced Pressure Backflow Assembly (RPBA) shall be required to prevent backflow.

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Please see Chapter 6.110 for BPA installation details include clearances, freeze protection, site selection and drainage.

E. Valve and Backflow Prevention Assembly (BPA) boxes

Valve and BPA boxes shall be installed flush to grade outside of play and high vehicular and pedestrian traffic areas.

Valve and BPA boxes shall have filter fabric underlayment installed at the bottom to prevent rodent intrusion and sediment builds up.

Valve and BPA boxes shall be supported with bricks or concrete blocks as approved by the City to prevent settlement.

F. Pipe Connections

During construction, pipe ends shall be plugged or capped to prevent entry of dirt, rocks, or other debris.

PVC pipe, couplings and fittings shall be handled and installed with care and in accordance with the manufacturer's recommendation. For gasketed connections, the outside of the PVC pipe shall be chamfered to a minimum of 1/16 inch at approximately 22 degrees. For all other connections, pipe and fittings shall be joined by solvent welding. Solvents used must penetrate the surface of both pipe and fittings which will result in complete fusion at the joint. The solvent and cement shall be of a type recommended by the pipe manufacturer.

Threaded PVC joints shall be assembled using Teflon tape as recommended by the pipe manufacturer.

On plastic to metal connections, work the metal connection first. Use a non-hardening compound on threaded connections. Connections between metal and plastic are to be threaded utilizing female threaded PVC adapters with a threaded schedule 80 PVC nipple only.

Due to the tendency of excess "pipe joint compound" to foul the check valve seats on Backflow Prevention Assemblies (BPA's), only Teflon tape used in moderation may be applied to pipe connections in the vicinity of any BPA.

Due to the potential for electrolysis, galvanized nipples and fittings are not allowed in the vicinity of BPA's.

G. Electrical Wire Installation

The electrical controller shall be located in an open space or in a utility easement whenever possible.

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All control wires shall be labeled at the controller, splice boxes and at the valves in the field.

Wiring between the automatic controller and the automatic valves shall be direct burial, #14 and may share a common neutral. A minimum of two spare # 14 UF yellow wires shall be installed from the controller to the furthest valve in each direction, looping through each control valve box. There shall be a 2 foot loop left in each control valve box. Separate control conductors shall be run from the automatic controller to each valve. When more than one automatic controller is required, a separate common neutral shall be provided for each controller and the automatic valve which it controls. Wire shall be installed adjacent to or beneath the irrigation pipe. Plastic tape or nylon ty-wraps shall be used to bundle wires together at 10 foot intervals, and the wire shall be "snaked" from side to side in the trench. When necessary to run wire separate from the irrigation pipe, the wire shall be bundled and placed under detectable marking tape. When lateral pipe lines have less than 18 inches of cover, direct burial wire shall be installed below the pipe at a minimum depth of 18 inches from finished grade.

Wiring placed under pavement and walls or through walls, shall be placed in irrigation casing. See 6.210 Section C.

Splices will be permitted only at junction boxes, valve boxes, or at control equipment. A minimum of 2 feet of excess conductor wire shall be left at all splices and terminal and control valves to facilitate inspection and future splicing.

#### H. Material Specifications

As a means of keeping the City's parts inventory to a minimum and maintenance personnel familiarized and knowledgeable about product operation, the following is a list of approved products to be used on all jobs in which the City will be responsible for maintenance and operations. Requests for approved equals need to be submitted to the City of Lacey Public Works Department, Development Review section.

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**Material Specifications**

<b>Description</b>	<b>Approved Device</b>
Pop Up Spray Heads	Rainbird 1800 PRS SAM <ul style="list-style-type: none"> <li>• minimum of 6" pop up</li> <li>• installed on Toro Funny Pipe</li> </ul>
Gear Driven Rotary Heads	Hunter I-20 and I-40 Series <ul style="list-style-type: none"> <li>• installed on prefabricated O-Ring PVC Swing Joints</li> <li>• check valves on all heads</li> </ul>
Remote Control Valve and Master Valve	Weathermatic 21000DW series installed with isolation ball valve and double union. A master valve shall be installed directly after the DCVA.
Quick Coupling Valves	West Ag 4V100-R-Y or Rainbird 44RC <ul style="list-style-type: none"> <li>• installed at point of connection and at the furthest valve at the far end of the main line</li> <li>• installed on prefabricated O-Ring PVC Swing Joints</li> </ul>
Double Check Valve Assembly	Febco 850U or DOH approved equal

Description	Approved Device
Reduced Pressure Backflow Assembly	Wilkins 975XL or DOH approved equal
Flow Sensing Device	Data Industrial IR series <ul style="list-style-type: none"> <li>• installed with master control valve</li> <li>• wiring between flow sensor and irrigation controller shall be a twisted pair direct burial 2-conductor shielded 18 AWG or larger stranded copper wire with appropriate ratings for distance of run. Wire shall be a single run with no splices.</li> <li>• master control valve shall be the same valve as the remote control valve</li> </ul>
Automatic Controller (for City owned and maintained systems)	Toro Sentinel with stainless steel cabinet and full surge protection <ul style="list-style-type: none"> <li>• shall be grounded conforming to NEC specifications</li> </ul>
Valve Boxes	<ul style="list-style-type: none"> <li>• Carson 910-12B for Quick Coupler</li> <li>• Carson 1419B for remote control valve</li> <li>• Other boxes shall be sized accordingly</li> </ul>
Shut-Off Valves	Schedule 80 PVC KBI, Spears ball valve or approved equal
Drip Irrigation	Netafim check valve with Netafim disk filter and fittings

#### I. Flushing

All main supply lines shall receive two fully open flushings to remove debris that may have entered the line during construction. The first flushing shall be completed prior to installing valves or testing.

All lateral lines shall receive one full-open flushing prior to placement of sprinkler heads, emitters, and drain valves. Note, drain valves on main lines are not recommended. Quick couplers shall be installed on the downstream side at the cross connection device and at each terminus of the main line from

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the cross connection device. The flushing shall be of sufficient duration to remove any dirt and debris that have entered the lateral lines during construction.

#### J. Testing

All gauges used for testing water pressure shall be certified correct by an independent testing laboratory immediately prior to use on the project. Gauges shall be retested when ordered by the inspector.

Automatic controllers shall be tested by actual operation for a period of two weeks under normal operating conditions. Should adjustments be required, the Contractor shall do so according to the manufacturer's recommendation or under the City's direction until the operation is satisfactory to the City.

All main lines shall be purged of air and tested with a minimum static water pressure of 150 psi for 60 minutes without introduction of additional service or pumping pressure. Testing shall be done with one pressure gauge installed on the line in a location determined by the City inspector. Lines which show loss of pressure exceeding 5 psi after 60 minutes will be rejected.

All lateral lines shall be purged of air and tested in place at operating line pressure with a pressure gauge and with all fittings capped or plugged. The operating line pressure shall be maintained for 30 minutes with valves closed and without introduction of additional pressure. Lines which show leaks or loss of pressure exceeding 5 psi at the end of specified test period will be rejected.

The contractor shall correct rejected installations and retest for leaks as specified herein.

The Backflow Prevention Assembly installation shall be inspected and approved by the City of Lacey Cross-Connection Specialist prior to testing.

Following a satisfactory inspection a Washington State Certified "Backflow Assembly Tester" shall be employed by the contractor to test the backflow prevention assembly for proper functioning. If deficiencies are found, repair or replacement and retesting is required before final approval.

#### K. Backfill

Backfill shall not be started until all piping has been inspected, tested and approved by the City inspector, after which, backfilling shall be completed as soon as possible. All backfill material placed within 6 inches of the pipe shall be free of rocks, roots, or other objectionable material which might cut or otherwise damage the pipe.

Backfill from the bottom of the trench to approximately 6 inches above the pipe shall be by continuous compacting in a manner that will not damage

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pipe or wiring and shall proceed evenly on both sides of the pipe. The remainder of the backfill shall be thoroughly compacted, except that heavy equipment shall not be used within 18 inches of any pipe. The top 6 inches of the backfill shall be of topsoil material.

L. Adjusting System

Before final inspection, the contractor shall adjust and balance all sprinklers to provide adequate and uniform coverage. Spray patterns shall be balanced by adjusting individual sprinkler heads with the adjustment screws or replacing nozzles to produce a uniform pattern.

M. System Operation

The irrigation system shall be completely installed, tested and operable prior to planting unless otherwise specified in the plans or as approved by the City. The contractor shall be responsible for all maintenance, repair, and testing, inspecting and automatic operation of the system until all work is considered complete as determined by the final inspection.

N. As-Built Plans

Upon final acceptance of the work, the contractor shall submit two as-builts per Chapter 3.040 J and 3.065.

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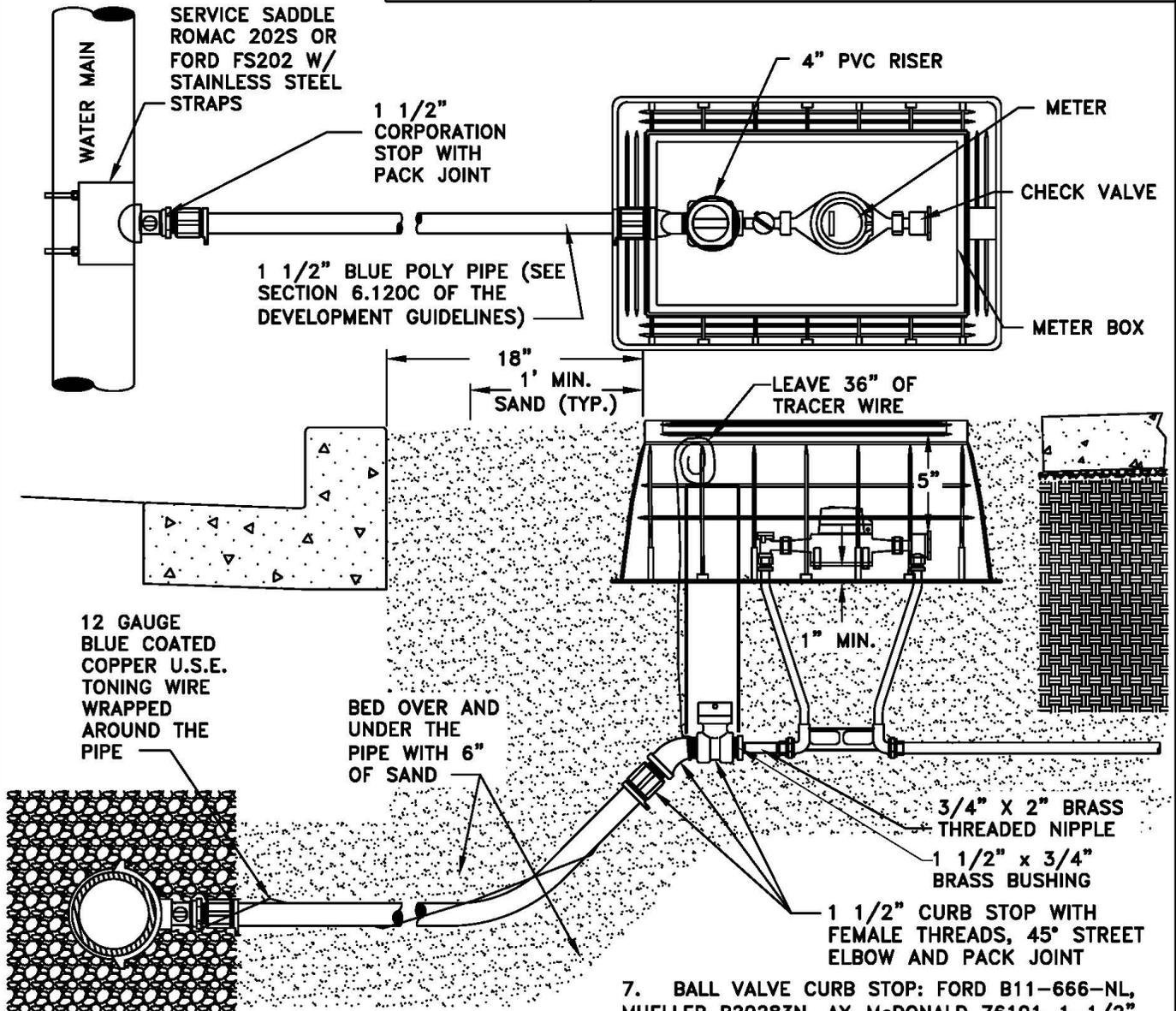
## LIST OF DRAWINGS

### CHAPTER 6 WATER

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ENVIRONMENT	METER BOX
TO BE USED IN ALL APPLICATIONS	CHRISTY FIBRELYTE BOX & LID BOX: FL 30T-12 LID: FL 30-D W/CITY OF LACEY IN LID

THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF ROAD ON THE NORTH OR EAST SIDE.



**GENERAL NOTES:**

- METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTER FOR METER BOX INSTALLATION.
- STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINT FITTINGS.
- THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
- FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
- ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.
- COPPER METER SETTERS: FORD VBH 72-15W, MUELLER B2402-R2EF15, AY-McDONALD 20-215WCDD33.

- BALL VALVE CURB STOP: FORD B11-666-NL, MUELLER B20283N, AY-McDONALD 76101-1-1/2".
- BALL VALVE CORPORATION STOP: FORD FB-1101-6G-NL, MUELLER E25029N, AY-McDONALD 74704B-33-1-1/2".

<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>5/8" SINGLE METER SERVICE</b>			
APPROVED <i>Rog A Schoenel</i> CITY ENGINEER		DWG. NO. <b>6-1</b>	
DES WHO	DWN WHO	CKD RAS	DATE 12/15/2014

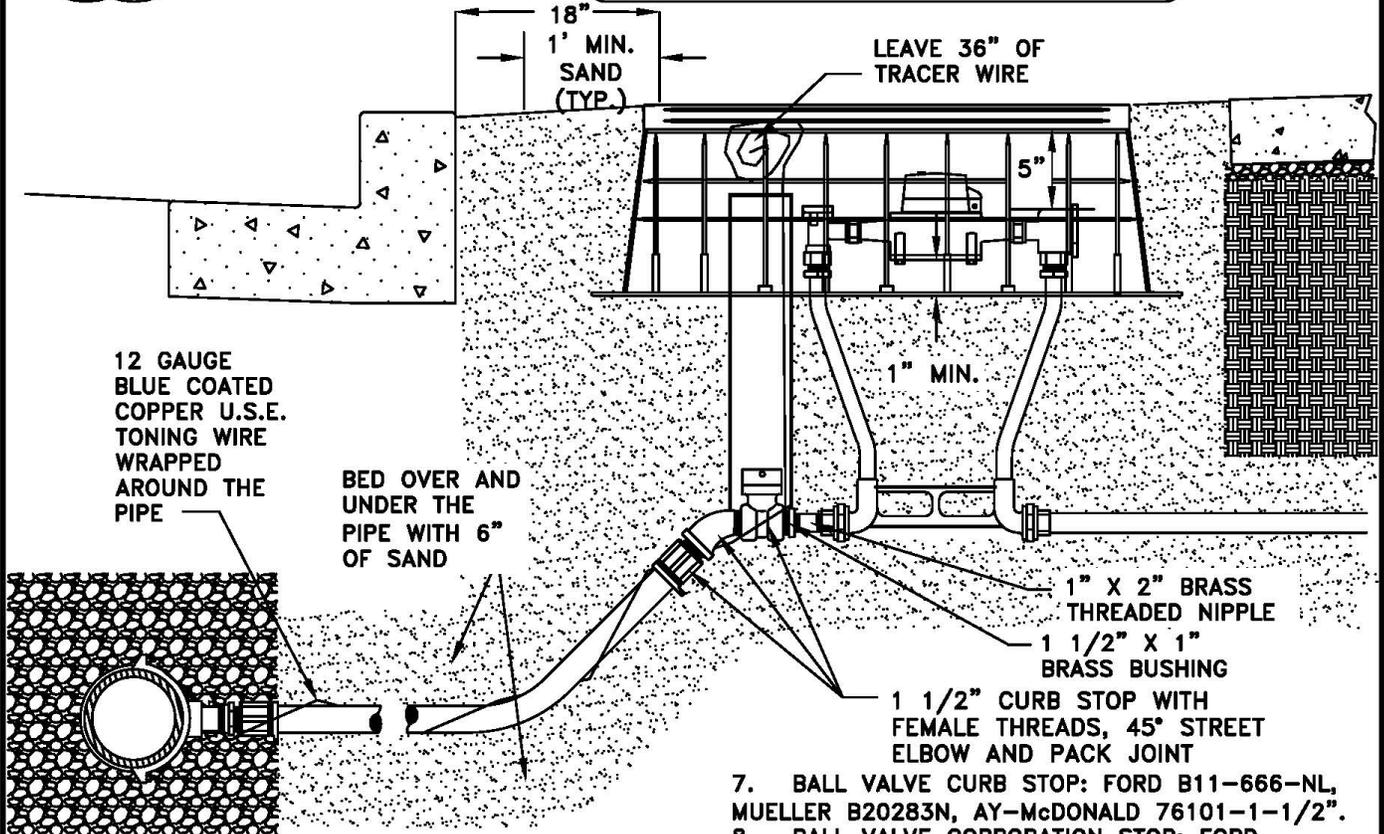
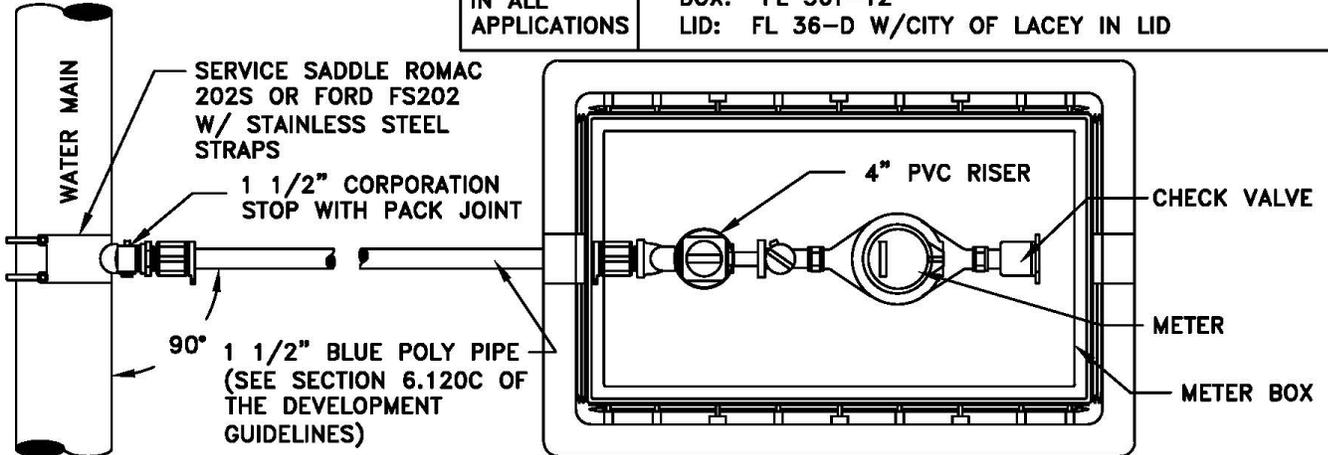
THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF ROAD ON THE NORTH OR EAST SIDE.

ENVIRONMENT

METER BOX

TO BE USED IN ALL APPLICATIONS

CHRISTY FIBRELYTE BOX & LID  
BOX: FL 36T-12  
LID: FL 36-D W/CITY OF LACEY IN LID



12 GAUGE BLUE COATED COPPER U.S.E. TONING WIRE WRAPPED AROUND THE PIPE

BED OVER AND UNDER THE PIPE WITH 6" OF SAND

- 7. BALL VALVE CURB STOP: FORD B11-666-NL, MUELLER B20283N, AY-McDONALD 76101-1-1/2".
- 8. BALL VALVE CORPORATION STOP: FORD FB-1101-6G-NL, MUELLER E25029N, AY-McDONALD 74704B-33-1-1/2".

**GENERAL NOTES:**

1. METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTERS FOR METER BOX INSTALLATION.
2. STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINTS.
3. THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
4. FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
5. ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.
6. COPPER METER SETTERS: FORD VBH 74-15W, MUELLER B2404-R2AG15, AY-McDONALD 20-412WCDD44.

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**1" SINGLE  
METER SERVICE**

APPROVED

*Reg A Schoenel*  
CITY ENGINEER

DWG. NO.

