CITY OF BLACK DIAMOND

February 26, 2009 Workstudy Agenda

25510 Lawson St., Black Diamond, Washington

Workstudies are meetings for Council to review upcoming and pertinent business of the City. Public testimony is only accepted at the discretion of the Council

6:00 P.M. – CALL TO ORDER, ROLL CALL

1.) Water Standards – Mr. Boettcher

2.) Adjournment

CHAPTER 6
WATER

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CHAPTER 6 - WATER

6.1 WATER PLANNING / DESIGN STANDARDS

6.1.01 OVERVIEW

These Engineering Standards set forth the minimum standards for the planning, design, and construction of water facilities.

The Black Diamond Municipal Code Public Service Chapter 13.04 is the basis for these Standards.

These standards do not include design of special facilities, such as Pump Stations or Reservoirs. These special facilities require unique design requirements and will be subject to individual review and approval by the City.

Although these standards are intended to apply to physical development within the City, the standards will not apply for all situations. Compliance with these standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

6.1.02 GENERAL REQUIREMENTS

See Chapter One. Stand alone

6.1.03 GENERAL WATER DESIGN STANDARDS

A. Prior to construction, the Contractor shall notify the City for a pre-construction meeting. The Contractor's representative who will be the day-to-day on-site person in charge shall be in attendance with the applicant at the preconstruction meeting. A video tape of the project before construction shall be performed.

B. Work shall be performed only by contractors experienced in laying public water mains.

C. Prior to any work being performed, the Contractor shall contact the City's Utilities Superintendent or City Engineer to set forth his proposed work schedule.

D. Contractor shall deliver material submittal for all materials to be used ~~from~~ to the City's Water Superintendent and/or City Engineer prior to delivery of materials to the site. City Water Department representative shall be on site to inspect materials prior to ~~unloading~~ installation. Contact the City's Utility Superintendent to schedule delivery time and date. ~~Any materials unloaded without inspection shall be removed from the site~~.

E. Water mains shall be laid only in dedicated streets or in 15' (minimum width) easements which have been granted to the City. Off-site easements shall be dedicated to the City prior to any work within such easements. All easements shall be clearly shown and labeled on plans.

F. All water main distribution pipeline construction shall have a minimum 36" cover from finished grade and 42" cover over transmission mains. Water mains shall be extended to the far property line(s) of the property being served. Off-site extensions may be required to hydraulically loop existing and new systems. Oversizing of water mains may be required to be installed per City's current Water Comprehensive Plan. 8" ductile iron pipe is the minimum size required.

G. Fire hydrants are generally required approximately every 500' in residential areas, and every 250' in commercial areas. However, fire hydrants shall be furnished and installed at all locations as specifically mandated by the fire marshall and/or per City Building Code.

H. Fire hydrants on dead end streets and roads shall be located within approximately 300' from the frontage center of the farthest lot. Distances required herein shall be measured linearly along street or road.

Pipes connecting hydrants to mains shall be at least 6" diameter and not longer than 50'.

J. Dead end lines are not permitted ~~except where the Developer can demonstrate to the City's satisfaction that it would be impractical to extend the line at a future date~~. Water mains on platted cul-de-sacs shall be extended ~~off-site~~ to create a hydraulic loop. ~~When this is impractical, the water mains shall extend to the plat line beyond the cul-de-sac to neighboring property for a convenient future connection. Fire hydrants shall be installed at or on the termination point~~.

K. All materials shall be new and undamaged.

L. The water main shall be cement lined, ductile iron pipe class 52. The minimum nominal size for water mains shall be 8", unless otherwise approved/required by City Engineer. EXCEPTION: 6" hydrant spools and pipelines located beneath rock or retaining walls shall be Cl. 53 and shall be contained inside steel sleeves.

M. All fittings shall be cement-lined ductile iron.

N. Pipe deflection at the joints shall be in accordandance with pipe manufacturer's recommendations.

O. All valve marker posts shall be painted yellow and marked with the distance to valve being referenced in unpaved areas.

combine to one section

move to this section

move to this section and combine

P. Residential water service pipe shall be 1" high plastic "Poly" pipe (no joints beneath pavement areas or from main to setter), meeting or exceed ASTM D2239, SDR-7 as manufactured by Driscopipe (CL 200), or City approved equivalent.