6-1.1

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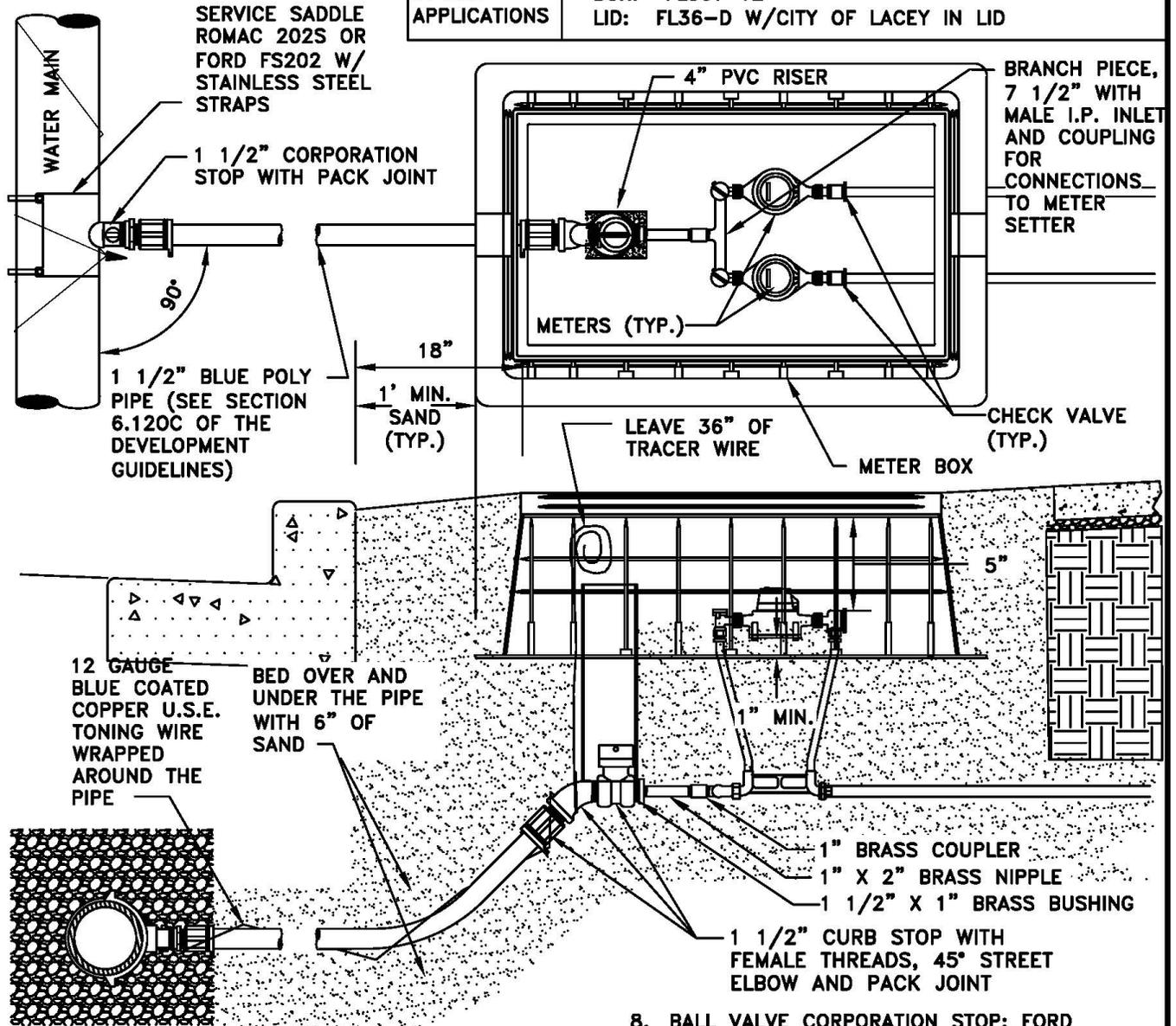
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12/15/2014

THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF THE ROAD ON THE NORTH OR EAST SIDE

ENVIRONMENT	METER BOX
TO BE USED IN ALL APPLICATIONS	CHRISTY FIBRELYTE BOX & LID BOX: FL36T-12 LID: FL36-D W/CITY OF LACEY IN LID



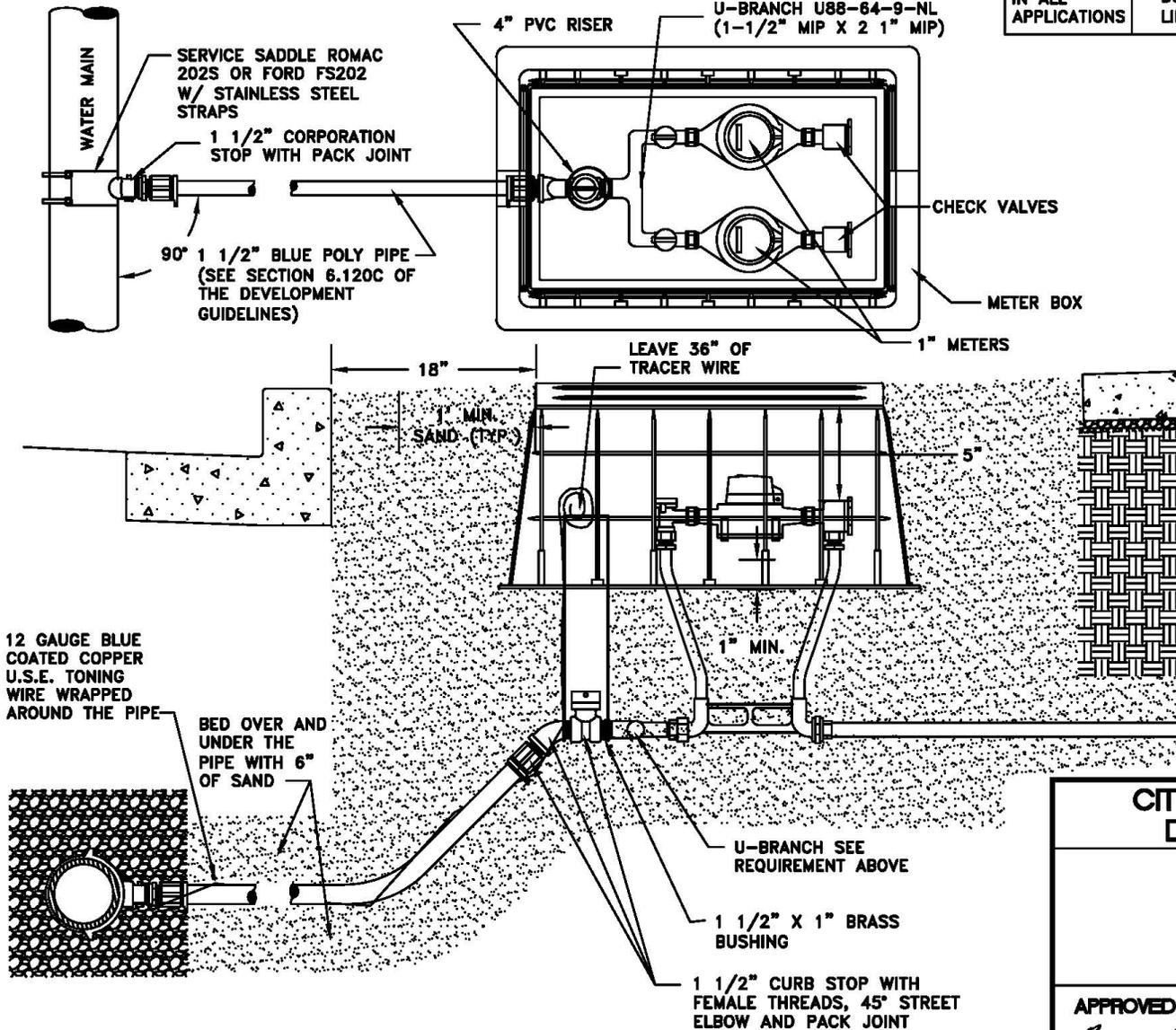
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- BALL VALVE CORPORATION STOP: FORD FB-1101-6G-NL, MUELLER E25029N, AY-McDONALD 74704B-33-1-1/2".
- U-BRANCH: FORD U-88-43-NL, MUELLER H15364, AY-McDONALD 708UMM 1" X 3/4"

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
<b>5/8" DOUBLE METER SERVICE</b>			
 GIT ENGINEER			DWG. NO. <b>6-2</b>
DES WHO	DWN WHO	CKD RAS	DATE 12/15/2014

THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF ROAD ON THE NORTH OR EAST SIDE.



ENVIRONMENT	METER BOX
TO BE USED IN ALL APPLICATIONS	CHRISTY FIBRELYTE BOX & LID BOX: FL 36T-18 LID: FL 36-D W/CITY OF LACEY IN LID

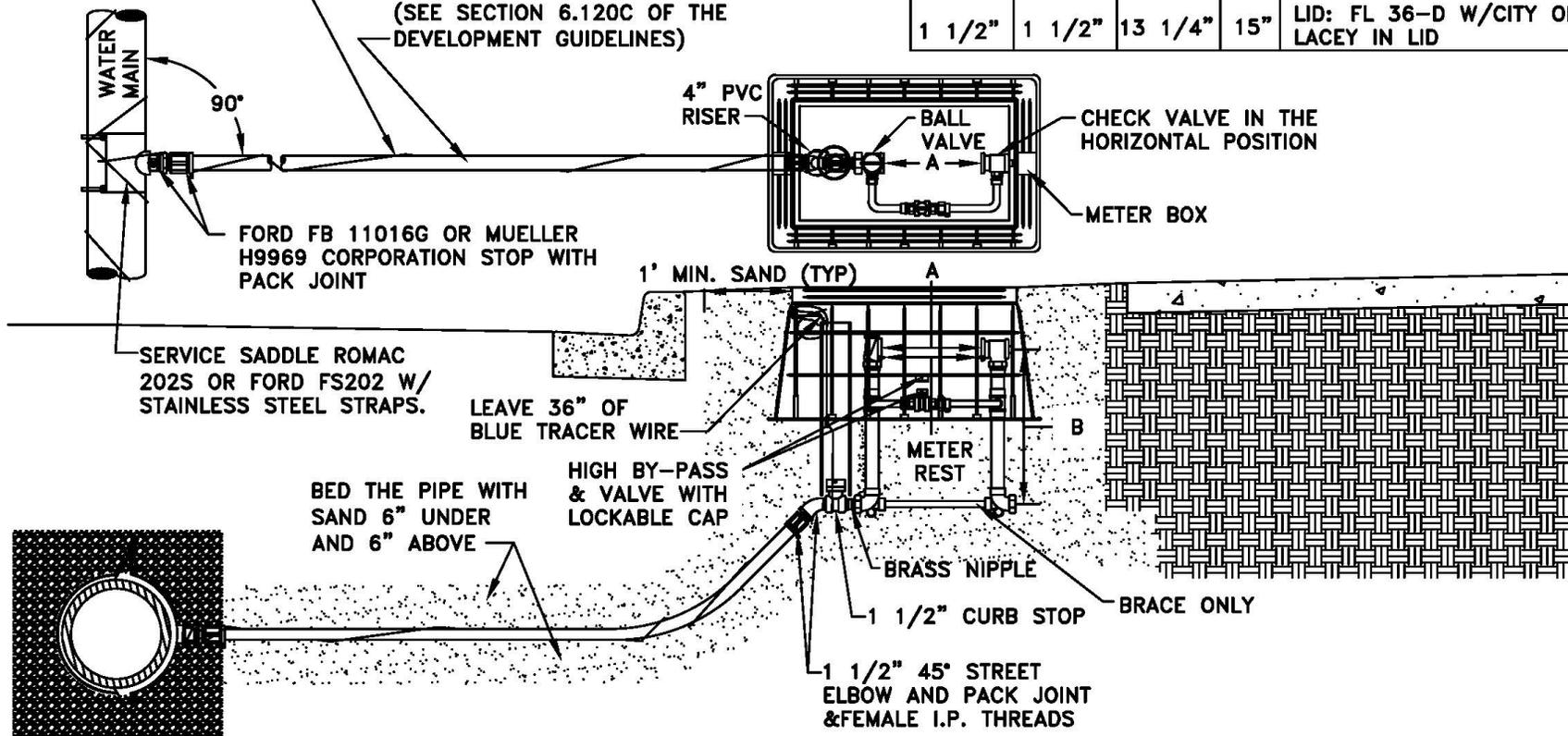
- GENERAL NOTES:
- METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTERS FOR METER BOX INSTALLATION.
  - STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINTS.
  - THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
  - FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
  - ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.
  - COPPER METER SETTERS: FORD VBH 74-15W, MUELLER B2404-R2AG15, AY-McDONALD 20-412WCDD44.
  - BALL VALVE CURB STOP: FORD B11-666-NL, MUELLER B20283N, AY-McDONALD 76101-1-1/2".
  - BALL VALVE CORPORATION STOP: FORD FB-1101-6G-NL, MUELLER E25029N, AY-McDONALD 74704B-33-1-1/2".
  - U-BRANCH: FORD U-88-64-9-NL, MUELLER H15364N, AY-McDONALD 708UMM 1.5" X 1" X 9".

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
DOUBLE 1 INCH METER DETAIL			
APPROVED <i>Ray A. Schaefer</i> CITY ENGINEER			DWG. NO. 6-2.1
DES WHO	DWN BM	CKD RAS	DATE 12/15/2014

12 GAUGE BLUE COATED  
COPPER U.S.E. TONING WIRE  
WRAPPED AROUND THE PIPE

1 1/2" BLUE POLYETHYLENE PIPE  
(SEE SECTION 6.120C OF THE  
DEVELOPMENT GUIDELINES)

METER SIZE	LINE SIZE	A	B	METER BOX IN PLANTER ONLY
1 1/2"	1 1/2"	13 1/4"	15"	CHRISTY FIBRELYTE BOX & LID BOX: FL 36T-18 LID: FL 36-D W/CITY OF LACEY IN LID



**GENERAL NOTES:**

- METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTERS FOR METER BOX INSTALLATION.
- STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINTS.
- THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
- FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
- ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.
- COPPER METER SETTERS, HIGH BY-PASS STYLE: FORD VBH 76-15HB, MUELLER B2423-29900015-15, AY-McDONALD 20-R615WDF665.
- BALL VALVE CURB STOP: FORD B11-666-NL, MUELLER B20283N, AY-McDONALD 76101-1-1/2".
- BALL VALVE CORPORATION STOP: FORD FB1101-6G-NL, MUELLER E25029N, AY-McDONALD: 74704B-33-1-1/2".

CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS

1 1/2" METER SERVICE  
W/HIGH BYPASS

APPROVED

*Reg A Schoenel*  
CITY ENGINEER

DWG. NO.

6-3

DES  
WHO

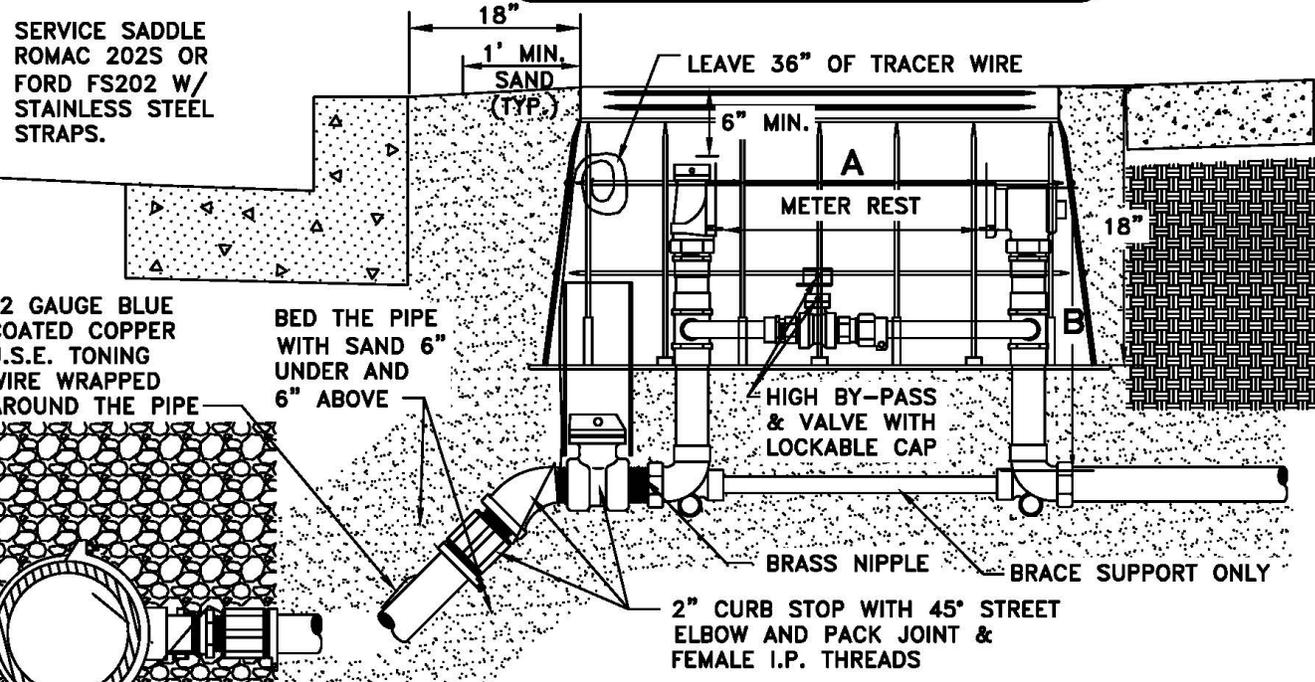
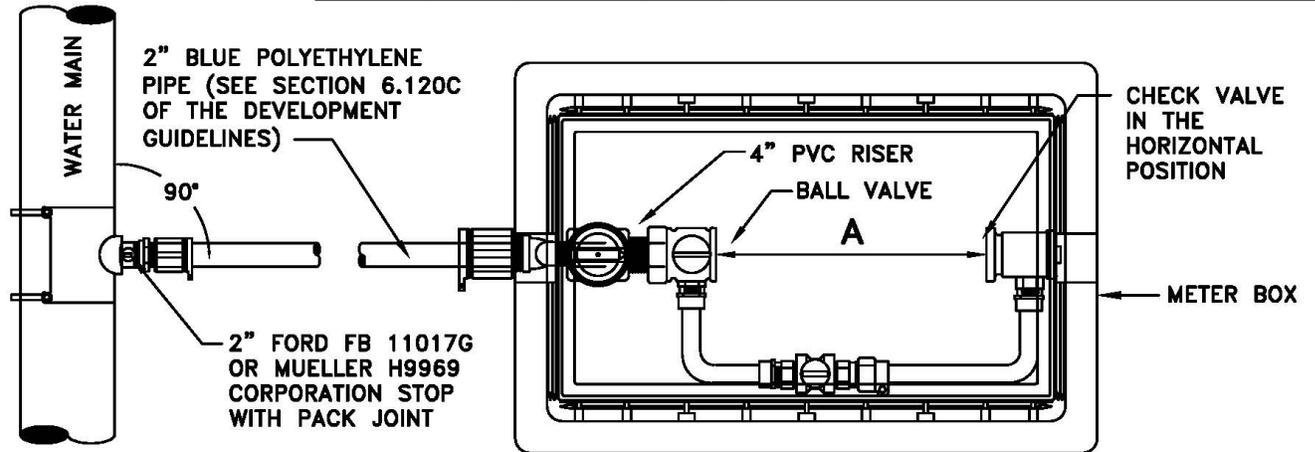
DWN  
WHO

CKD  
RAS

DATE  
12/15/2014

THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF THE ROAD ON THE NORTH OR EAST SIDE.

METER SIZE	LINE SIZE	A	B	METER BOX IN PLANTER ONLY
2"	2"	17 1/4"	15"	CHRISTY SYNERTech BOX & LID BOX: FL 36T-18 LID: FL 36T W/CITY OF LACEY IN LID

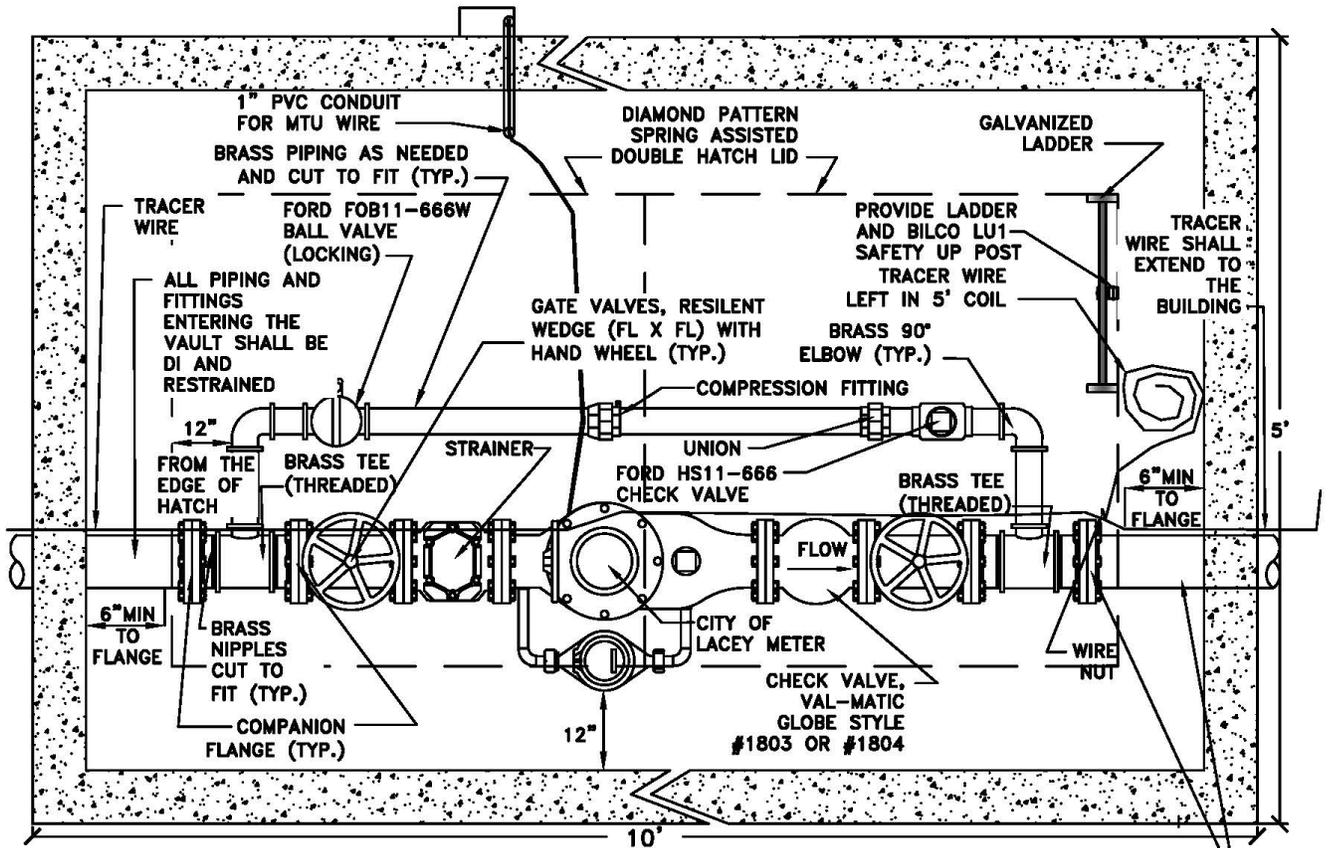


7. BALL VALVE CURB STOP: FORD B11-777-NL, MUELLER B20283N, AY-McDONALD 76101-2".
8. BALL VALVE CORPORATION STOP: FORD FB1101-7G-NL, MUELLER E25029N, AY-McDONALD: 74704B-33-2".

**GENERAL NOTES:**

1. METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTERS FOR METER BOX INSTALLATION.
2. STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINTS.
3. THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
4. FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
5. ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.
6. COPPER METER SETTERS, HIGH BY-PASS STYLE: FORD VBH 77-15HB, MUELLER B2423-29900012-2, AY-McDONALD 20-R715WDF775.