Q. Meter services and meter boxes shall be set to final grade. Centerline of service inlets shall be located to match bottom elevation of meter box in such a manner that meter inlet and outlet will be the same elevation as bottom of meter box. Service inlet shall be centered at inlet end of box and faced toward outlet end of box parallel with long sides.

R. All water services shall end within road right-of-way or easements and are not allowed in driveways or sidewalks unless approved by the City.

S. All meters shall be installed by the City, and the Developer/Owner shall pay the current meter installation charge and any other water system fees, costs or charges.

T. One water sampling station may be required for developments in size of five lots or larger as required by the City. The water sampling shall be ~~furnished and~~ installed at a location determined by the City. One additional sampling station may be required for each additional 50 lots or portion thereof. Location(s) shall be determined by the City of Black Diamond Water Department.

U. All new buildings and residences shall include in their water service a suitable shut off check valve ~~unless waived on the application form of the City~~. Shut off shall be accessibly located on the customer side of the meter setter.

V. All new construction shall comply with the "Accepted procedure and practice in Cross Connection Control Manual" as published by the Pacific Northwest Section of the American Water Works Association", 1996, Sixth Edition, and current amendments thereto. ~~A copy of such is available for review at the City office.~~

W. Each fitting/valve shall have attachment type listed (e.g. FL, MJ, FL x MJ, etc.). Watermain shut-off shall be coordinated with the Water Department for preferred timing during flow control conditions. Cut in connections shall not be made on Fridays, holidays or weekends. All tapping sleeves and tapping valves shall be pressure tested prior to making connection to existing mains.

X. Contractor shall notify City's Water Superintendent and obtain approval of schedule for water shut-off or turn-on, affecting the water system, a minimum of 48 hours in advance. Valves shall only be operated by City forces.

Y. Road restoration shall be per City, County or State design and construction standards, as may be applicable. Developer and Contractor shall become familiar with all State, County and City conditions of required permits, and shall adhere to all conditions and requirements.

Z. Provide air vacuum release assemblies where required (typically at the high points of the water system).

AA. List pipe length (from center-of-fitting to center-of-fitting), size, and material along side of each pipe, e.g. 150 L.F. - 8" D.I.. Pipe material can be listed in a general note in lieu of listing along each pipe.

BB. Dimension existing and new main locations from right-of-way line and/or property line, or label stations and offsets.

CC. Blocking

Provide thrust blocking at all fittings and bends in accordance with the City standards. ~~Provide anchor blocking at all fittings and bends in accordance with the City Standards. All blocking shall be designed by the Developer's Engineer.~~ At vertical bends, pipe shall be restrained a minimum of 36' (2 joints) from each side of bend. Reduced-size concrete blocks shall be installed at bends. No change in pipe direction or diameter shall occur within 36' of the vertical bend. In addition, bends, tees, reducers, etc., beyond the 36' limit, shall be restrained with standard blocking. Where this criteria cannot be met, plans should call for vertical blocking without joint restraint, or a restraint method should be designed and detailed on the plan.

- Check if special blocking or joint restraint designs are necessary (e.g. poor soil, conflicting utility, etc.).
- Show all blocking on any detail drawing that shows vertical bends.
- See Approved Materials List for joint restraint methods, other than concrete blocking.

DD. Drawings shall reference distance to nearest existing valve and/or hydrant from new point of connection to existing watermain.

EE. Where hydrants are not available, provide temporary 2" blow off assemblies for testing and disinfection of new 8" watermains or 4" blow off assemblies for 12" or larger watermains. Place blow-off at high end of line, where possible.

FF. Cap end of existing water lines to be abandoned as follows:

- Asbestos cement lines: use end cap coupling.
- Cast or ductile iron lines: use MJ cap or plug.