<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>2" METER SERVICE W/HIGH BYPASS</b>			
APPROVED <i>Rog A Schaefer</i> CITY ENGINEER		DWG. NO. <b>6-3.1</b>	
DES. WHO	DWN. WHO	CKD. RAS	DATE 12/15/2014



## PLAN VIEW

**GENERAL NOTES:**

1. A MINIMUM OF 10 PIPE DIAMETERS OF STRAIGHT UNOBSTRUCTED PIPE SHALL BE REQUIRED UPSTREAM OF THE METER.
2. THE METER VAULT SHALL BE SIZED PROPERLY TO MEET MINIMUM PIPING CLEARANCE REQUIREMENTS.
3. THE CONCRETE METER VAULT SHALL BE BEDDED WITH 6" OF CRUSHED ROCK. THE INSTALLATION SHALL BE LEVEL AND SET TO MATCH FINAL GRADE.
4. THE CONCRETE METER VAULT AND LID SHALL BE DESIGNED FOR H-20 LOADING. THE HATCHES SHALL BE DIAMOND PLATE ALUMINUM STYLE, L.W. PRODUCTS, BILCO OR A PRE-APPROVED EQUAL AND SHALL HAVE ALL 316 STAINLESS STEEL HARDWARE. THE HATCHES SHALL HAVE A SLAM LOCK HASP AND WEATHER PROTECTED PAD LOCK COVER.
5. THE METER VAULT SHALL BE PROVIDED WITH A DRAIN AND THE FINAL INSTALLATION SHALL DRAIN PROPERLY.
6. THE BYPASS PIPING AND GLOBE STYLE CHECK VALVE ARE NOT REQUIRED FOR IRRIGATION ONLY INSTALLATIONS.
7. ALL PIPING SHALL BE A MINIMUM OF 12" ABOVE VAULT FLOOR AND BE SUPPORTED BY ADJUSTABLE JACK STANDS. THE STANDS SHALL BE PLACED IN FOUR LOCATIONS TO PROVIDE FIRM SUPPORT.
8. ALL BYPASS PIPE AND FITTINGS SHALL BE 2" DOMESTIC BRASS MEETING LOW LEAD REQUIREMENTS. GALVANIZED STEEL PIPING WILL NOT BE ACCEPTED.
9. THE TOP OF THE METER AND VALVE WHEELS SHALL BE MINIMUM 12" BELOW THE LID.
10. A HOLE SHALL BE DRILLED IN THE VAULT WALL 12" DOWN FROM THE LID FOR A 1" PVC ELECTRICAL CONDUIT TO A REMOTE READER BOX PLACED NO MORE THAN 3' AWAY FROM THE VAULT. THE REMOTE METER BOX SHALL BE A CHRISTY FL 30T. THE CONDUIT PENETRATION SHALL BE GROUTED.
11. THE VAULT SHALL BE INSTALLED IN A PLANTER OR IN A PLANTER ISLAND AND SHALL NOT BE ALLOWED IN ANY DRIVING SURFACE. WHEN PLANS ARE ALTERED A PLANTER ISLAND SHALL BE CREATED TO INSTALL THE VAULT IN.
12. IF A REDUCED PRESSURE BACK FLOW ASSEMBLY (RPBA) IS INSTALLED DOWN STREAM OF THE VAULT, A GLOBE STYLE CHECK VALVE WILL NOT BE REQUIRED. SUBSTITUTE A STANDARD DUCTILE IRON SPOOL PIECE IN ITS PLACE.

ALL PIPE ENTERING THE VAULT SHALL BE DUCTILE IRON AND THE CONNECTION SHALL BE MADE WITH A FIELD FLANGE

METER AND STRAINER LAY LENGTHS	
3" COMPOUND	17 "
3" TURBINE (IRRIGATION)	12 "
3" STRAINER	6 "
4" COMPOUND	20 "
4" TURBINE (IRRIGATION)	14 "
4" STRAINER	7.5 "

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**STANDARD PLUMBING  
CONFIGURATION FOR  
3" & 4" METERS**

APPROVED

*Rog A Schoenel*  
CITY ENGINEER

DWG. NO.

6-3.2

DES

WHO

DWN

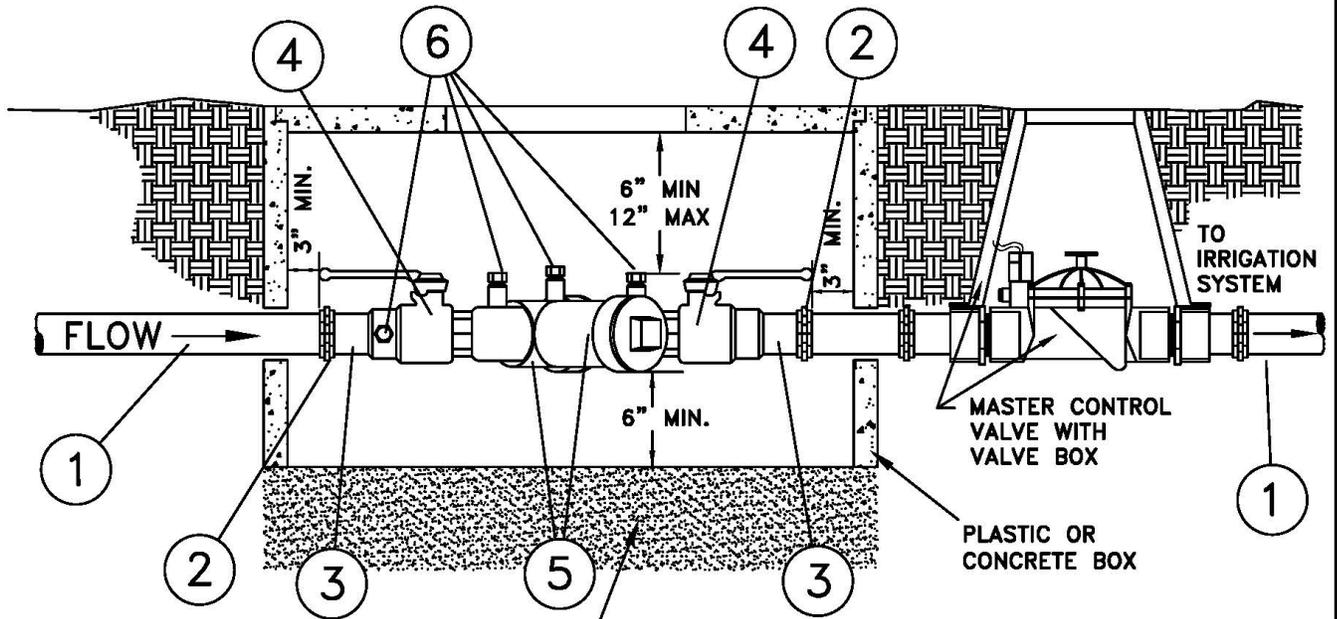
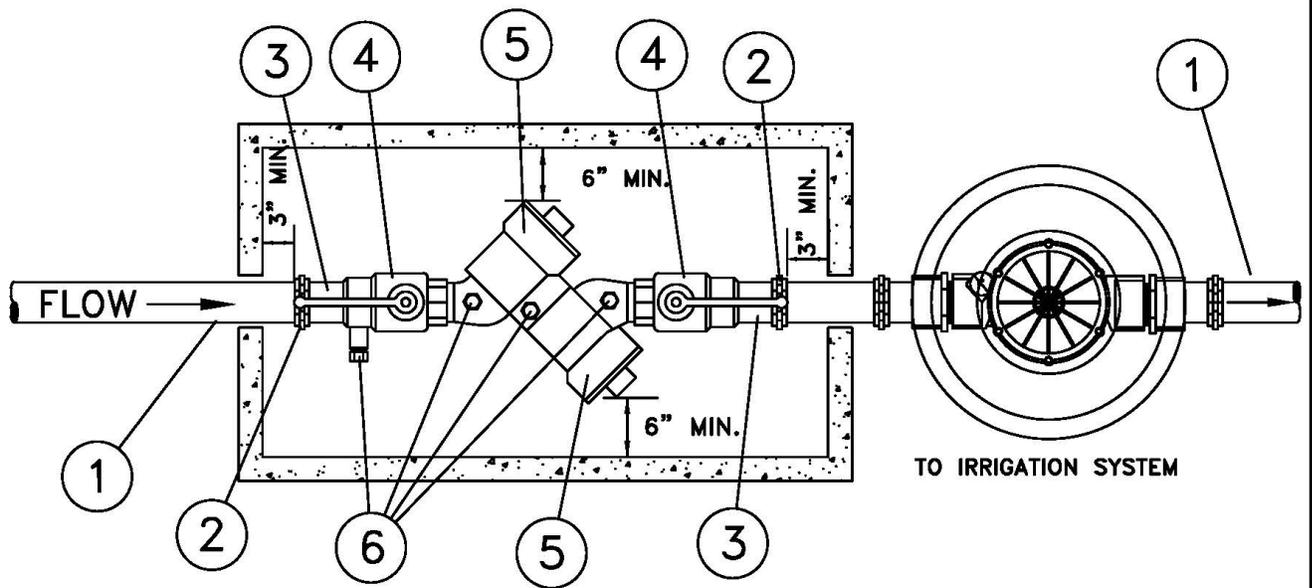
WHO

CKD

RAS

DATE

12/15/2014



12" THICK PEA GRAVEL OR  
1 1/2" MINUS WASHED ROCK

**MATERIAL LIST:**

- 1. SERVICE LINE
- 2. UNION
- 3. NIPPLE
- 4. SHUT-OFF VALVE
- 5. CHECK VALVE (D.S.H.S. APPROVED)
- 6. TESTS COCKS

**GENERAL NOTES:**

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCVA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS
4. SEE DETAIL 6-4.6 OR 6-4.7 FOR TYPICAL LAYOUT.
5. A MASTER CONTROL VALVE WITH UNIONS ON BOTH SIDES SHALL BE INSTALLED WITHIN 5' OF THE DCVA ON PUBLIC WORKS PROJECTS.

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**DOUBLE CHECK VALVE  
ASSEMBLY FOR 2"  
OR SMALLER IRRIGATION**

APPROVED

*Rog A Schoenel*  
CITY ENGINEER

DWG. NO.

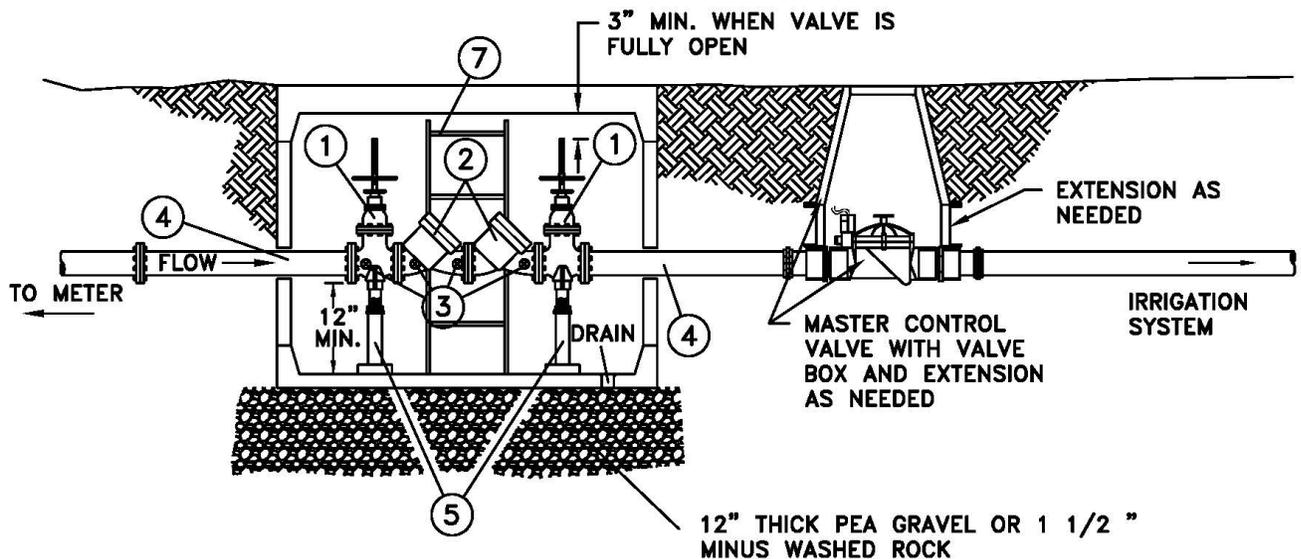
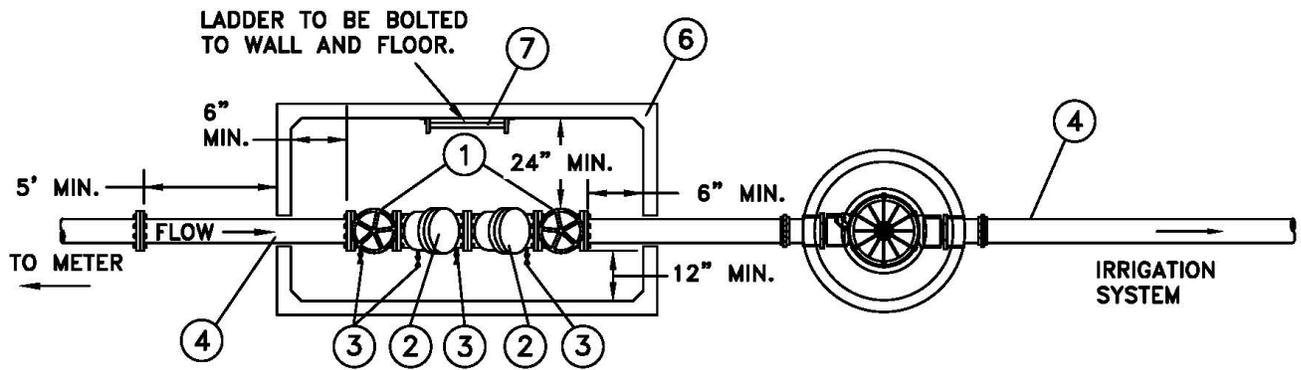
6-4.2

DES.  
CM

DWN.  
WHO

CKD.  
RAS

DATE  
12/15/2014



**GENERAL NOTES:**

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACKFLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCVA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS. DOCUMENTATION OF TESTING MUST BE SUBMITTED TO THE LACEY PUBLIC WORKS DEPARTMENT.
4. WHERE PIPING PASSES THROUGH CONCRETE WALL PROVIDE 2" CLEARANCE W/ WATERPROOF MASTIC OR FLEXIBLE SEALANT
5. ALL VAULTS MUST BE EQUIPPED WITH A DRAIN OR FLOAT ACTIVATED ELECTRIC PUMP.
6. ALL IRRIGATION LINES UP TO THE FIRST VALVE ON THE DCVA SHALL BE DISINFECTED, PRESSURE TESTED, FLUSHED AND TESTED FOR PURITY PER THE CITY OF LACEY STANDARDS.
7. A MASTER CONTROL VALVE WITH UNIONS ON BOTH SIDES SHALL BE INSTALLED WITHIN 5' OF THE DCVA ON PUBLIC WORKS PROJECTS.

**MATERIAL LIST:**

1. OS&Y GATE VALVE W/HANDWHEEL FL X FL
2. DSHS APPROVED CHECK VALVE FL X FL
3. TEST COCK - 4 REQUIRED
4. PVC C900 OR CLASS 52 DI WALL PIPE FL X FL
5. VALVE STANDS
6. VAULT FOR 3" OR 4" DCV ASSEMBLIES-USE PIPE INC. VAULT NO. 448402 W/L.W. HATCH NO. HDSA 3' X 3' DOUBLE DOOR OR APPROVED EQUAL.
7. LADDER

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**DOUBLE CHECK VALVE  
ASSEMBLY FOR 3" & UP  
IRRIGATION**

APPROVED

*Rog A Schoenel*

CITY ENGINEER

DWG. NO.

6-4.3

DES.

WHO

DWN.

WHO

CKD.

RAS

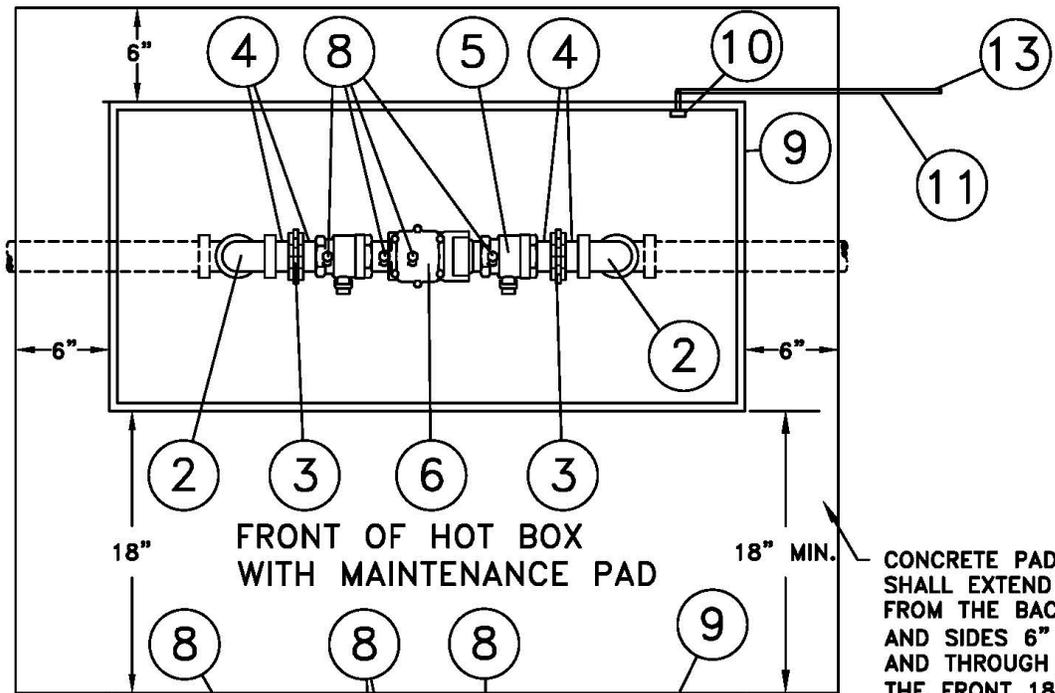
DATE

12/15/2014

# PLAN

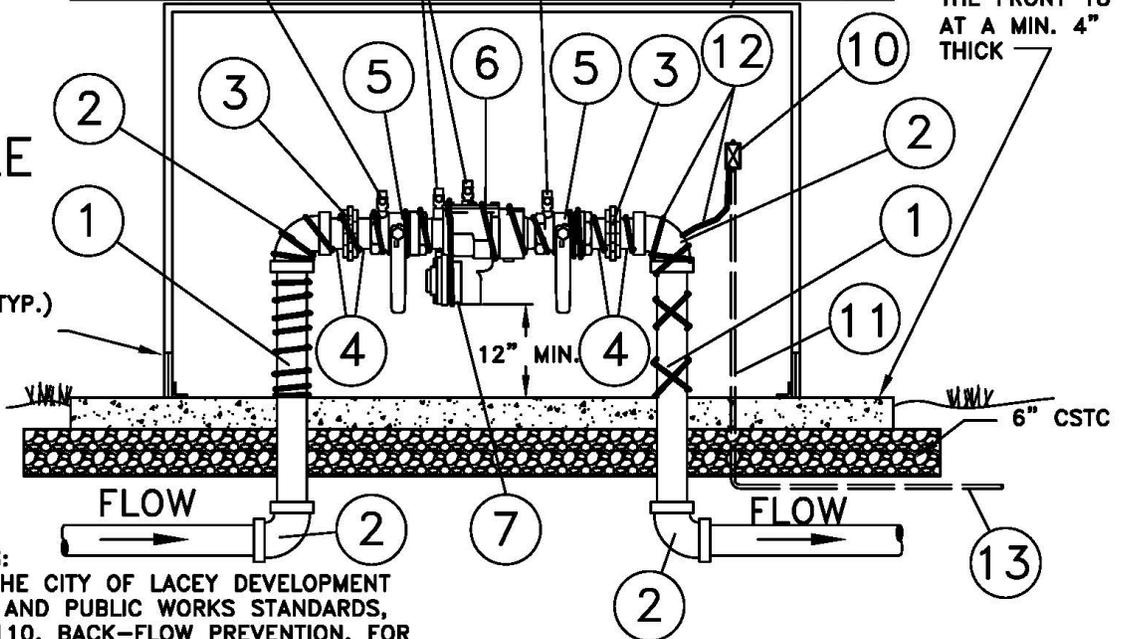
## MATERIAL LIST:

1. SERVICE LINE
2. 90° BEND
3. UNION
4. NIPPLE
5. SHUT-OFF VALVE
6. ASSEMBLY BODY
7. RELIEF VALVE
8. TESTS COCKS
9. HEATED HOT BOX ENCLOSURE
10. J-BOX
11. CONDUIT
12. HEAT TAPE
13. CONDUIT TO OWNERS POWER SOURCE



# PROFILE

DRAIN HOLE (TYP.) BOTH ENDS



## GENERAL NOTES:

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE RPBA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS.
4. DO NOT INSTALL IN AREA SUBJECT TO FLOODING.
5. ALL RPBA SHALL BE INSTALLED IN A HOT BOX EQUIPPED WITH ELECTRICAL COMPONENTS (CONDUITS, WIRING, ETC.) AND POWER SUPPLIED BY THE OWNER TO PREVENT THE UNIT FROM FREEZING.
6. ALL PIPING AND FITTINGS SHALL BE DOMESTIC BRASS MANUFACTURED IN THE U.S.A.
7. DRAIN HOLE OPENINGS SHALL BE 1 1/2 TIMES THE DIAMETER OR THE SUPPLY LINE.
8. THE HOT BOX SHALL BE NEUTRAL BEIGE.

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS  
REDUCED PRESSURE  
BACKFLOW ASSEMBLY  
FOR 2" OR SMALLER  
(OUTDOOR APPLICATION)**

APPROVED

*Reg A Schoenel*  
CITY ENGINEER

DWG. NO.

6-4.4

DES.

JC

DWN.