GG. Pressure reducing station plans should show location of pressure relief discharge pipe and discharge point of floor drain piping (drain to daylight or sump pump if drain to daylight is unavailable). Pressure relief discharge pipe shall be shown at a location that will not be subject to damage or erosion during discharge of water (to storm system if available).

HH. All water vaults (water service, backflow device, pressure reducing station, etc.) shall include designs for floor drain piping draining to daylight. Discharge point of vault floor drains shall be shown on the plan. Where vault floor drain cannot drain to daylight, consult with the City during project design review to determine the best alternative to a daylight drain (to storm if necessary).

6.1.04 WATER GENERAL PLAN NOTES

The following is a listing of General Notes that should be incorporated on the first water plan sheet. All the notes on the list may not pertain to every project. The Engineer should include only those notes that are relevant to the project and may omit non-relevant notes. If additional notes are needed for specific aspects, they should be added after the General Notes.

Water General Notes: ← space or delete

1. All work shall conform to City of Black Diamond City Engineering Standards and the Developer Extension Agreement.

2. All pipes shall be cement lined, ductile iron class 52 unless otherwise shown. Minimum size water line is 8".

3. All pipe and fittings not to be disinfected in place shall be swabbed with 1% available chlorine solution prior to installation.

4. The new watermain shall be connected to the existing system only after new main is pressure tested, flushed, disinfected, and satisfactory bacteriological sample results are obtained.

5. After disinfecting the watermain, chlorinated water shall be disposed of in a manner that does no physical or environmental damage to property, streams, storm sewers or any waterways.

6. Watermain shut-off shall be coordinated with the City's Utilities Superintendent for preferred timing during flow control conditions. Watermain shut-offs shall not be scheduled to take place on Fridays, or on the day before a City holiday, unless otherwise approved by the City.

7. The locations of all existing utilities shown hereon have been established by field survey or obtained from available records and should therefore be considered approximate only and not necessarily complete. It is the sole responsibility of the contractor to independently verify the accuracy of all utility locations shown, and to further discover and avoid any other utilities not shown hereon which may be affected by the implementation of this plan.

8. Deflect the watermain above or below existing utilities as required to maintain 3' minimum cover and 12" minimum vertical clearance between utilities unless otherwise specified.

9. The watermain shall be installed only after the roadway subgrade is backfilled, graded and compacted in cut and fill areas.

10. Trench backfill of 5/8"-minus crushed rock and surface restoration of existing asphalt pavement shall be as required by these standards (see Trench Restoration detail).

11. All fittings shall be blocked per Standard Detail unless otherwise specified.

12. All water meters shall be 5/8" x 3/4" unless otherwise specified.

13. When working with asbestos cement pipe, the Contractor is required to maintain workers' exposure to asbestos material at or below the limit prescribed in WAC 296-62-07705.

14. Call 1-800-424-5555 a minimum of 48 hours before construction for utility locations.

15. Uniform plumbing code requires the installation of privately owned and operated pressure reducing valves where the operating pressure exceeds 80 psi.

16. The Contractor shall use a vacuum street sweeper to remove dust and debris from pavement areas ~~as directed by the Engineer~~. Care shall be taken to control fugitive dust. Flushing of streets shall not be permitted. Delete

17. Before commencement of trenching, the Contractor shall provide erosion control measures in accordance with these standards and the Department of Ecology requirements.

18. Abandonment of existing water services shall be accomplished as follows:

    a. Remove existing service saddle from water main and replace with new stainless steel repair band, Romac SS2, Romac Service Saddle 101S, or approved equal (will not be required when water main is to be abandoned prior to service demolition).

    b. Remove and return existing meter, setter and meter box to the City of Black Diamond Water Department.

    c. Cap or crimp (if copper) existing service line to be abandoned in place, each end.

19. Where new utility line crosses below an existing AC main, the AC pipe shall be replaced with DI pipe to 3' past each side of the trench. Alternatively, where directed by the Engineer, the trench shall be backfilled with controlled density fill (CDF, aka flowable fill) from bottom of trench to spring line of the AC main.

20. Avoid crossing water or sewer mains at highly acute angles. The smallest angle measure between utilities should be 45 to 90-degrees.