WHO

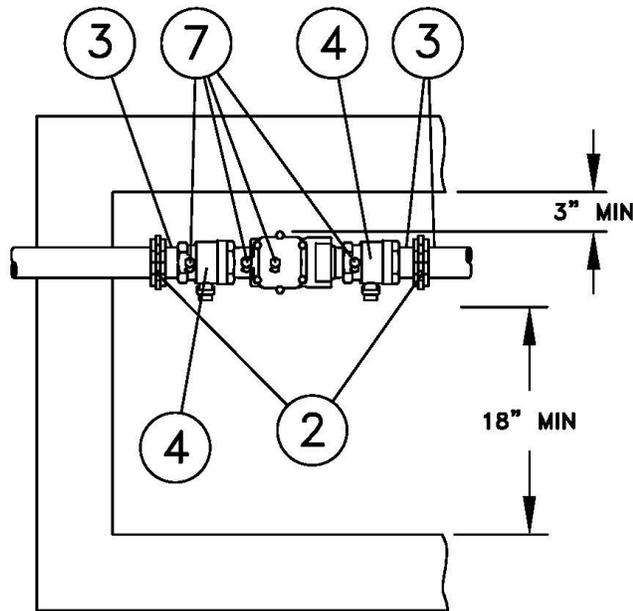
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RAS

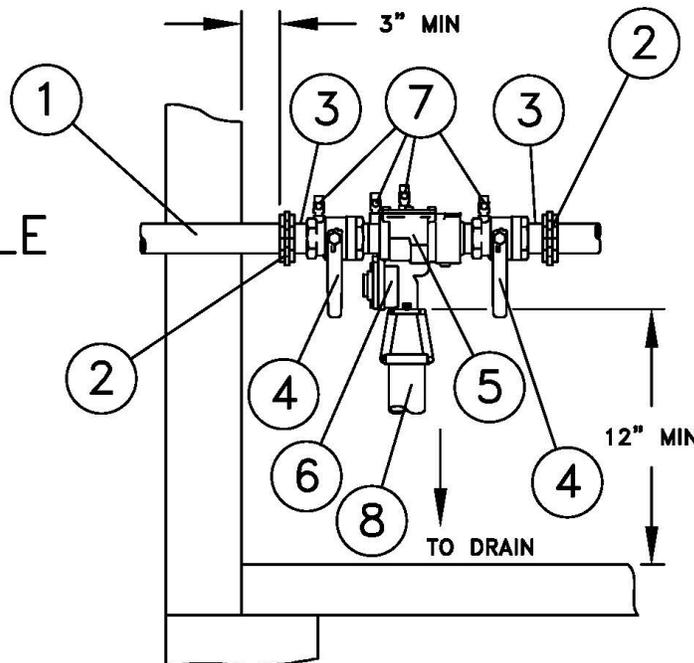
DATE

12/15/2014

PLAN



PROFILE



**MATERIAL LIST:**

- 1. SERVICE LINE
- 2. UNION
- 3. NIPPLE
- 4. SHUT-OFF VALVE
- 5. ASSEMBLY BODY
- 6. RELIEF VALVE
- 7. TESTS COCKS
- 8. DRAIN LINE

**GENERAL NOTES:**

- 1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
- 2. THE BPA INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
- 3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCVA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS.
- 4. DRAIN LINE SHALL BE 1.5 TIMES THE DIAMETER OF THE SERVICE LINE AND BE SCREENED AT THE OUTFALL.

DG6-4.41.DWG

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**REDUCED PRESSURE  
BACKFLOW ASSEMBLY  
FOR 2" OR SMALLER  
(INDOOR APPLICATION)**

APPROVED

*Reg A Schaefer*

CITY ENGINEER

DWG. NO.

6-4.41

DES.

JC

DWN.

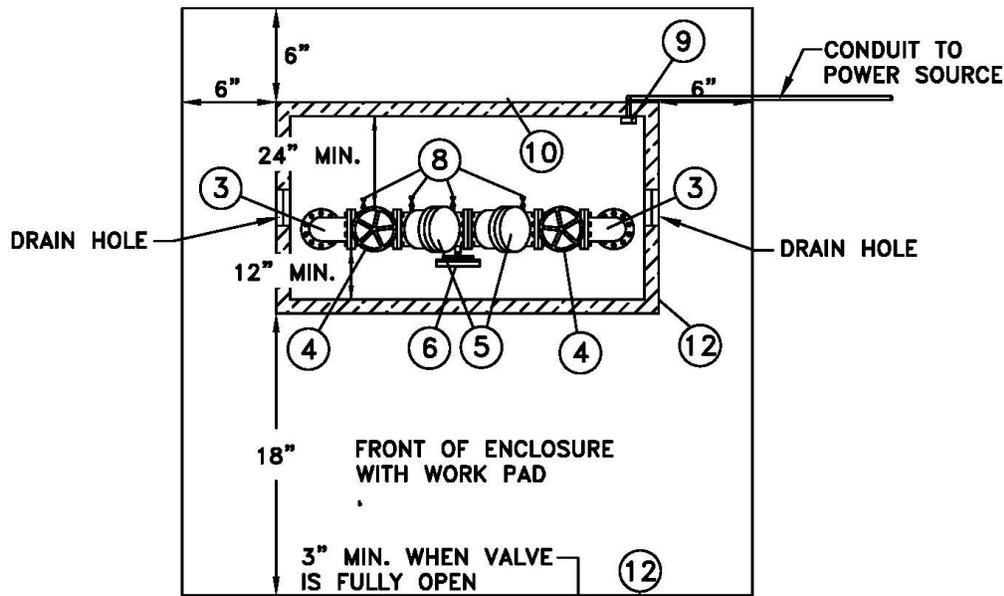
WHO

CKD.

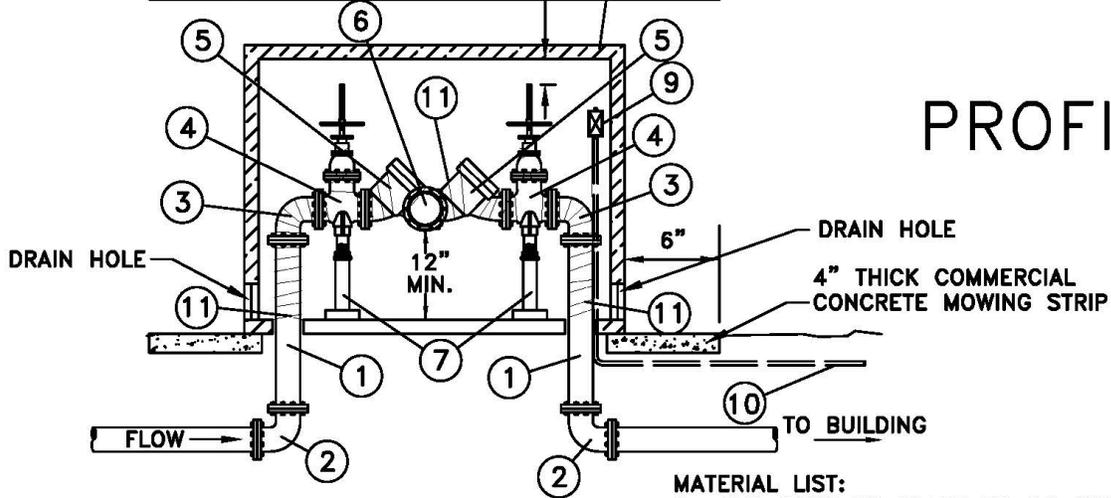
RAS

DATE

12/15/2014



PLAN



PROFILE

**GENERAL NOTES:**

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACKFLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE RPBA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS. DOCUMENTATION OF TESTING MUST BE SUBMITTED TO THE LACEY PUBLIC WORKS DEPARTMENT.
4. DRAIN HOLES SHALL BE 1.5 TIMES THE DIAMETER OF THE SERVICE LINE AND INCLUDE SCREENING.
5. ALL RPBA SHALL BE INSTALLED IN A HOT BOX EQUIPPED WITH ELECTRICAL COMPONENTS (CONDUITS, WIRING, J-BOX) AND POWER SUPPLIED BY OWNER.
6. DO NOT INSTALL IN AREAS SUBJECT TO FLOODING.
7. ALL IRRIGATION LINES UP TO THE FIRST VALVE ON THE RPBA SHALL BE DISINFECTED, PRESSURE TESTED, FLUSHED AND TESTED FOR PURITY PER THE CITY OF LACEY STANDARDS.
8. PVC PIPE AND FITTINGS SHALL NOT BE ALLOWED.

**MATERIAL LIST:**

1. PVC C900 OR CLASS 52 D.I. WALL PIPE FL X FL
2. 90° BEND FL X MEGALUG
3. 90° BEND FL X FL
4. OS&Y GATE VALVE W/HANDWHEEL FL X FL
5. D.S.H.S. APPROVED CHECK VALVE FL X FL
6. RELIEF VALVE FL
7. SUPPORT STANDS
8. TEST COCKS - 4 REQUIRED
9. JUNCTION BOX
10. POWER SOURCE CONDUIT
11. HEAT TAPE
12. HEATED HOT BOX ENCLOSURE

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**REDUCED PRESSURE  
BACKFLOW ASSEMBLY  
FOR 3" & GREATER**

APPROVED

*Rog A Schoenel*  
CITY ENGINEER

DWG. NO.

6-4.5

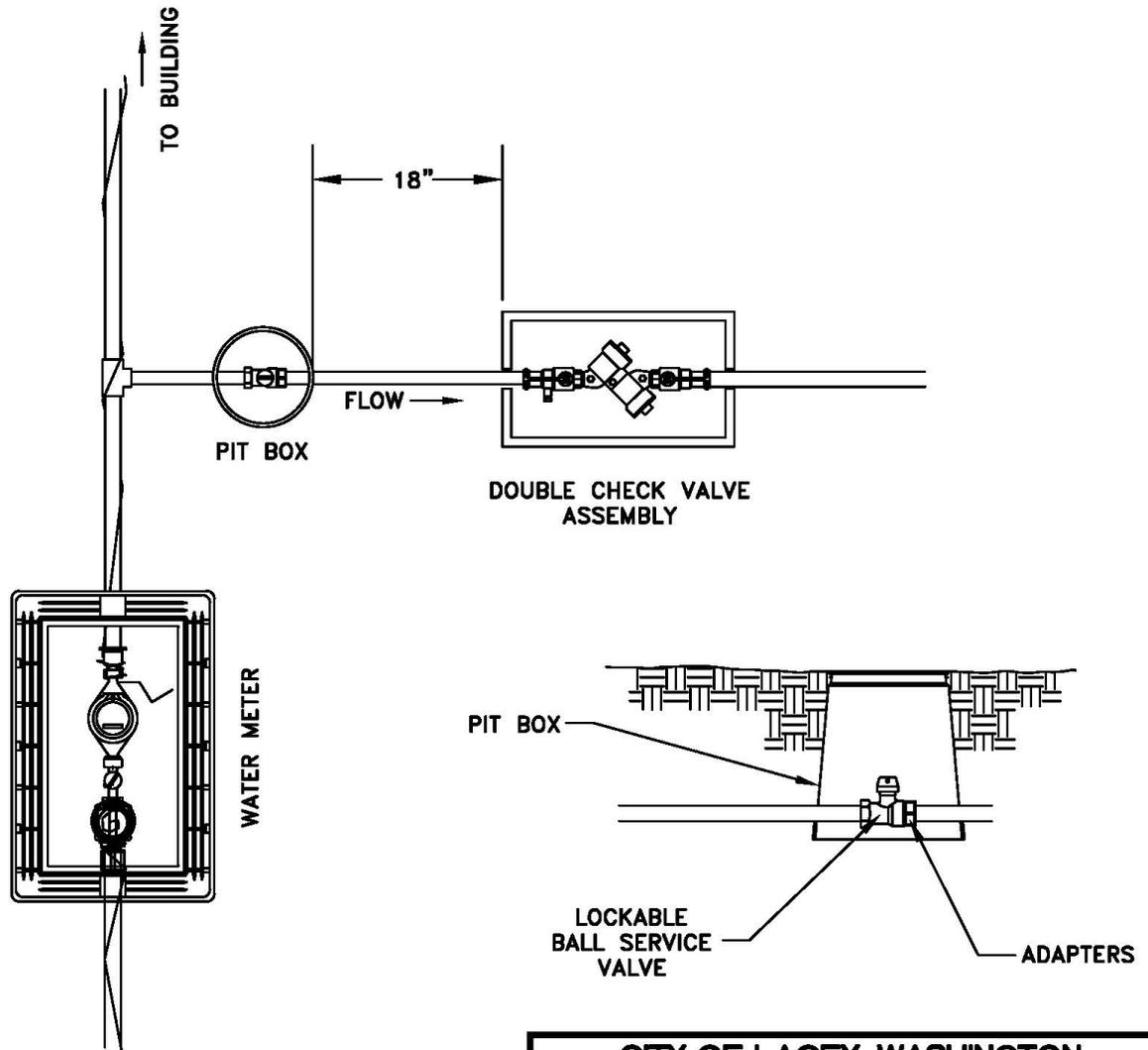
DES.  
WHO

DWN.  
WHO

CKD.  
RAS

DATE  
12/15/2014

LINE SIZE	BALL VALVE	VALVE BOX
3/4"	FORD FOB11-333W	CARSON MODEL 910-12
1"	FORD FOB11-444W	
1 1/2"	FORD FOB11-666W	
2"	FORD FOB11-777W	
2 1/2"	FORD FOB11-788W	



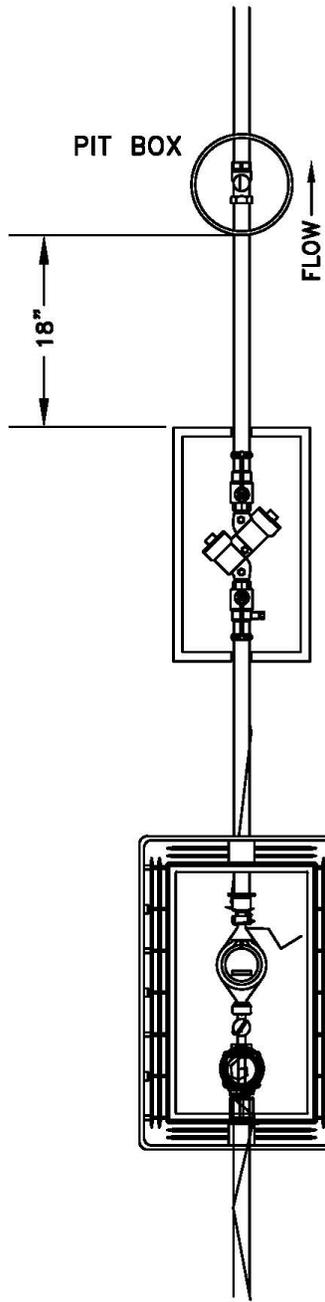
**GENERAL NOTES:**

1. THIS CONFIGURATION IS REQUIRED IF THE IRRIGATION SYSTEM DOES NOT HAVE IT'S OWN SEPARATE WATER METER.
2. DO NOT INSTALL IN AREAS SUBJECT TO FLOODING.

DG6-4.6.DWG

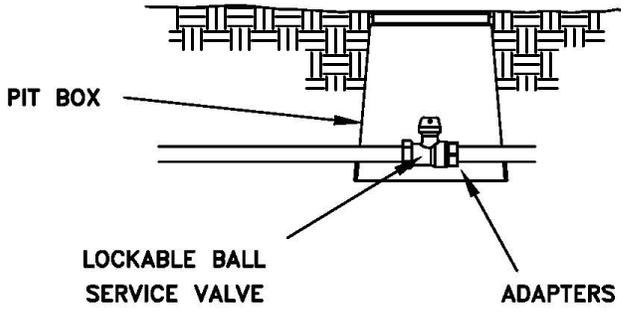
CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
IRRIGATION FOR RESIDENTIAL DOMESTIC SERVICE TYPE I			
<i>Ray A. Schoenfeld</i> CITY ENGINEER			DWG. NO. 6-4.6
DES. CM	DWN. WHO	CKD. RAS	DATE 12/15/2014

LINE SIZE	BALL VALVE	VALVE BOX
3/4"	FORD FOB11-333W	CARSON MODEL 910-12
1"	FORD FOB11-444W	
1 1/2"	FORD FOB11-666W	
2"	FORD FOB11-777W	
2 1/2"	FORD FOB11-788W	



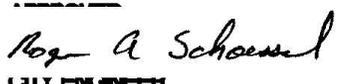
DOUBLE CHECK VALVE ASSEMBLY

PIT BOX DETAIL

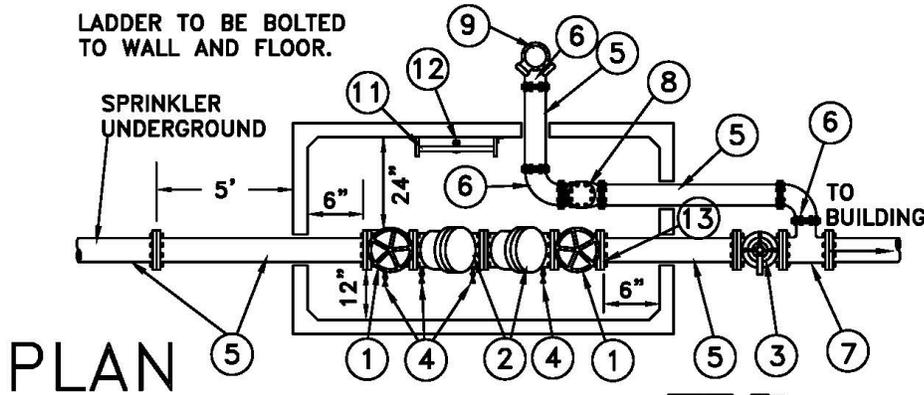


- GENERAL NOTES:**
1. THIS CONFIGURATION IS REQUIRED FOR AN IRRIGATION SYSTEM THAT HAS IT'S OWN WATER METER SUCH AS COMMERCIAL SITES.
  2. DO NOT INSTALL IN AREAS SUBJECT TO FLOODING.
  3. ALL PIPING SHALL BE BLUE POLY PIPE.

DG6-4.7.DWG

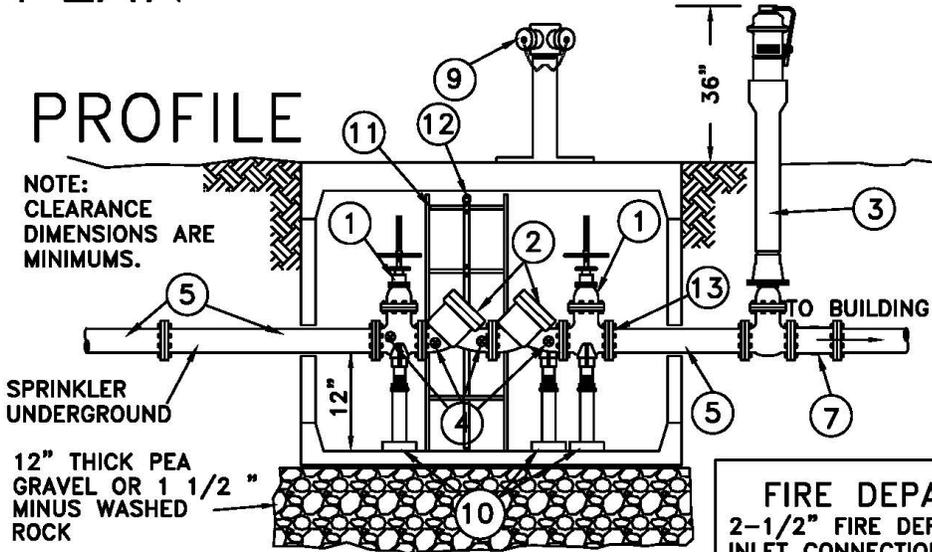
CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
IRRIGATION SERVICE FOR COMMERCIAL SITES TYPE II			
 <small>CITY ENGINEER</small>			<b>DWG. NO.</b> <b>6-4.7</b>
<b>DES.</b> WHO	<b>DWN.</b> WHO	<b>CKD.</b> RAS	<b>DATE</b> 12/15/2014

LADDER TO BE BOLTED TO WALL AND FLOOR.



PLAN

PROFILE



NOTE: CLEARANCE DIMENSIONS ARE MINIMUMS.

12" THICK PEA GRAVEL OR 1 1/2" MINUS WASHED ROCK

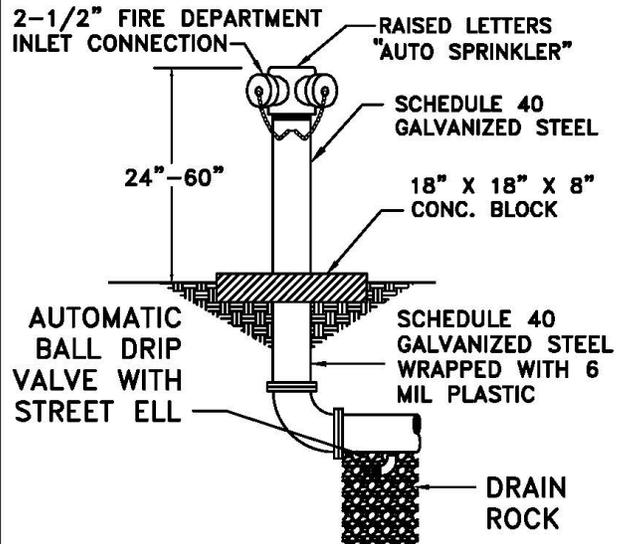
GENERAL NOTES:

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACKFLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCDA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS. DOCUMENTATION OF TESTING MUST BE SUBMITTED TO THE LACEY PUBLIC WORKS DEPARTMENT.
4. THOROUGHLY FLUSH LINES PRIOR TO INSTALLING BACK FLOW ASSEMBLY.
5. PIPE FROM VAULT TO BUILDING SHALL BE CLASS 52 DI, FLANGED AND NO VICTAULIC COUPLING.
6. TAMPER SWITCHES SHALL BE INSTALLED ON 1 AND 3 CONNECTED TO BUILDING FIRE ALARM SYSTEM.
7. WHERE PIPING PASSES THROUGH CONCRETE WALL PROVIDE 2" CLEARANCE W/ WATERPROOF MASTIC OR FLEXIBLE SEALANT.
8. DIAMETER OF PIPE AND FITTINGS TO BE DETERMINED BY CERTIFIED SPRINKLER DESIGNER.
9. ALL PIPING SHALL BE A MINIMUM OF 4" DIAMETER AS PER NFPA13.
10. ALL VAULTS SHALL BE EQUIPPED WITH A DRAIN OR FLOAT SWITCH ACTIVATED ELECTRIC SUMP PUMP.
11. ALL FIRE SPRINKLER LINES UP TO THE FIRST VALVE ON THE DCDA SHALL BE DISINFECTED, PRESSURE TESTED, FLUSHED AND TESTED FOR PURITY PER THE CITY OF LACEY STANDARDS.

MATERIAL LIST:

1. OS&Y GATE VALVE W/HANDWHEEL FL X FL
2. DSHS APPROVED CHECK VALVE FL X FL
3. POST INDICATOR VALVE
4. TEST COCK - 4 REQUIRED
5. CLASS 52 DI WALL PIPE FL X FL
6. CLASS 52 DI 90° BEND FL X FL
7. CLASS 52 DI TEE FL X FL
8. SWING CHECK VALVE W/BALL DRIP ASSEMBLY
9. FIRE DEPARTMENT CONNECTION
10. VALVE STANDS
11. LADDER
12. BILCO LU1 SAFETY POST
13. FIELD FLANGE

FIRE DEPARTMENT CONNECTION



CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS

SINGLE SERVICE DOUBLE  
CHECK DETECTOR (DCDA)  
VALVE ASSEMBLY W/FDC

APPROVED

*Rog A Schoenel*  
CITY ENGINEER

DWG. NO.