21. Where watermain crosses above or below sanitary sewer, one full length of water pipe shall be centered for maximum joint separation. Encasement may be required at the discretion of the City Engineer.

22. At points where existing thrust blocking is found, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5'.

23. All new buildings and residences shall include in their water service a suitable shut off check valve and PRV ~~unless waived on the application form of the City.~~ Code 6.40 Shut off shall be accessibly located on the customer side of the meter setter. SEE Customer Service detail.

6.1.05 PLANNING CRITERIA

6.1.05.1 MAIN EXTENSIONS AND UPSIZING WATER LINES TO PROPERTY

See City of Black Diamond Municipal Code Section 13.04.040 for specific requirements. Watermains shall be extended to the far property line(s) of the property being served. Off-site extensions may be required to hydraulically loop existing and new system. Dead end lines are not permitted, except by approval of the Public Works Director.

6.1.05.2 PIPE SIZING

Minimum water main size is 8" ductile, larger size pipe will be required if shown in the city's current Comprehensive Water Plan or as deemed necessary based on the project demands. Verification of capacity by the developer's engineer may be required at the request of the City.

6.1.05.3 SYSTEM PARAMETERS

A. Water velocity in mains - velocities shall not exceed 10 feet per second during highest demand and fireflow.

B. Distribution System Pressures (Measured at Finished Floor Building Elevation):

Desirable	-	Minimum	50 psi
		Maximum	80 psi
Allowable	-	Minimum	43 psi
		Maximum	125 psi

Minimum 30 psi is allowed for existing systems.

Individual pressure reducing valves are required to be installed by Developer/Owner on all services.

B. Reservoir Replenishment - Facilities (i.e. transmission mains, pump stations) shall be sized to enable storage facilities to be refilled within 3 days after an emergency or major fire.

6.1.05.4 FIREFLOW REQUIREMENTS

Fireflow requirements shall be as determined by City of Black Diamond. Insert table 4.15 out of water comp plan Page 4-16

The City will determine available fireflow using its computer simulated model. The Developer/Owner shall be responsible for all costs associated with project-specific computer modeling.

Minimum system pressure during fireflow analysis is 20 psi throughout the system.

6.1.06 VALVING

600' maximum distance between valves on distribution mains.

Provide a valve at each end of an easement, except when the developer can demonstrate to the City's satisfaction that it would be impractical.

At watermain intersections, valves shall be placed on 3 out of 4 legs at each cross, and 2 out of 3 legs at each tee (unless tapping an existing watermain).

Additional valves may be required for area isolation.

Air/vacuum relief valves shall be installed at local high points in watermain.

Only one valve is required on the tee serving a fire hydrant.

6.1.07 FIRE HYDRANTS

The following information is provided as a guideline to be used during design. The final number of hydrants and their location shall be approved by the City of Black Diamond and the City's Fire Marshall.

A. ~~Guard posts are to be used only in parking lots when no curbs are present or in exposed areas in parking lots.~~ delete same longer

B. Pipes connecting hydrants to mains shall be 6" in diameter and not longer than 50'.

C. Between the time that the fire hydrant is installed and the completed facility is placed in operation, the fire hydrant shall at all times be wrapped in burlap, or covered in some other suitable manner to clearly indicate that the fire hydrant is not in service.

D. Fire hydrant location:

Single-family residential: Spacing = 500' apart. Coverage =250' from front property line.

Multi-family/commercial: As determined by the fire department,

E. 3' minimum clearance shall be provided around hydrant for operation.

F. When fire hydrants are located in parking lots, or other areas subject to vehicular traffic, hydrant guard posts shall be installed as follows:

Hydrant guard post shall be installed in areas where the hydrant is not protected by a cement concrete curb on all sides where vehicles may have access.

6.1.08 PIPE CLASS / PROTECTION / COVER

A. Pipe shall be ductile iron, class 52. All ductile iron pipe shall conform to ANSI/AWWA C151/A21.51 standards. The pipe shall be cement lined to a minimum thickness of 1/16".