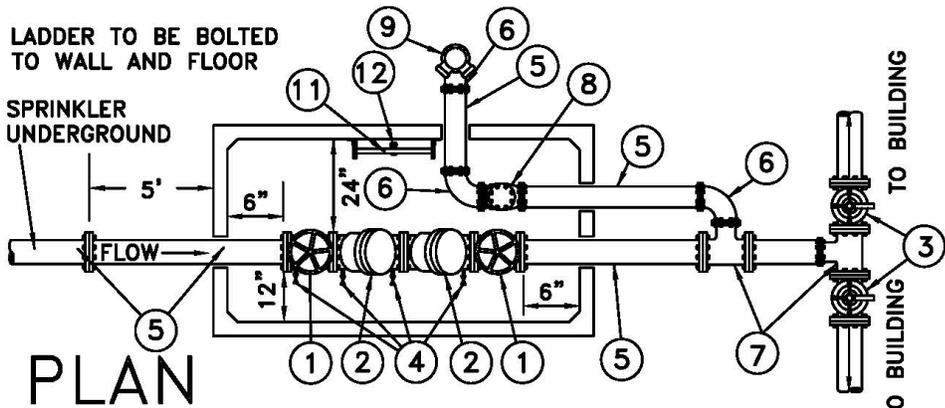
6-5.1

DES. WHO

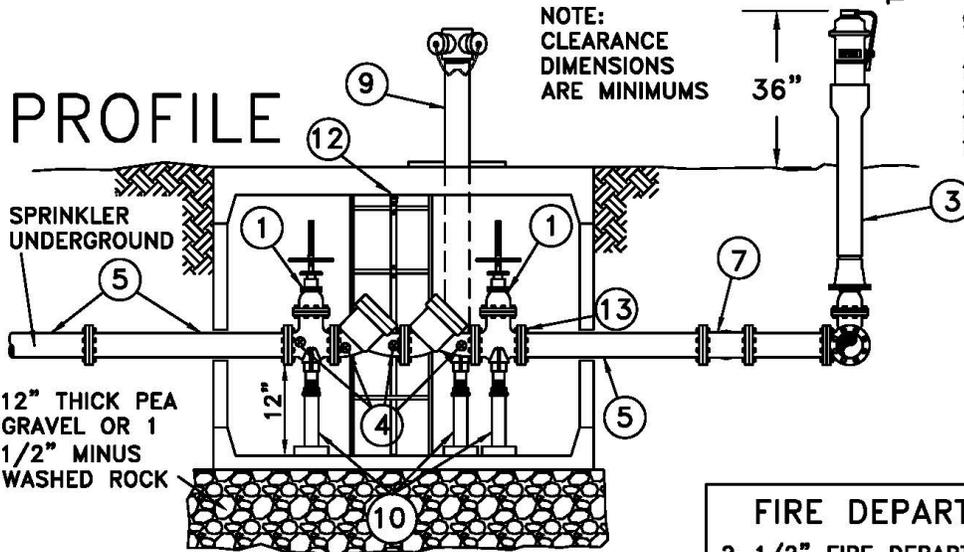
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CKD. RAS

DATE 12/15/2014



PLAN



PROFILE

NOTE:  
CLEARANCE  
DIMENSIONS  
ARE MINIMUMS

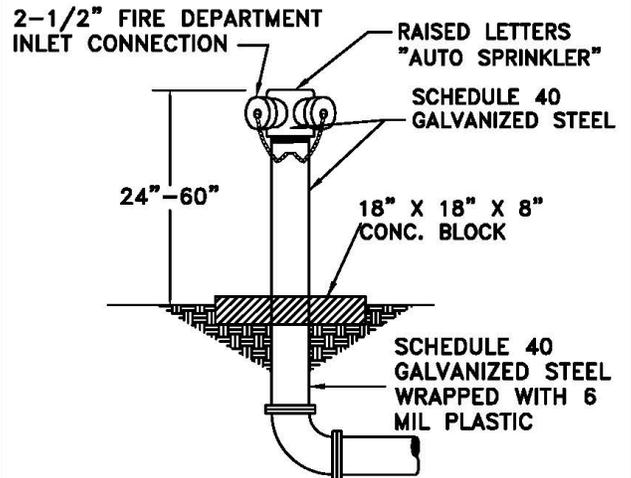
- MATERIAL LIST:**
1. OS&Y GATE VALVE W/HANDWHEEL FL X FL
  2. DSHS APPROVED CHECK VALVE FL X FL
  3. POST INDICATOR VALVE
  4. TEST COCK - 4 REQUIRED
  5. CLASS 52 DI WALL PIPE FL X FL
  6. CLASS 52 DI 90° BEND FL X FL
  7. CLASS 52 DI TEE FL X FL
  8. SWING CHECK VALVE W/BALL DRIP ASSEMBLY
  9. FIRE DEPARTMENT CONNECTION
  10. VALVE STANDS
  11. LADDER
  12. BILCO LU1 SAFETY POST
  13. FIELD FLANGE

**GENERAL NOTES:**

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACKFLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCDA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS. DOCUMENTATION OF TESTING MUST BE SUBMITTED TO THE LACEY PUBLIC WORKS DEPARTMENT.
4. THOROUGHLY FLUSH LINES PRIOR TO INSTALLING BACKFLOW ASSEMBLY.
5. PIPE FROM VAULT TO BUILDING SHALL BE CLASS 52 DI FLANGED FITTINGS AND NO VICTAULIC FITTINGS.
6. TAMPER SWITCHES SHALL BE INSTALLED ON 1 AND 3 CONNECTED TO BUILDING FIRE ALARM SYSTEM.
7. WHERE PIPING PASSES THROUGH CONCRETE WALL PROVIDE 2" CLEARANCE W/ WATERPROOF MASTIC OR FLEXIBLE SEALANT.
8. DIAMETER OF PIPE AND FITTINGS TO BE DETERMINED BY CERTIFIED SPRINKLER DESIGNER.
9. ALL PIPING SHALL BE A MINIMUM OF 4" DIAMETER AS PER NFPA13.
10. ALL VAULTS SHALL BE EQUIPPED WITH A DRAIN OR FLOAT SWITCH ACTIVATED ELECTRIC SUMP PUMP.
11. ALL FIRE SPRINKLER LINES UP TO THE FIRST VALVE ON THE DCDA SHALL BE DISINFECTED, PRESSURE TESTED, FLUSHED AND TESTED FOR PURITY PER THE CITY OF LACEY STANDARDS.

DG6-5.2.DWG

**FIRE DEPARTMENT CONNECTION**



**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**DUAL SERVICE DOUBLE  
CHECK DETECTOR (DCDA)  
VALVE ASSEMBLY W/FDC**

APPROVED

*Rog A Schoessel*  
CITY ENGINEER

DWG. NO.

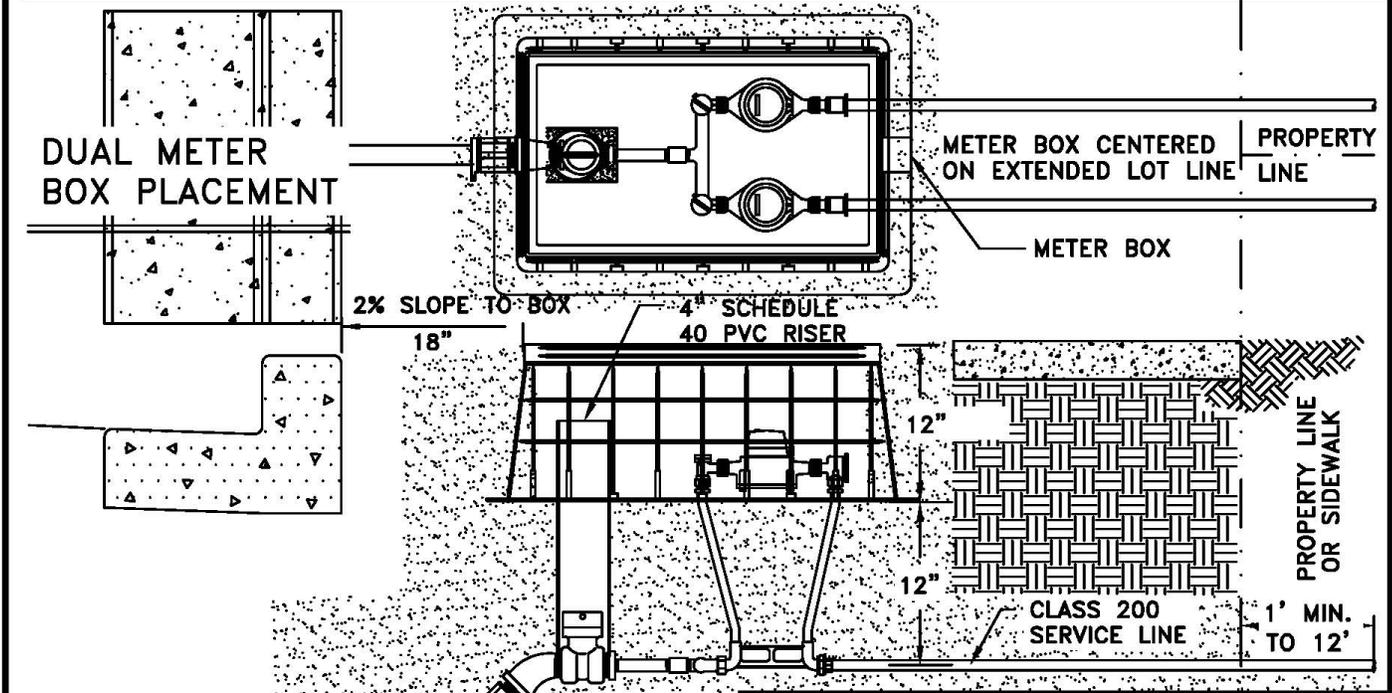
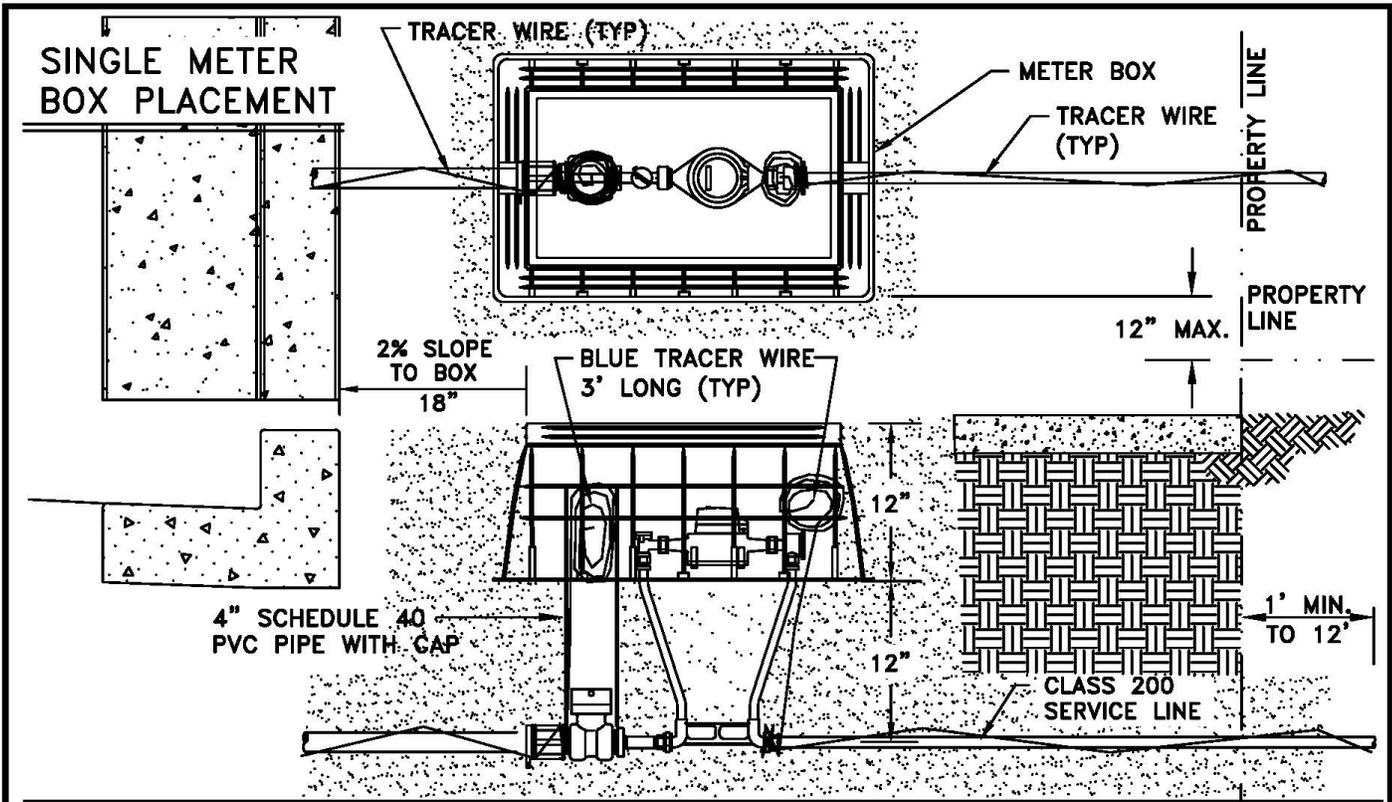
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LRW

DWN.  
WHO

CKD.  
RAS

DATE  
12/15/2014



**GENERAL NOTES:**

1. METER BOXES SHALL NOT BE INSTALLED IN CONCRETE OR CONCRETE DRIVEWAYS. WHEN NECESSARY CREATE PLANTERS FOR METER BOX INSTALLATION.
2. STAINLESS STEEL INSERTS ARE REQUIRED FOR ALL PACK JOINTS.
3. THE SETTER ANGLE STOP SHALL BE A MINIMUM OF 1" ABOVE BOTTOM OF METER BOX. INSIDE OF BOX SHALL BE CLEAN OF EXCESS SAND OR DEBRIS.
4. FILL THE ENTIRE AREA AROUND AND UNDER THE METER BOX WITH A MINIMUM 1' OF SAND.
5. ALL BRASS AND COPPER SHALL BE LOW LEAD COMPLIANT.

DG6-7.DWG

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**TYPICAL METER  
PLACEMENT**

APPROVED

*Ray A. Schoenel*  
CITY ENGINEER

DWG. NO.

6-7

DES.

WHO

DWN.

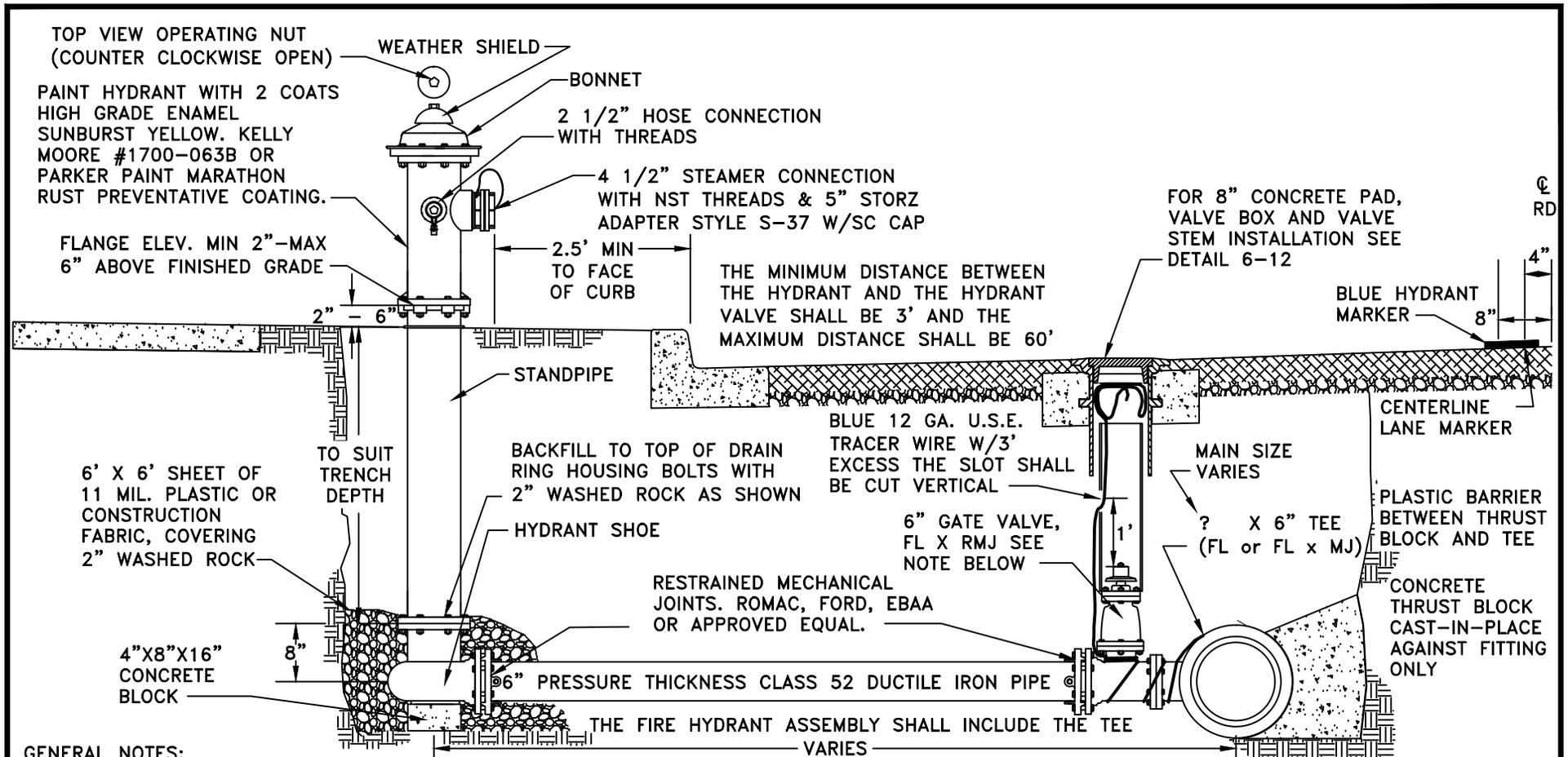
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DATE

12/15/2014



**GENERAL NOTES:**

1. A MINIMUM FIVE FOOT RADIUS OF UNOBSTRUCTED WORKING AREA SHALL BE PROVIDED AROUND ALL HYDRANTS. THE UNOBSTRUCTED AREA SHALL INCLUDE BUT NOT BE LIMITED TO TREES, SHRUBS, PLANTS, VAULTS, FDC AND METERS.
2. HYDRANT SHALL BE WATEROUS PACER, M & H RELIANT STYLE 929, AMERICAN AVK, KENNEDY K-81, MUELLER CENTURION AND EJIW 5CD250 WATER MASTER.
3. GATE VALVES SHALL BE RESILIENT WEDGE NRS WITH O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT BY ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C515. VALVES SHALL BE MUELLER, M&H, KENNEDY, CLOW R/W WATEROUS SERIES 500 OR EJIW FLOWMASTER.
4. REMOVE FACTORY CHAINS HOLDING CAPS.
5. WHEN DISTANCE BETWEEN HYDRANT AND VALVE EXCEED 20 FEET, FIELDLOK GASKETS SHALL BE INSTALLED.
6. INSTALLATION OF THE TYPE 2E TWO WAY BLUE REFLECTIVE HYDRANT MARKER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
7. THE TYPE 2E TWO WAY BLUE REFLECTIVE HYDRANT MARKER SHALL BE ALIGNED WITH THE OUTSIDE EDGE OF THE LANE MARKER OR 8" FROM THE CENTER OF THE RPM TO THE CENTER LINE OF THE ROADWAY. SEE DETAIL 4-27

DG6-8.DWG

CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS

**FIRE HYDRANT  
ASSEMBLY**

APPROVED

*Ray A. Schoenel*  
CITY ENGINEER

DWG. NO.

6-8

DES

WHO

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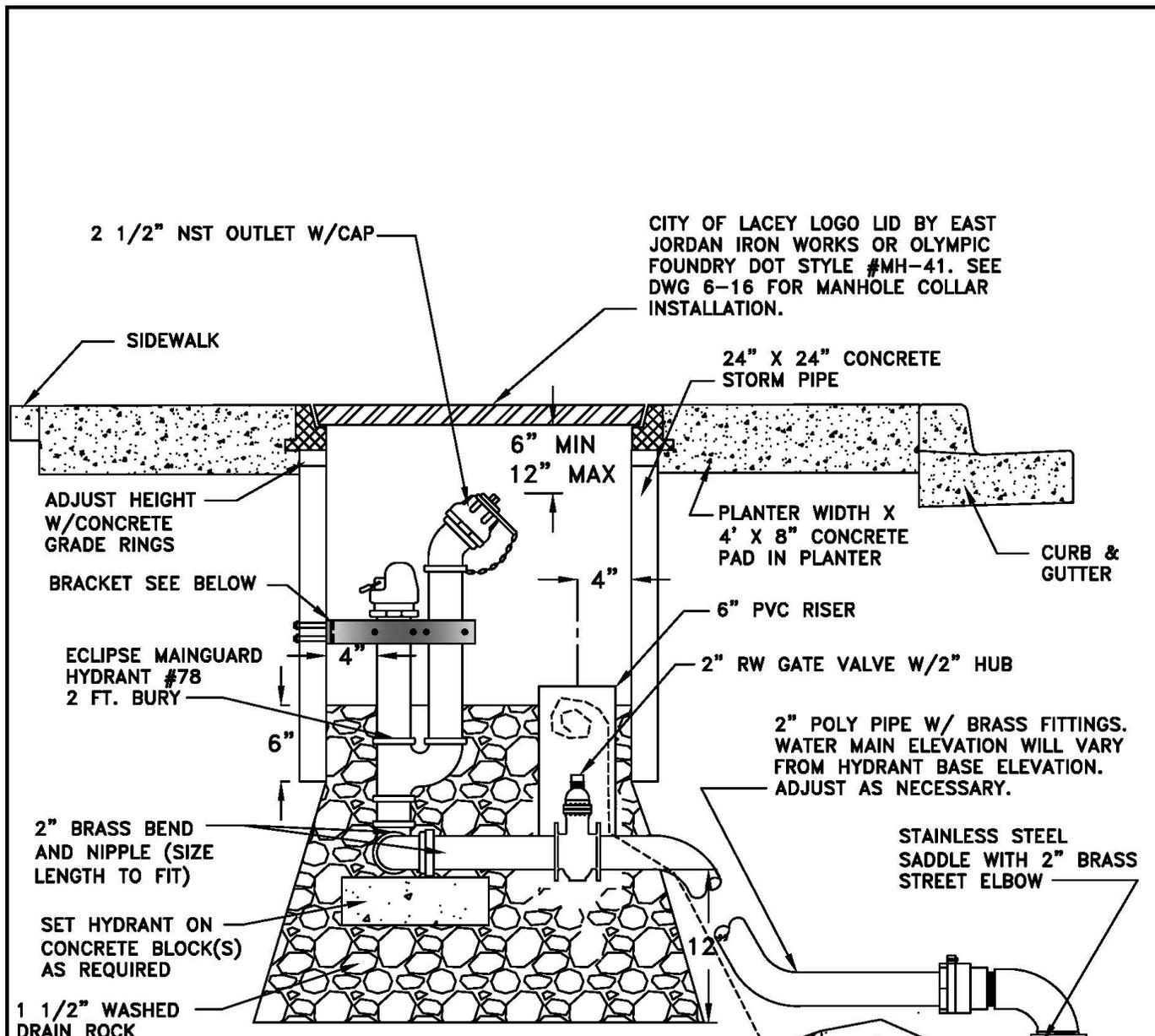
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12/15/2014





CITY OF LACEY LOGO LID BY EAST JORDAN IRON WORKS OR OLYMPIC FOUNDRY DOT STYLE #MH-41. SEE DWG 6-16 FOR MANHOLE COLLAR INSTALLATION.

ADJUST HEIGHT W/CONCRETE GRADE RINGS

BRACKET SEE BELOW

ECLIPSE MAINGUARD HYDRANT #78  
2 FT. BURY

2" BRASS BEND AND NIPPLE (SIZE LENGTH TO FIT)

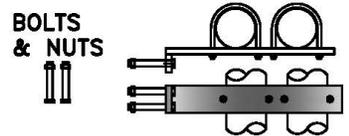
SET HYDRANT ON CONCRETE BLOCK(S) AS REQUIRED

1 1/2" WASHED DRAIN ROCK

2" POLY PIPE W/ BRASS FITTINGS. WATER MAIN ELEVATION WILL VARY FROM HYDRANT BASE ELEVATION. ADJUST AS NECESSARY.

STAINLESS STEEL SADDLE WITH 2" BRASS STREET ELBOW

**BRACKET TOP VIEW**



THRUST BLOCK  
12 GA. BLUE TRACER WIRE WITH 3 EXTRA WRAPS AT PIPE END

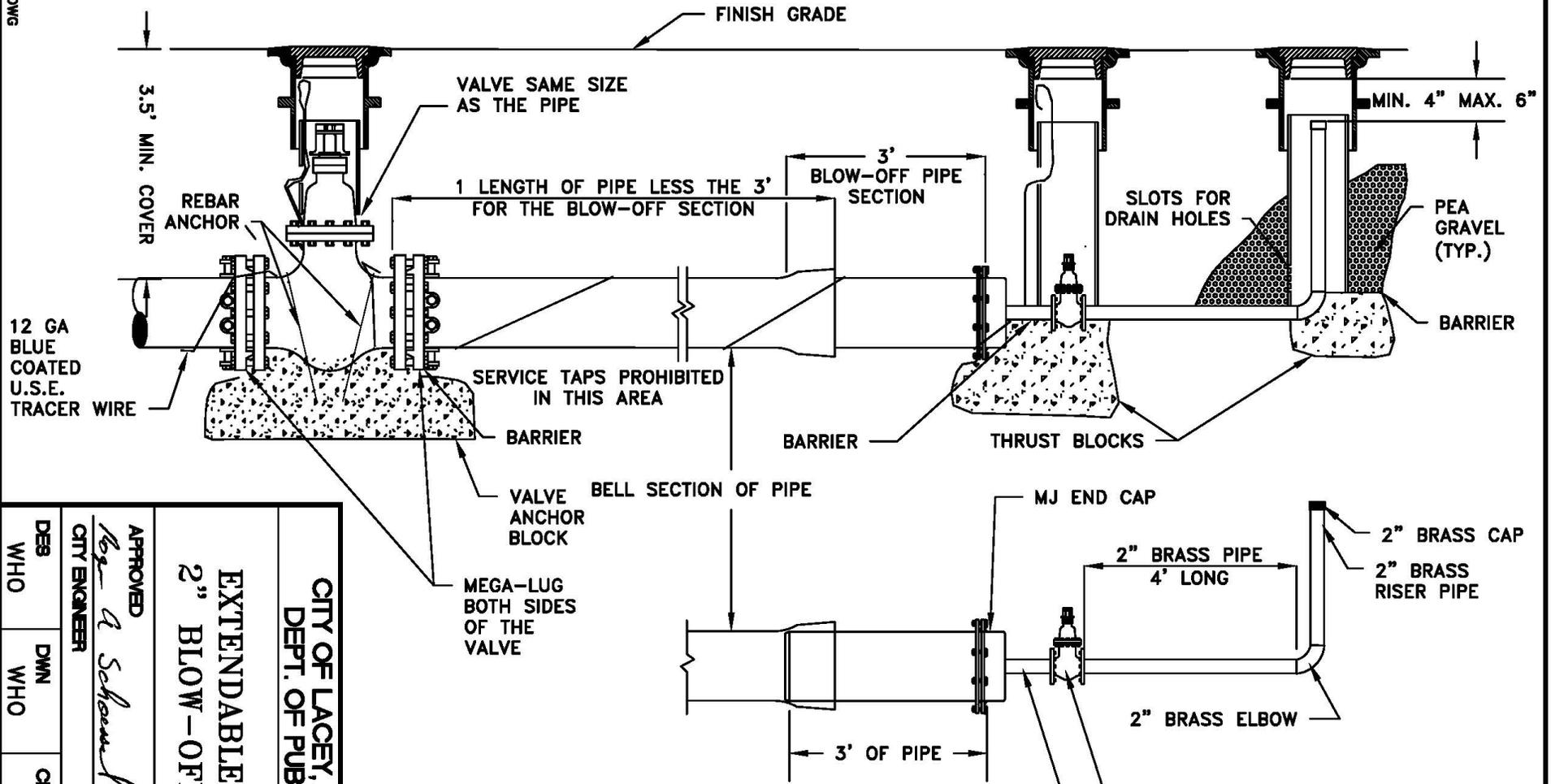
THE BRACKETS SHOULD BE CUSTOM MADE SINCE THE SPACING OR LOCATION OF THE UNIT MAY VARY. ALL PARTS SHALL BE STAINLESS STEEL A MIN. 3/16" THICK, 1 3/4" HIGH. THE NUTS AND BOLTS SHALL BE 3/8" STAINLESS STEEL.

**GENERAL NOTES:**

1. ALL BRASS PIPING AND FITTINGS SHALL BE DOMESTIC AND MANUFACTURED IN THE U.S.A.
2. THE BLOW-OFF UNIT SHALL BE SUPPORTED BY A ROD DRIVEN DEEP INTO THE GROUND TO KEEP THE UNIT RIGID.
3. IN A CUL-DE-SAC SCENARIO THE BLOW-OFF SHALL END AT THE MIDDLE OF THE SAC.
4. THERE SHALL NOT BE ANY SERVICE CONNECTIONS PAST THE BLOW-OFF

DG6-10.1.DWG

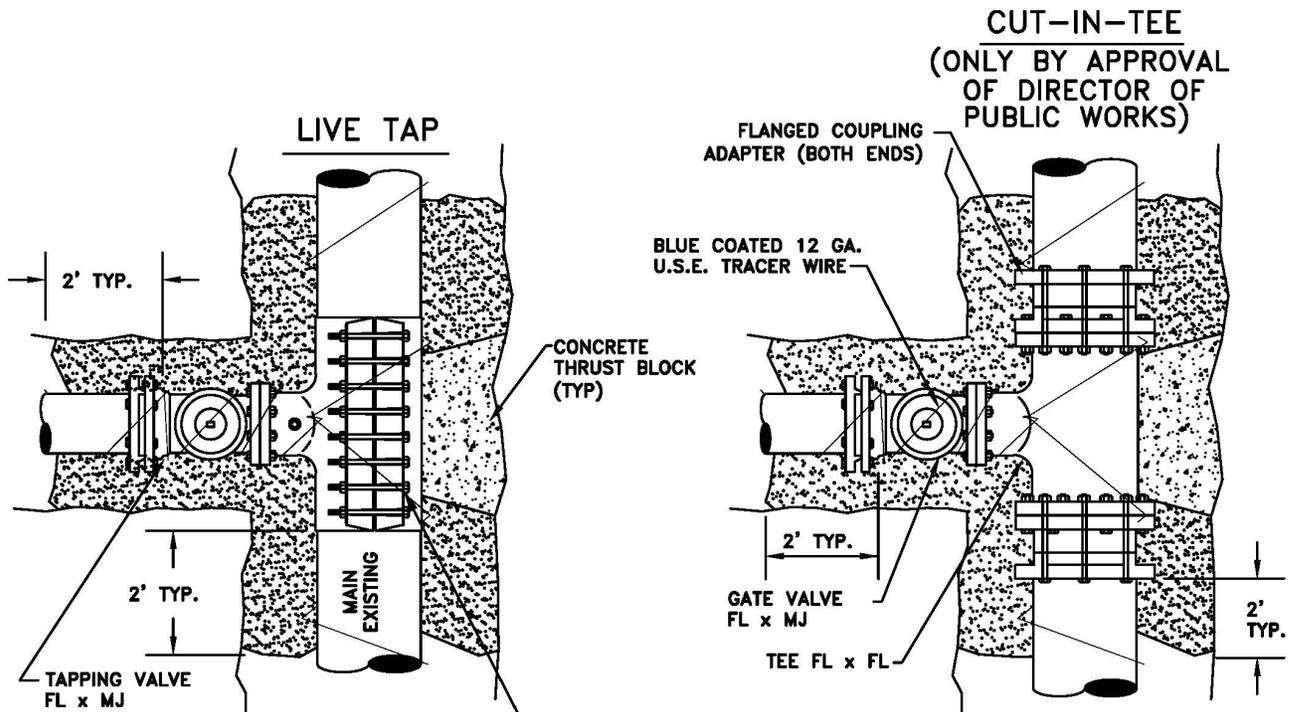
<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>BLOW-OFF HYDRANT ASSEMBLY IN THE PLANTER STRIP</b>			
APPROVED <i>Bob A. Schoenel</i> CITY ENGINEER		DWG. NO. <b>6-10.1</b>	
DES. EP	DWN. BP	CKD. RAS	DATE 12/15/2014



**GENERAL NOTES:**

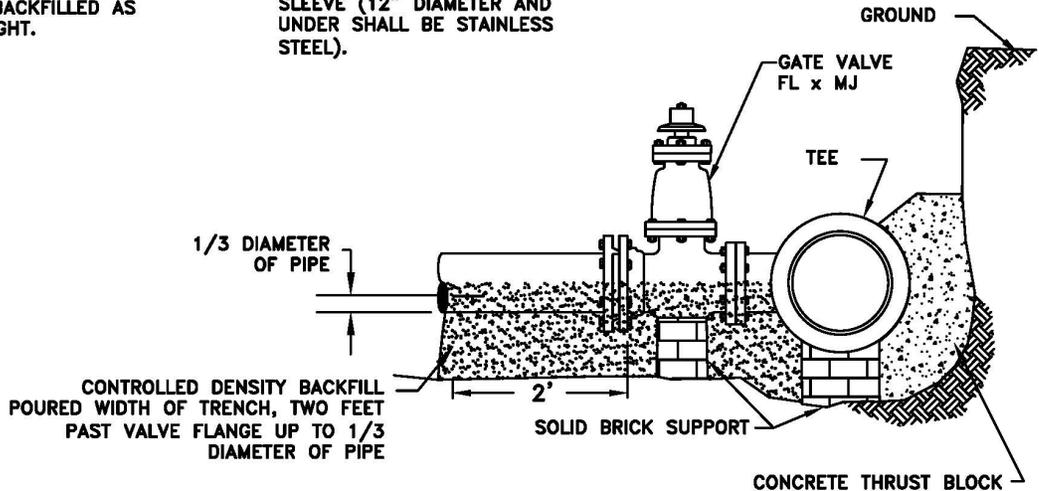
1. FOR VALVE BOX REQUIREMENTS SEE DETAIL 6-12.
2. FILL THE AREA OUTSIDE OF THE BLOW-OFF RISER STAND PIPE WITH PEA GRAVEL.
3. ALL 2" PIPING AND FITTINGS SHALL BE DOMESTIC BRASS.
4. NO SERVICE CONNECTIONS SHALL BE ALLOWED BETWEEN THE ON SIZE VALVE AND THE BLOW-OFF VALVE.

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
EXTENDABLE MAIN WITH 2" BLOW-OFF ASSEMBLY			
DESIGNED BY	DRAWN BY	CHECKED BY	DATE
WHO	WHO	RAS	12/15/2014
APPROVED	CITY ENGINEER		DWG. NO.
<i>Ray A. Schenck</i>		6-10.2	



VALVE AND SLEEVE SHALL BE SUPPORTED AND BACKFILLED AS SHOWN BELOW-RIGHT.

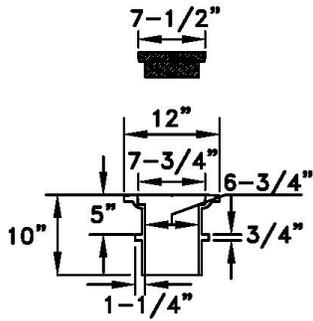
ASTM APPROVED TAPPING SLEEVE (12" DIAMETER AND UNDER SHALL BE STAINLESS STEEL).



**GENERAL NOTES:**

1. 11 MIL. PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK OR CDF BACKFILL ARE POURED.
2. CONTROLLED DENSITY FILL SHALL CONSIST OF 1750# SAND, 1750# PEA GRAVEL, 230# WATER, 141# CEMENT, 6 OUNCES WATER REDUCING AGENT PER 100# CEMENT.
3. MJ CUT IN TEES SHALL NOT BE PERMITTED.
4. THE EXISTING MAIN, TAPPING SLEEVE AND VALVE SHALL BE SUPPORTED THROUGHOUT THE ENTIRE PROCESS WHEN TAPPING THE EXISTING WATER MAIN.
5. CONNECT TO EXISTING TRACER WIRE, IF PRESENT.
6. CUT-IN TEES MAY BE REQUIRED AT THE DIRECTION OF THE CITY.
7. CUTTING AC PIPE REQUIRES PROPER AC CUTTING AND DISPOSAL PRACTICES BE FOLLOWED. REFER TO OLYMPIC AIR POLLUTION CONTROL AUTHORITY DOCUMENT AND AWWA AC PIPE CUTTING DOCUMENT. AC PIPE CUTTER SHALL BE CERTIFIED.

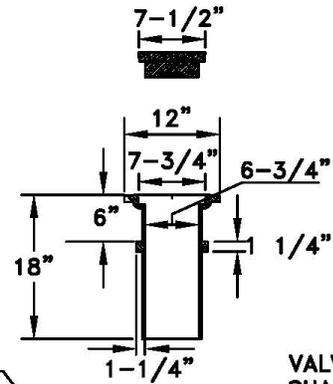
<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>CONNECTION TO EXISTING MAIN</b>			
APPROVED <i>Rog A Schoenel</i> CITY ENGINEER			DWG. NO. <b>6-11</b>
DES. LRW	DWN. WHO	CKD. RAS	DATE 12/15/2014



EAST JORDAN IRON WORKS



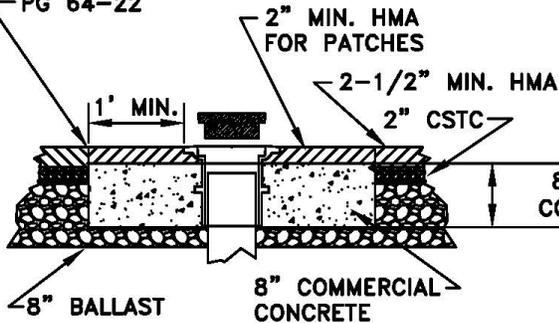
OLYMPIC FOUNDRY



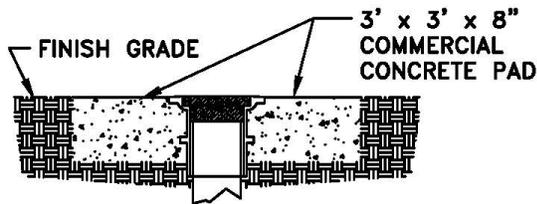
RECESSED HANDLE TYPE LID WITH CITY OF LACEY & WATER CAST IN LID

VALVE BOXES SHALL BE EAST JORDAN IRON WORKS (10" OR 18") OR OLYMPIC FOUNDRY (VB-950 10 OR 18)

SEAL WITH PAVING ASPHALT PG 64-22



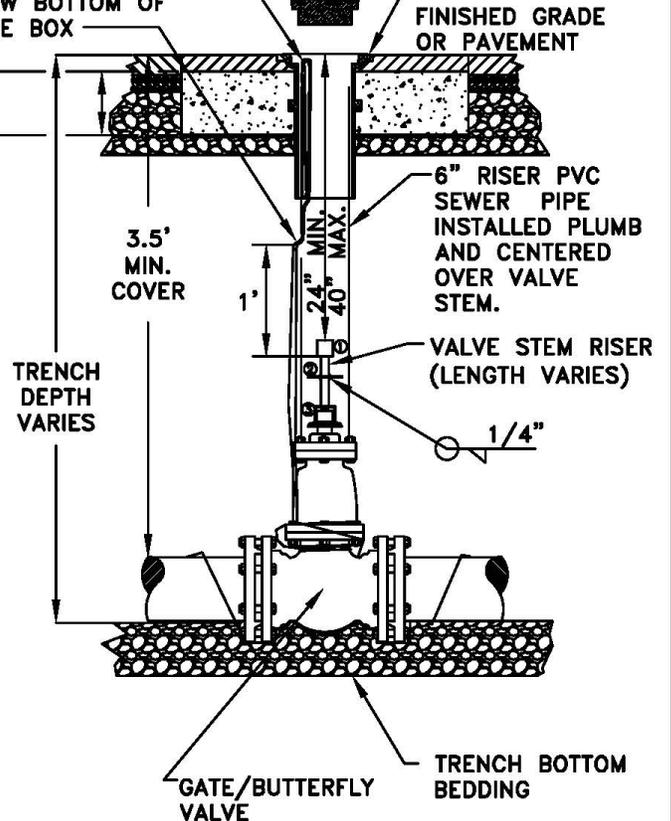
INSIDE PAVED ROADWAY



OUTSIDE PAVED AREA

LEAVE 36" LOOP OF WIRE AT THE TOP

SLOT FOR TRACER WIRE CUT VERTICALLY 1' ABOVE HUB OR 6" BELOW BOTTOM OF VALVE BOX



**GENERAL NOTES:**

1. ALL VALVES SHALL HAVE A U.S.E. 12 GAUGE BLUE COATED COPPER TRACER WIRE TIED OFF AT VALVE BODY. THE WIRE SHALL BE EXTENDED UP ON THE OUTSIDE RISER PIPE A FOOT ABOVE THE VALVE HUB BEFORE THE WIRE IS PUT INTO THE RISER THROUGH A SLOT CUT INTO THE RISER. LEAVE 36" OF WIRE ABOVE THE TOP OF VALVE BOX.
2. ALL WELDS TO THE SHAFT SHALL BE FILLET WELD, AROUND THE ENTIRE PLATE PER #2 BELOW.
3. VALVE BOX AND LID SHALL BE DUCTILE IRON, MANUFACTURED IN THE USA AND SHALL BE A MATCHED SET FROM THE SAME MANUFACTURER.

**VALVE STEM EXTENSION LEGEND**

- ① VALVE OPERATING NUT OR 1-7/8" X 1-7/8" X 2" HIGH GRADE STEEL WELDED TO GUIDE PLATE.
- ② 3/16" THICK X 5 1/5" DIA STEEL GUIDE PLATE WELDED TO RISER SHAFT.
- ③ 2"X2"X 3/16" SQUARE STRUCTURAL STEEL TUBING TO FIT OPERATING NUT. LENGTH AS REQUIRED.

CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS

STANDARD VALVE BOX  
INSTALLATION

APPROVED

CITY ENGINEER

*Ray A. Schoessel*

DWG. NO.

6-12

DES

WHO

DWN

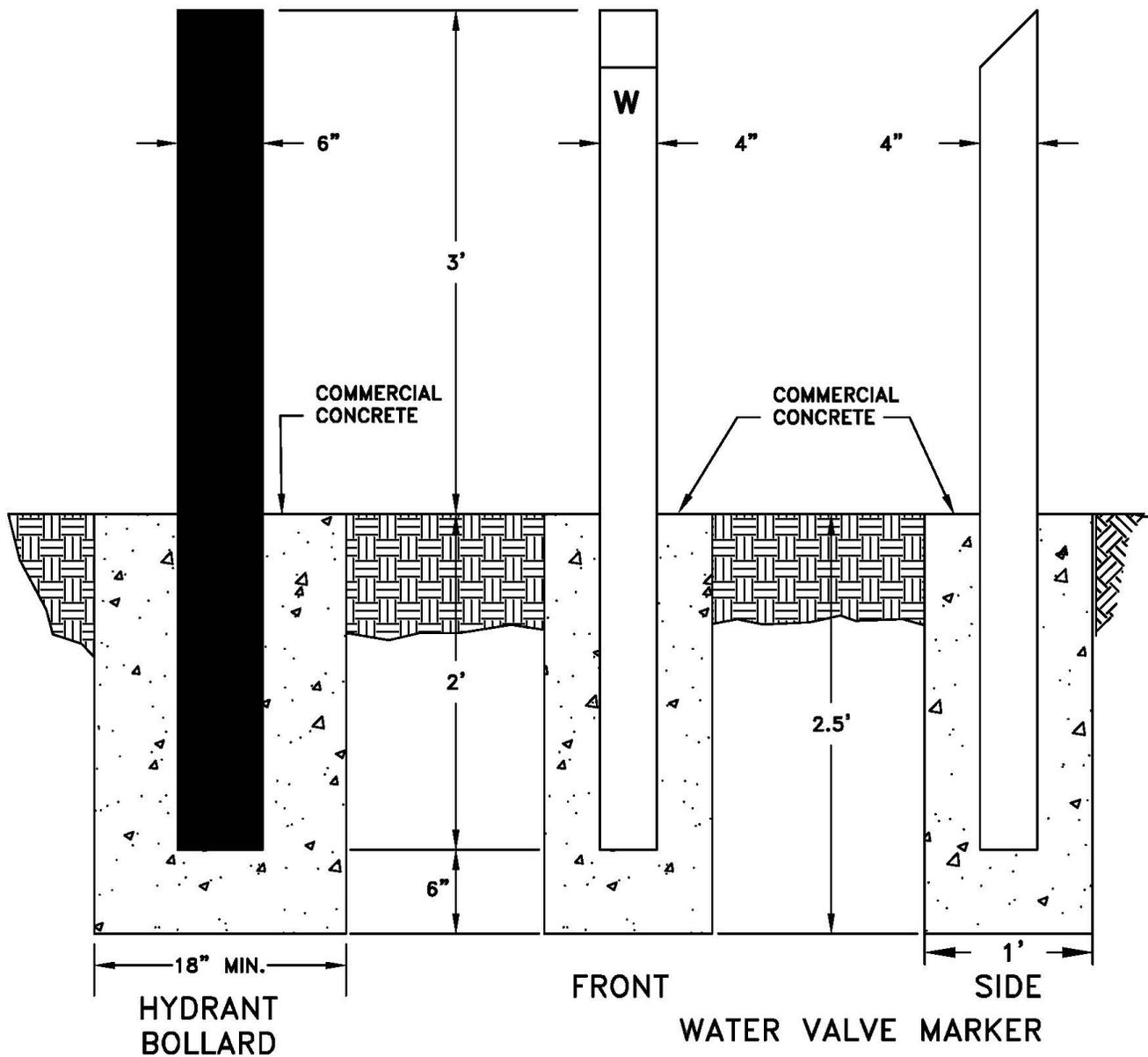
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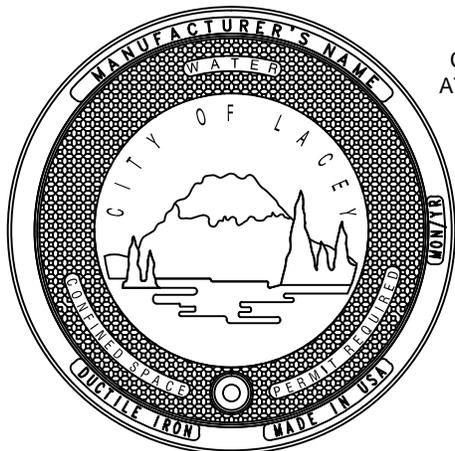
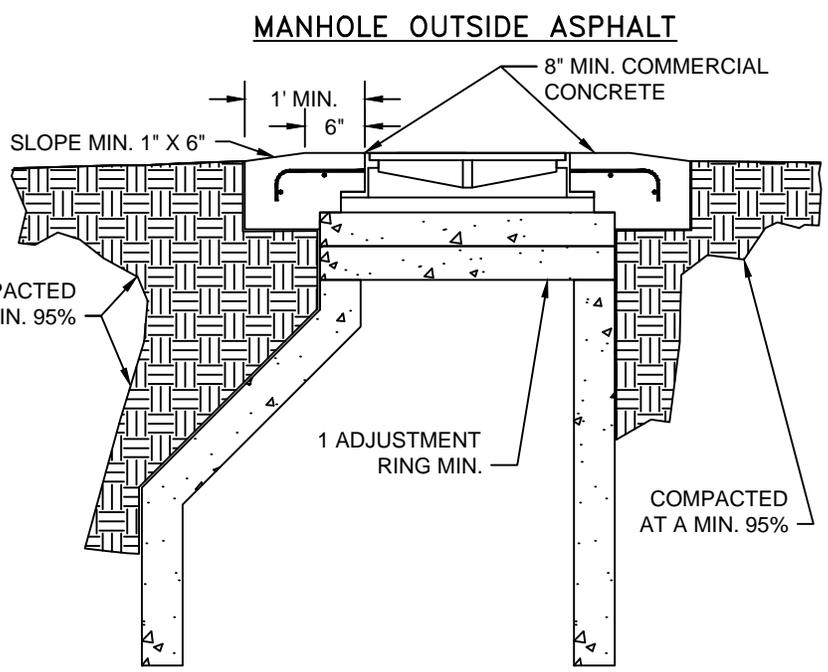
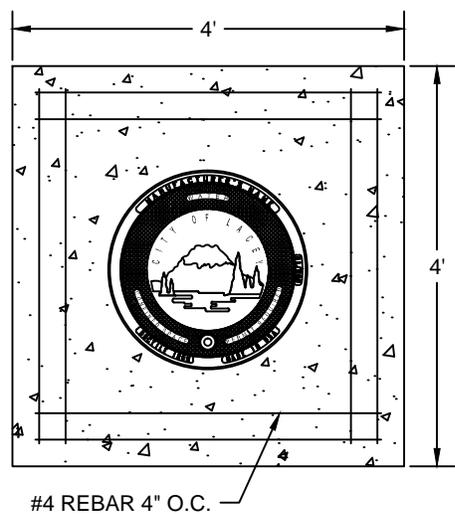
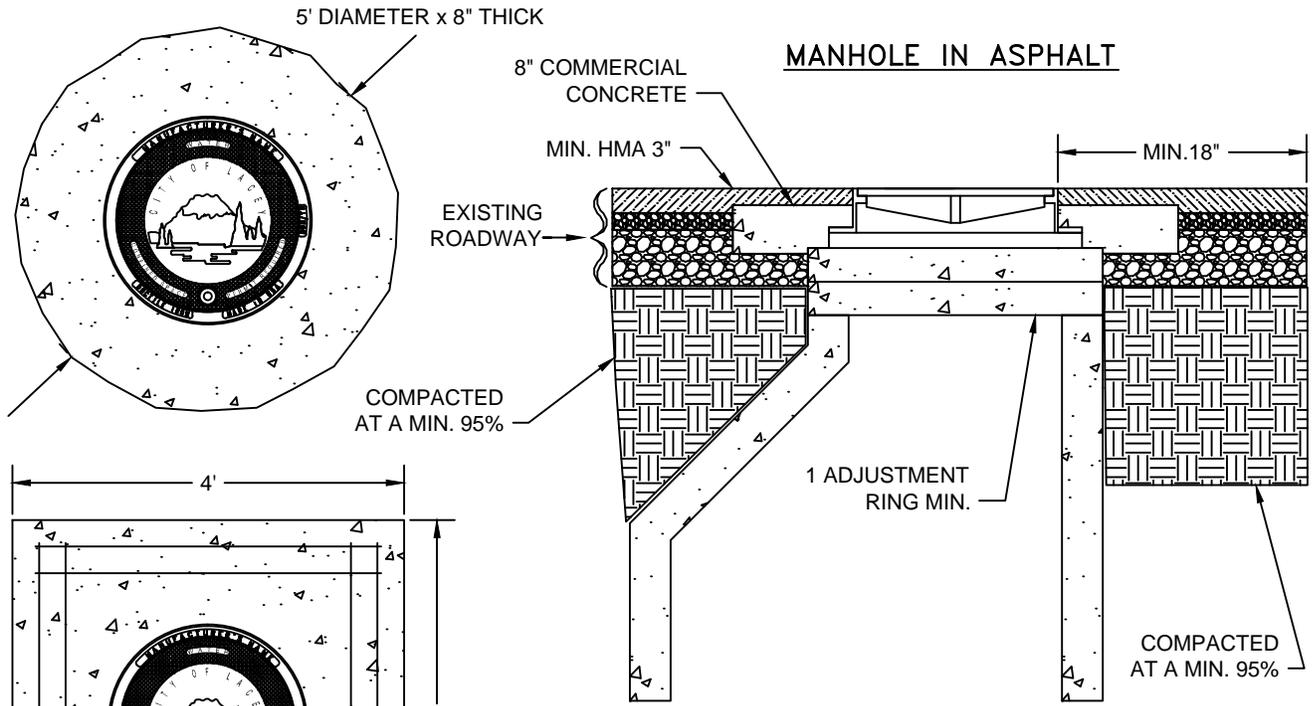
**GENERAL NOTES:**

1. HYDRANT BOLLARDS SHALL BE INSTALLED AT A MINIMUM OF 5' FROM THE HYDRANT SITUATED SO AS NOT TO BLOCK ANY OF THE HYDRANT PORTS.
2. THE HYDRANT BOLLARDS SHALL BE 6" IN DIAMETER SCHEDULE 20 STEEL POST AND FILLED WITH CONCRETE.
3. THE HYDRANT BOLLARDS SHALL BE COATED WITH 1 PRIME COAT AND TWO COATS OUTDOOR OIL BASE EMANEL THE SAME COLOR AS THE HYDRANT SEE DETAIL 6-8.
4. WHEN HYDRANT BOLLARDS ARE REQUIRED IN HIGH TRAFFIC AREAS GLASS BEADS SHALL BE SPRAYED OR PLACE ON TO THE WET PAINT TO PROVIDE BETTER VISABILITY AT NIGHT.

**GENERAL NOTES:**

1. 4" SCHEDULE 40 STEEL OR REINFORCED CONCRETE MARKER POST STAMPED WITH "W" AND DISTANCE TO VALVE.
2. THE POST TO BE COATED WITH ONE PRIME COAT AND TWO COATS OF OUTDOOR OIL BASE ENAMEL (WHITE).

<b>CITY OF LACEY, WASHINGTON</b>			
<b>DEPT. OF PUBLIC WORKS</b>			
<b>HYDRANT BOLLARD &amp; WATER VALVE MARKER POST DETAIL</b>			
APPROVED <i>Rog A Schoessel</i> CITY ENGINEER		DWG. NO. <b>6-13</b>	
DES WHO	DWN WHO	CKD RAS	DATE 12/15/2014



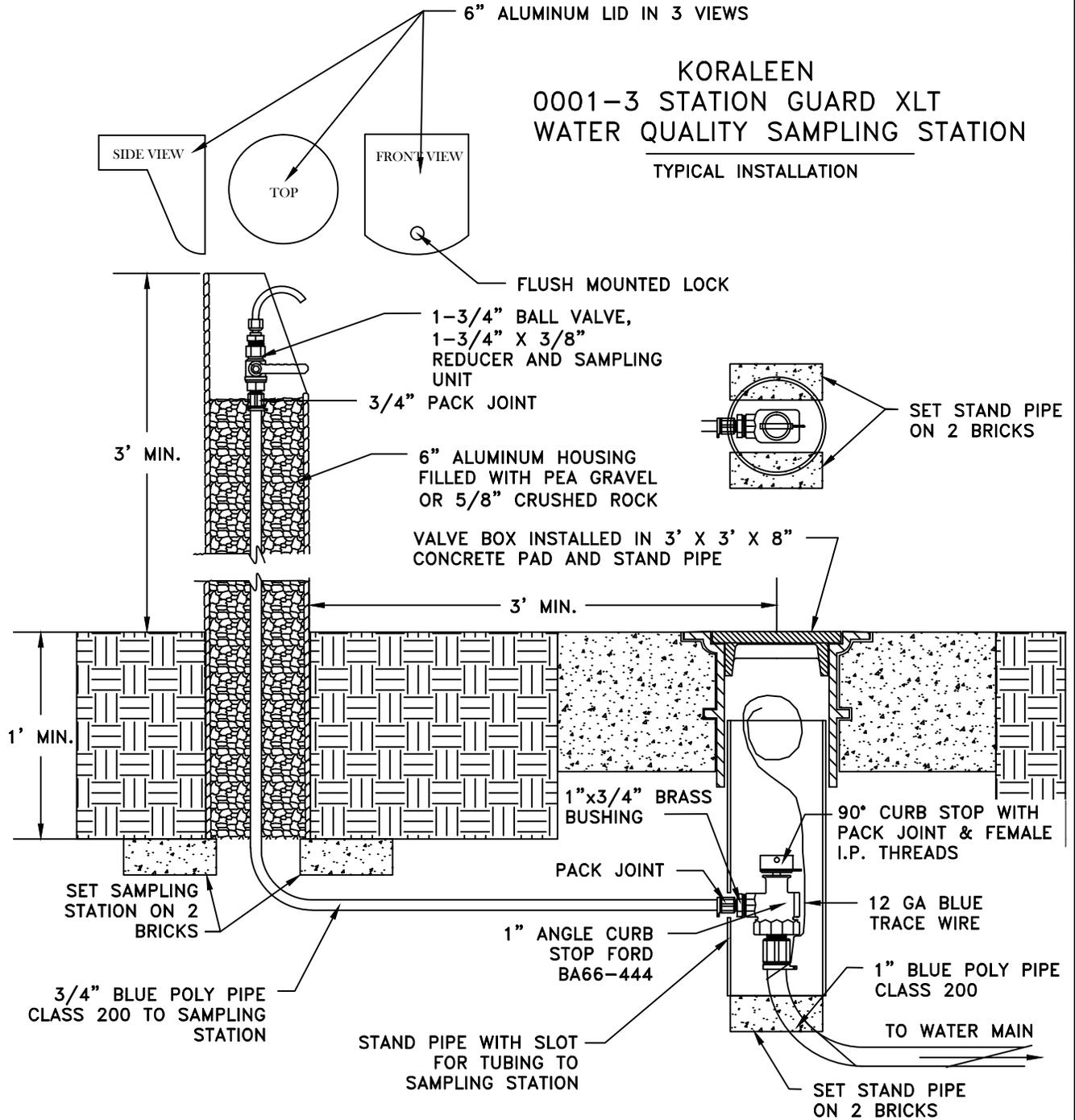
NTS

- GENERAL NOTES:
1. ALL CONCRETE PADS FOR MANHOLES OUTSIDE THE ASPHALT SHALL HAVE REINFORCING STEEL AS SHOWN ABOVE, DEFORMED BAR TO MEET ASTM A615 GRADE 60 FY=60,000 P.S.I.
  2. ALL MANHOLE FRAME AND COVER ASSEMBLIES SHALL BE EJCO OR OLYMPIC FOUNDRY, WSDOT STYLE #41 WITH THE CITY LOGO STAMPED IN IT, DUCTILE IRON AND MANUFACTURED IN THE USA.
  3. ADJUST GRADE RINGS WITH BRICK WEDGES OR GROUT. NO WOOD OR ROCKS SHALL BE USED AS ADJUSTMENT SPACERS.

CITY OF LACEY, WASHINGTON			
DEPT. OF PUBLIC WORKS			
WATER MANHOLE LOGO			
COVER & FRAME			
INSTALLATION			
APPROVED			DWG. NO.
<i>Ray A. Schoenel</i>			6-16
CITY ENGINEER			
DES.	DWN.	CKD.	DATE
WHO	WHO	RAS	12/15/2014

KORALEEN  
0001-3 STATION GUARD XLT  
WATER QUALITY SAMPLING STATION

TYPICAL INSTALLATION



GENERAL NOTES:

1. THE KORALEEN SAMPLING STATION SHALL BE INSTALLED BEHIND THE SIDEWALK WITHIN 1 FOOT OF THE PROPERTY LINE AND WHEN POSSIBLE IN A OPEN SPACE. THE VALVE BOX SHALL BE INSTALLED IN THE PLANTER STRIP IN A CONCRETE PAD.
2. THE STAND PIPE SHALL REST ON A BRICK TO PROTECT THE WATER LINE FROM BEING CRUSHED.
3. A TRACER WIRE SHALL BE INSTALLED WITH THE WATER LINE.

DG6-17.DWG

CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS

KORALEEN SAMPLING  
STATION

APPROVED

*Ray A. Schoenel*  
CITY ENGINEER

DWG. NO.

6-17

DES.

WHO

DWN.

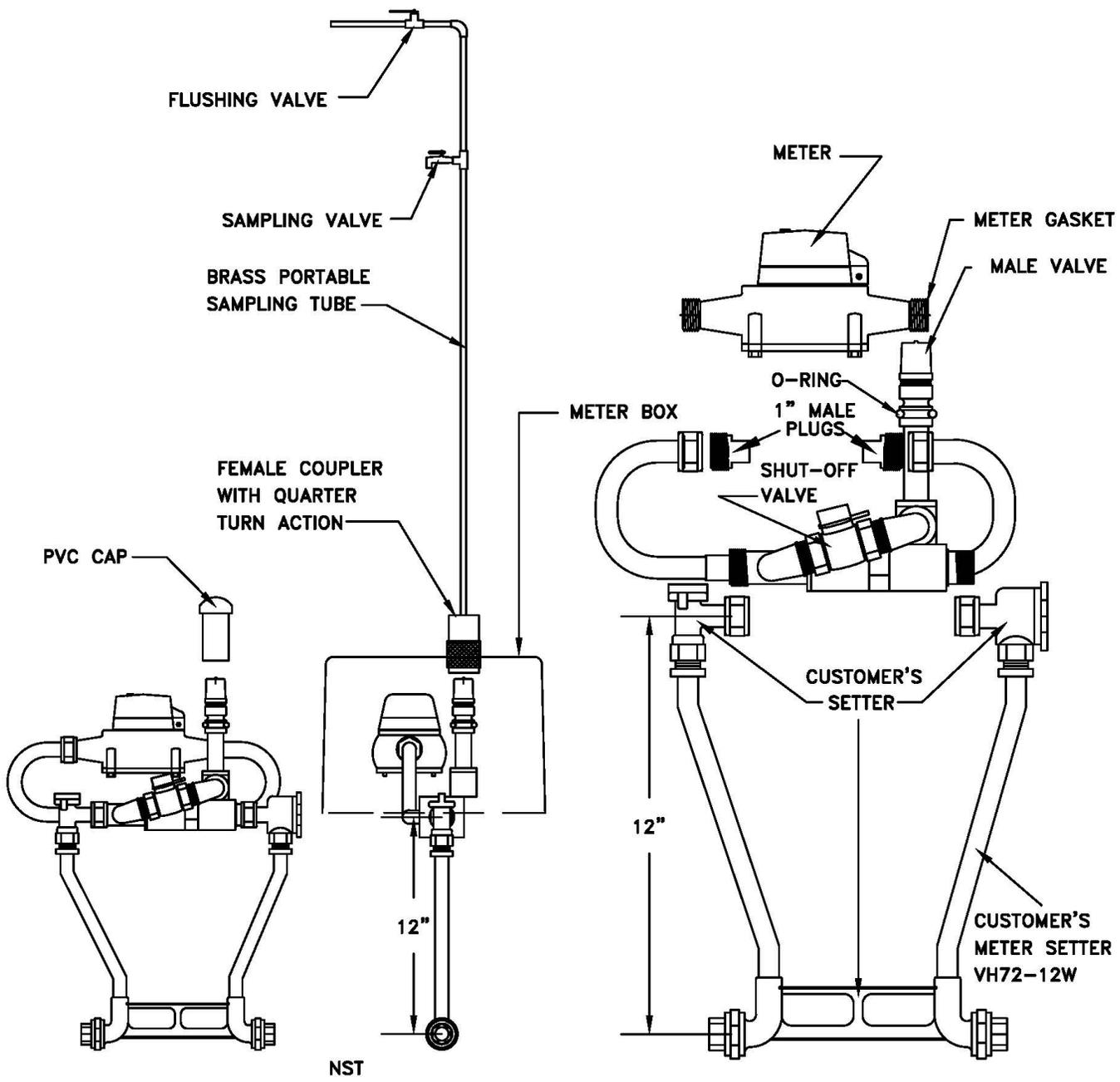
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DATE

12/15/2014

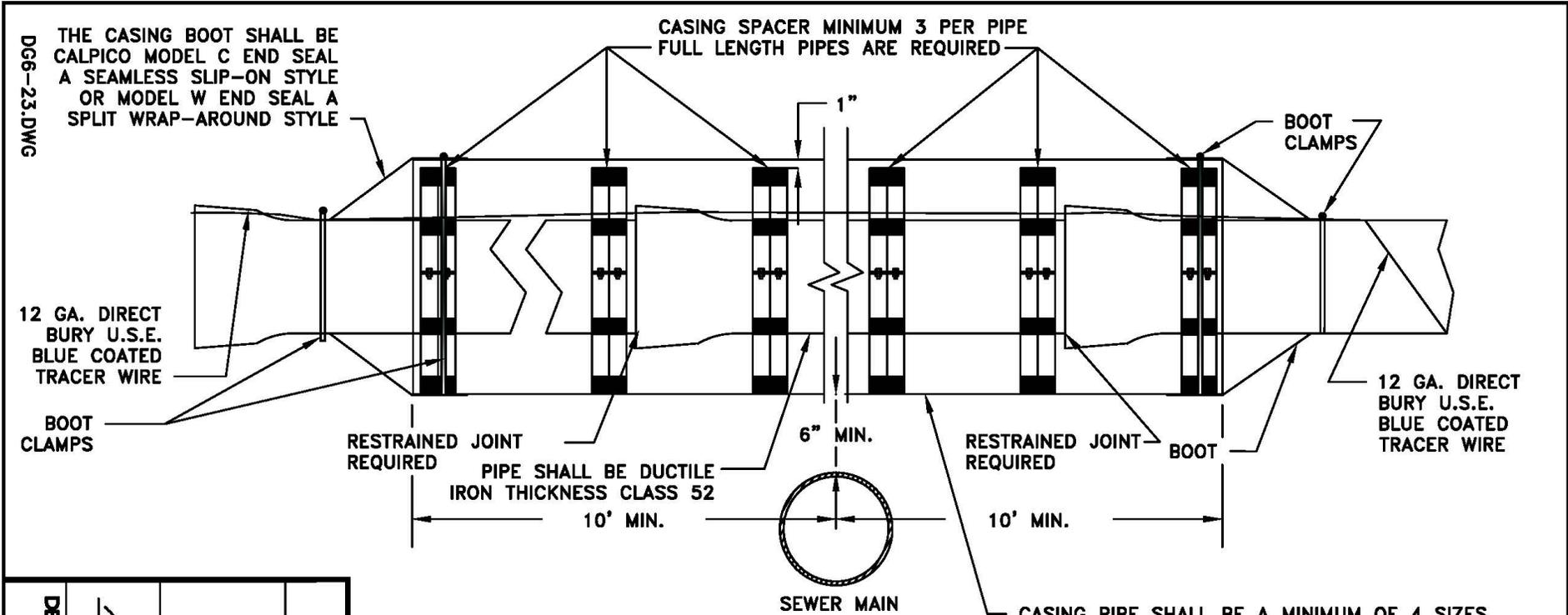


**GENERAL NOTES:**

1. PROVIDE THE CITY WITH A BRASS PORTABLE SAMPLING TUBE.
2. PROVIDE 2 EACH 1" MALE PLUGS TO CAP AND PROTECT THE SAMPLING UNIT.
3. THE SAMPLING STATION SHALL BE INSTALLED IN THE CUSTOMER'S METER SETTER. A SEPARATE METER SETTER IS NOT REQUIRED.

DG6-18.DWG

<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>#93-WM SAMPLING STATION</b>			
APPROVED <i>Rog A. Schoenel</i> CITY ENGINEER			DWG. NO. 6-18
DES. WHO	DWN. WHO	CKD. RAS	DATE 12/15/2014



CASING PIPE SHALL BE A MINIMUM OF 4 SIZES LARGER THAN THE PIPE BEING INSTALLED. CASING PIPE SHALL BE 1/4" STEEL, DUCTILE IRON OR IN SPECIAL CASES WITH THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS C-900 DR14

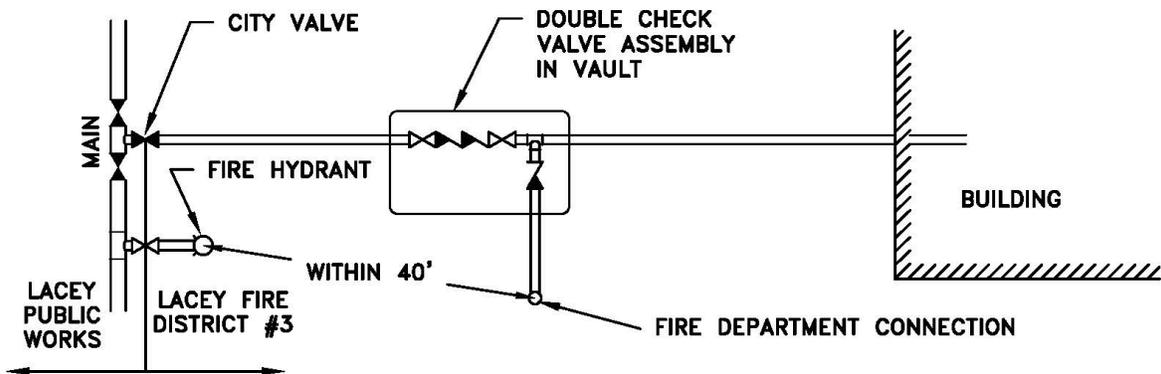
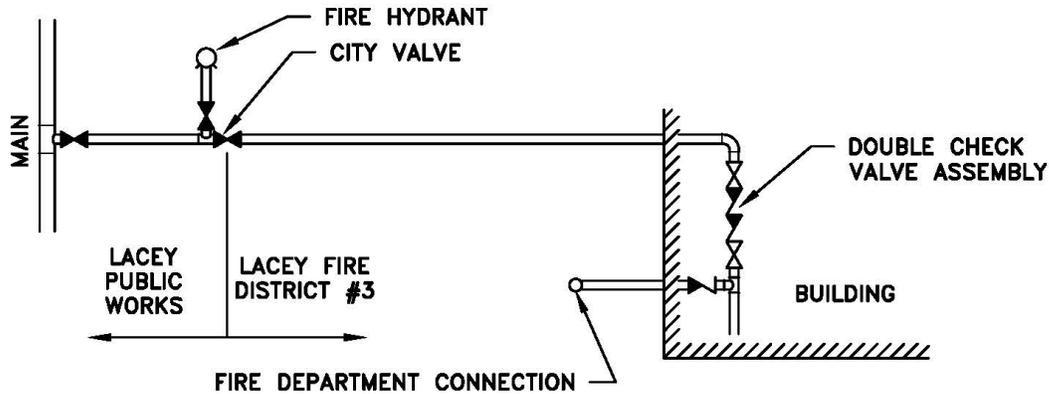
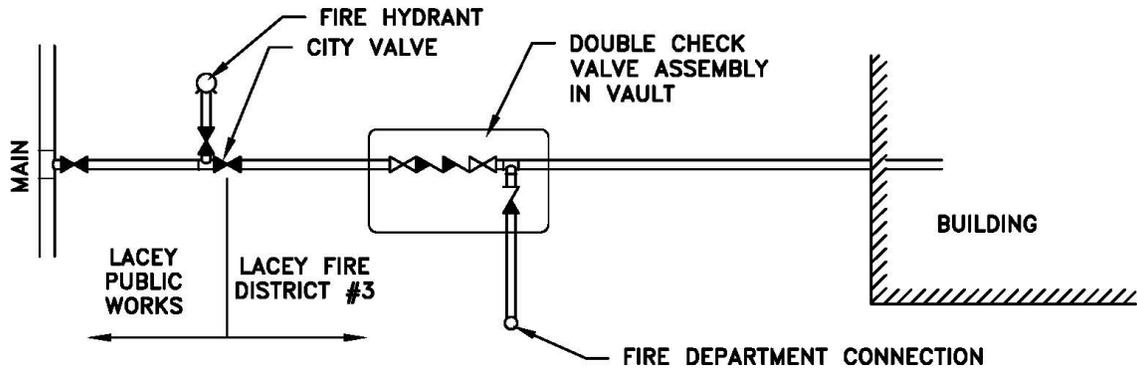
**GENERAL NOTES:**

1. MANUFACTURED CASING SPACERS ARE REQUIRED AND SHALL BE UNI-FLANGE OR CALPICO INC. PRODUCTS OR AS APPROVED BY THE CITY OF LACEY.
2. THE PIPE LENGTHS SHALL BE 20' WITH A MINIMUM OF 3 CASING SPACERS PER PIPE.
3. THERE SHALL BE NO MORE THAN 1" OF CLEARANCE BETWEEN THE TOP OF THE SPACER TO THE TOP OF THE CASING.
4. ALL JOINTS FOR THE PIPE BEING INSTALLED SHALL BE RESTRAINED.
5. IF PLASTIC PIPE IS ALLOWED BY THE CITY THE RESTRAINTS SHALL BE APPROVED BEFORE IT CAN BE ORDERED.
6. SINCE MOST CASING SPACERS ARE MANUFACTURED WHEN ORDERED ALL OF THE ABOVE INFORMATION SHOULD BE OBTAINED AS EARLY AS POSSIBLE SO THERE IS NO DELAY IN THE PROJECT.

<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>WATER PIPE ENCASEMENT REQUIREMENTS</b>			
APPROVED	<i>Ray A. Sebastian</i>		
CITY ENGINEER			
DEB.	DWN.	OKD.	DATE
WHO	WHO	RAS	12/15/2014
		DWG. NO.	6-23

DG6-23.DWG

THE CASING BOOT SHALL BE CALPICO MODEL C END SEAL A SEAMLESS SLIP-ON STYLE OR MODEL W END SEAL A SPLIT WRAP-AROUND STYLE



**GENERAL NOTES:**

1. THE CITY OF LACEY INSPECTOR SHALL WITNESS THE TESTING OF THE WATER MAINS AND HYDRANTS TO THE CITY'S VALVE. THE REQUIREMENT FOR DISINFECTING AND PURITY SHALL BE PER SECTION 6.200. NOTIFY THE CITY INSPECTOR FOR ALL TESTING THAT IS REQUIRED.
2. ALL FIRE SPRINKLER MAINS SHALL BE DUCTILE IRON CLASS 52 WITH 12 GA. BLUE COATED TRACER WIRE TO THE DCVA IN A VAULT OR AT THE BUILDING.
3. SEE CHAPTER 6.110 FOR MORE INFORMATION ON BACKFLOW PREVENTION.
4. ALL HYDRANTS SHALL BE INSTALLED ON THE UP STREAM SIDE OF THE FIRE LINE CONNECTION.
5. THERE SHALL BE 3 VALVES ON A TEE AND 4 VALVES ON A CROSS WHEN THE CITY'S WATER MAIN SERVICES A FIRE LINE OR AS DEEMED NECESSARY BY THE FIRE MARSHAL.
6. THE FDC SHALL BE LOCATED WITHIN 40' OF A HYDRANT.

7. ALL FIRE SPRINKLER MAINS SHALL BE TESTED AND PURIFIED TO THE 1ST VALVE AT THE DCDA.

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**FIRE SPRINKLER  
UNDERGROUND  
TESTING LIMITS**

APPROVED

*Reg A Schoenel*  
CITY ENGINEER

DWG. NO.

6-25.1

DES

LRW

DWN

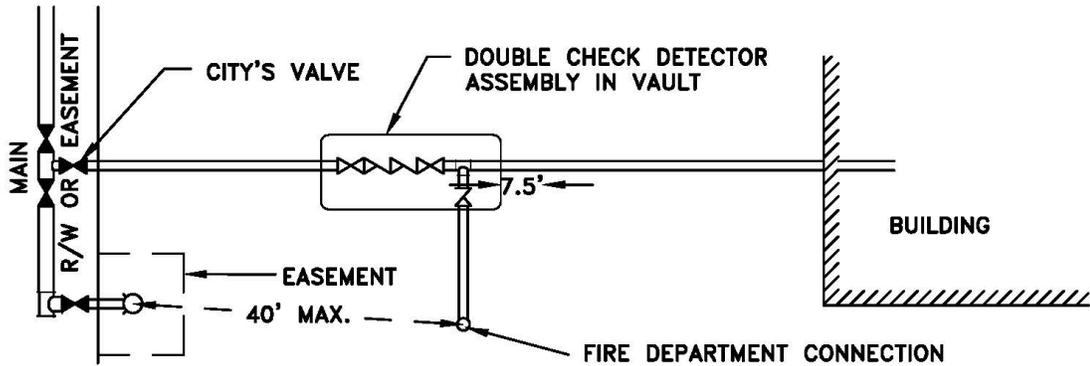
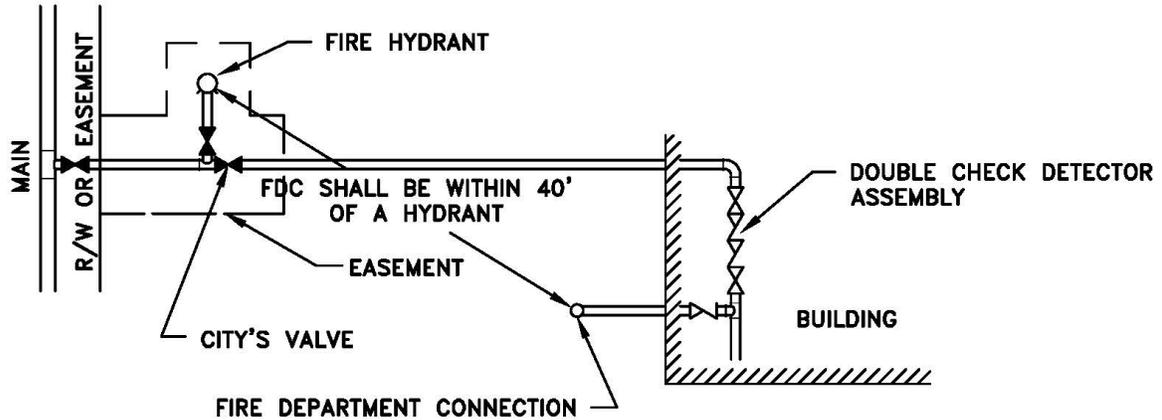
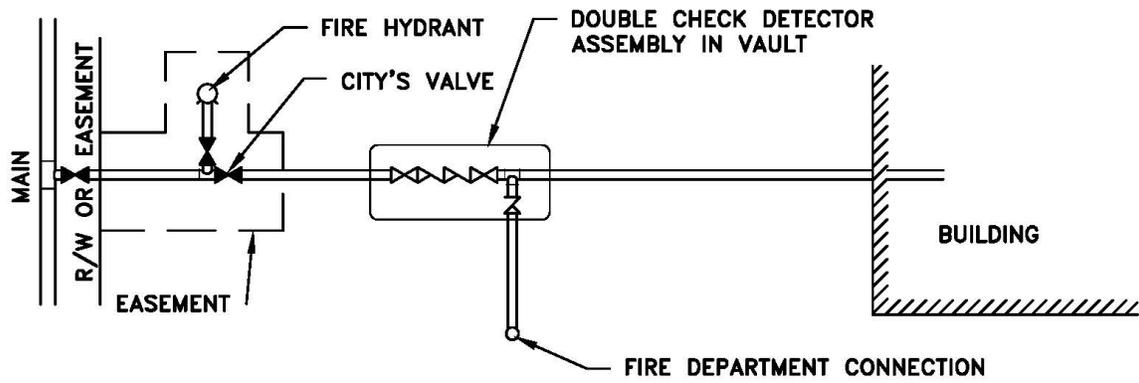
WHO

CKD

RAS

DATE

12/15/2014



**GENERAL NOTES:**

1. ALL PIPE EASEMENTS SHALL BE A MINIMUM 15 FEET WIDE WITH THE PIPE CENTERED IN THE EASEMENT.
2. ALL EASEMENTS SHALL END BEHIND THE CITY'S VALVE UNLESS OTHERWISE DIRECTED BY THE CITY.
3. ALL UNDERGROUND SPRINKLER PIPING FROM THE CITY'S VALVE TO THE DCDA SHALL BE TESTED, FLUSHED AND SAMPLED.
4. THE FDC SHALL BE LOCATED WITHIN 40' OF A HYDRANT.
5. HYDRANTS SHALL BE PLACED ON THE UP STREAM SIDE OF THE FIRE CONNECTION.
6. ALL FIRE SPRINKLER MAINS SHALL BE DUCTILE IRON THICKNESS CLASS 52 WITH 12 GA. BLUE COATED TRACER WIRE TO THE DCDA IN A VAULT OR AT THE BUILDING.

**CITY OF LACEY, WASHINGTON  
DEPT. OF PUBLIC WORKS**

**FIRE SPRINKLER  
UNDERGROUND  
EASEMENT LIMITS**

APPROVED

*Reg A Schoenel*

CITY ENGINEER

DWG. NO.

6-25.2

DES

LRW

DWN

WHO

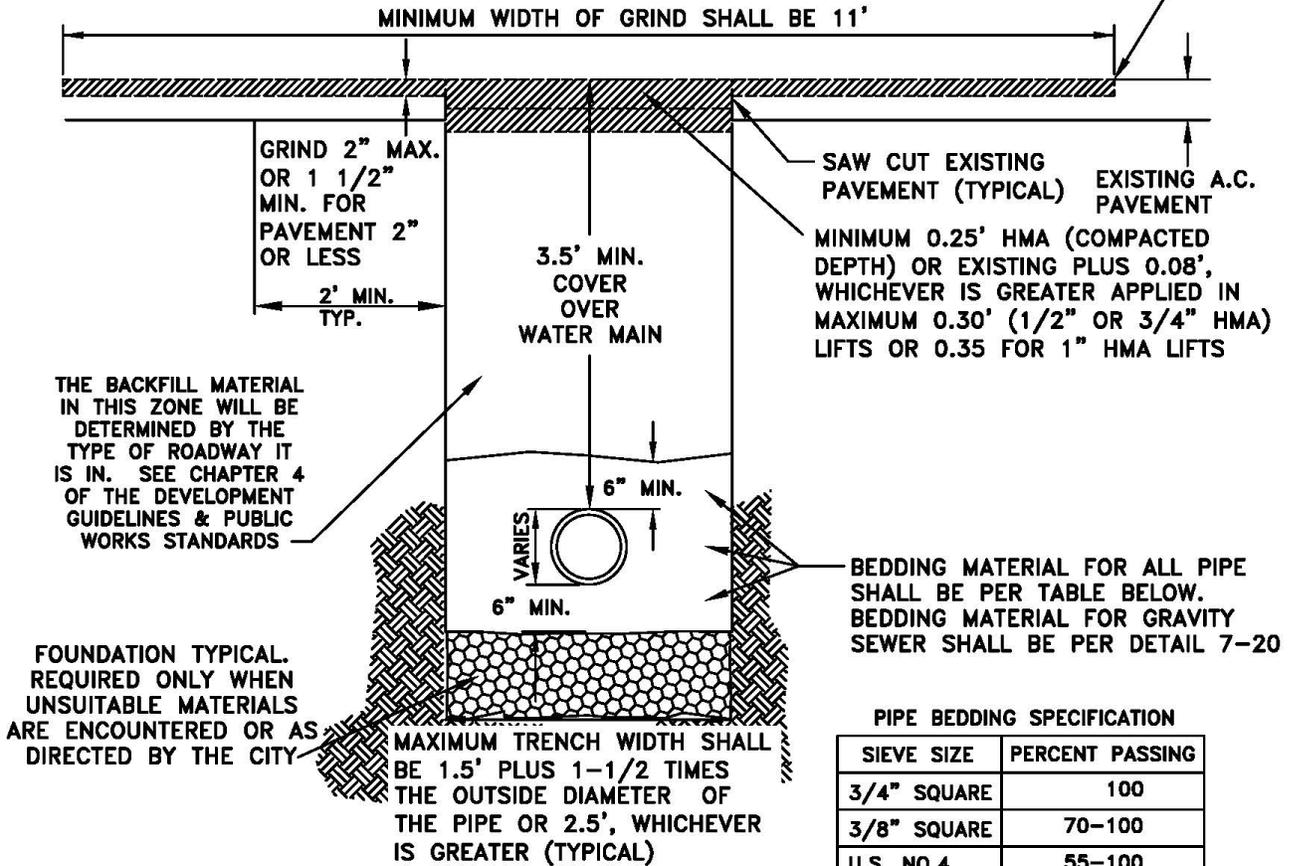
CKD

RAS

DATE

12/15/2014

EMULSIFIED ASPHALT GRADE  
 CSS-1 TACK SHALL BE APPLIED  
 TO EDGES OF EXISTING PAVEMENT.  
 ALL JOINTS SHALL BE SEALED  
 USING PAVING ASPHALT PG 64-22



PIPE BEDDING SPECIFICATION

SIEVE SIZE	PERCENT PASSING
3/4" SQUARE	100
3/8" SQUARE	70-100
U.S. NO. 4	55-100
U.S. NO. 10	35-95
U.S. NO. 20	20-80
U.S. NO. 40	10-55
U.S. NO. 100	0-10
U.S. NO. 200	0-03

GENERAL NOTES:

1. ALL MATERIALS EXCEPT H.M.A. SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY AS DETERMINED BY ASTM D1557.
2. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF LACEY STANDARDS.
3. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
4. WHENEVER GROUND WATER IS PRESENT A BARRIER SHALL BE INSTALLED ABOVE THE BEDDING.

CITY OF LACEY, WASHINGTON  
 DEPT. OF PUBLIC WORKS

PIPE ZONE BEDDING FOR  
 WATER MAINS & SERVICES

APPROVED

*Reg A Schoessel*  
 CITY ENGINEER

DWG. NO.

6-26

DES

WHO

DWN

WHO

CKD

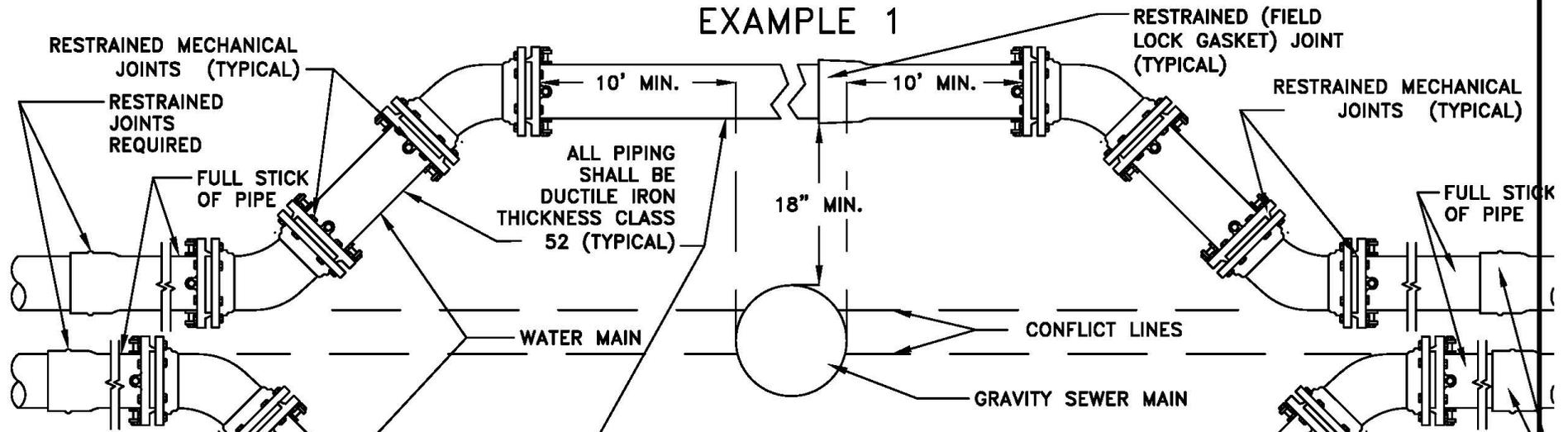
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DATE

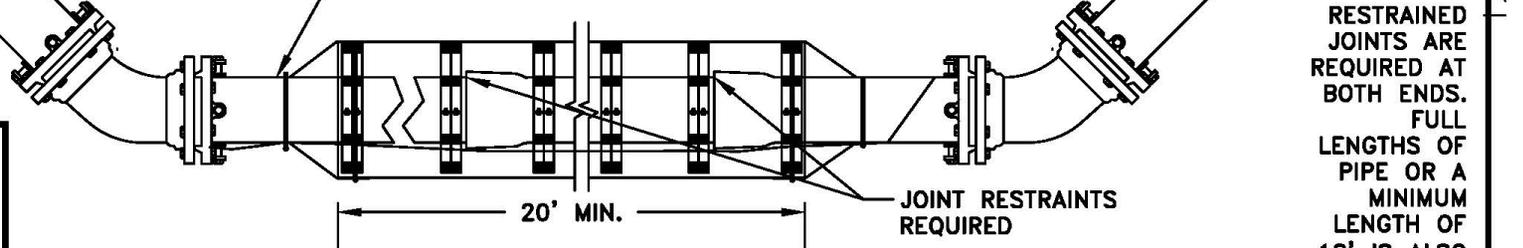
12/15/2014

066-27.DWG

**EXAMPLE 1**



**EXAMPLE 2**



**GENERAL NOTES:**

1. THE ENTIRE RUN SHALL BE DUCTILE IRON AND RESTRAINED.
2. FOR CASING REQUIREMENTS SEE DETAIL 6-23.
3. A FULL LENGTH OF PIPE SHALL BE INSTALLED AT BOTH BEGINNING AND END OF THE DEFLECTED RUNS. SEE ABOVE DETAIL.
4. THE FIRST BELL END JOINT BEFORE AND AFTER THE DEFLECTED RUNS SHALL BE RESTRAINED. OTHER RESTRAINTS SHALL BE INSTALLED AS DIRECTED BY THE CITY.
5. WHEN THE WATER MAIN IS REQUIRED TO BE INSTALLED OVER THE SEWER MAIN (DEFLECTED) AND DOES NOT MEET THE 18" SEPARATION, A CASING SHALL BE INSTALLED USING EXAMPLE 2 AS A GUIDE.
6. THE MINIMUM DEPTH OF THE WATERMAIN SHALL BE 3.5' BUT WHEN DEFLECTING THE WATER MAIN OVER THE SEWER MAIN USING A CASING THE SEPARATION BETWEEN THE BOTTOM OF THE CASING AND THE TOP OF THE SEWER MAIN MAY BE 6".
7. WHEN DEFLECTING THE WATER MAIN OVER THE SEWER MAIN WITHOUT A CASING THE MINIMUM DEPTH OF THE DEFLECTED WATER MAIN MAY BE 3'. THE MINIMUM SEPARATION BETWEEN THE BOTTOM OF THE WATER MAIN AND TOP OF THE SEWER MAIN SHALL BE 18".
8. AT NO TIME SHALL A PRESSURE SEWER MAIN BE INSTALLED OVER THE WATER MAIN OR SERVICE.

<b>CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS</b>			
<b>DEFLECTED WATER MAIN INSTALLATION FOR GRAVITY SEWER ONLY</b>			
DESIGNED BY WHO	DRAWN BY WHO	CHECKED BY RAS	DATE 12/15/2014
APPROVED <i>Rog A Schwend</i> CITY ENGINEER		DWG. NO. 6-27	