B. Ductile iron pipe shall be encased in a steel or ductile iron casing when crossing under improvements where the ability to remove and replace pipe without disturbance to the improvement is needed. Casings are required when:

- Crossing under rockeries over 5' high.
- Crossing under retaining wall footings over 5' wide.
- Crossing under reinforced earth retaining walls (both wall and reinforcing material).

Casings shall extend a minimum of 5' past each edge of the improvement, or a distance equal to the depth of pipe whichever is greater. The carrier pipe shall be supported by casing spacers and filled with sand.

Minimum clearance between bottom of rockery and top of pipe or casing shall be 2'. The trench shall be backfilled with crushed rock when clearance is less than 3'.

C. Watermain depth of cover:
- 3' minimum from final grade
- 6' maximum from final grade

D. Building setback requirements:
- ~~5' minimum from covered parking to watermain.~~ delete
- 10' minimum from building (and retaining walls) to watermain.
- 20' minimum easement shall be provided between buildings.
- ~~When passing between buildings which are 25' apart or less, ductile iron pipe shall be installed with 2' of pipe cover (5' beyond the limits of each building).~~ delete

6.1.09 CLEARANCES / OTHER UTILITIES

A. All clearances listed below are from edge-to-edge of each pipe and/or appurtenances.

B. Water services and sewer stubs shall have at least 10' horizontal separation.

C. Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90-degrees).

D. At points where thrust blocking is required, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5'.

E. Horizontal clearances from watermain:

Cable TV	5'
Gas	5'
Power	5'
Storm	5'
Sanitary	10'
Telephone, Fiber Optics	5'

F. Vertical clearances from watermain:

Cable TV	12"
Gas	12"
Power	12"
Storm	12"
Sanitary	18" below the water main
Telephone, Fiber Optics	12"

G. Where watermain crosses above or below sanitary sewer, one full length of water pipe shall be used with the pipes centered for maximum joint separation. Washington Department of Ecology criteria will also apply.

H. Send letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At minimum the following utilities should be contacted:

Cable Television
Natural Gas
Power
Sanitary Sewer
Storm Drainage
Telephone, Fiber Optics

I. Draft plans shall be sent to the above listed utilities to allow coordination of projects.

6.1.10 SLOPES

A. Vertical bends shall be used when joint deflection would exceed one-half of pipe manufacturer's recommended maximum deflection.

B. Pipe joints shall be restrained where slopes are 20% or greater. Joint restraint on slopes shall be megalug restrainer for mechanical joint fittings and tie rod/retainer clamp assemblies for DI push on joints or other methods from approved materials list. Anchor blocks shall be used in conjunction with joint restraint where slopes are 20% or greater.

C. Timber baffle/hill holders shall be required on unpaved slopes that exceed 20%, minimum spacing shall be 20' on center.

6.1.11 CONNECTIONS TO EXISTING SYSTEM

A. Cut-in connections are the preferred method of connections to the existing system. When tapping water mains use stainless steel or full-bodied cast iron Mueller-type tapping tee.

B. Size-on-size tapping tees are not allowed.

C. Connections to existing mains smaller than 8" diameter shall be made by cutting in a tee, unless otherwise approved by the City.

6.1.12 EASEMENTS

A. Show easements on plans and identify width.

B. Show easements on all private property. If easement is defined as a constant width on each side of watermain, then show a segment of the easement and label as typical (typ).

C. All easements shall be a minimum of 15' width, unless otherwise approved or required by the City. 20' minimum easements shall be provided between buildings on the same property, or through a side yard.

D. Also see Section 6.1.07.D. "Building Setback Requirements".

6.1.13 SERVICES

A. The minimum water service size shall be 1" diameter minimum from main to meter. Minimum allowable water meter size shall be 5/8" x 3/4". Check that minimum pressure can be maintained when service is flowing at anticipated maximum levels. If friction losses will cause pressure at building to drop below minimum, increase service line size as necessary to raise pressure.

B. Private water services shall be 1" minimum H.D. poly pipe with no joints. Sand may be utilized as an acceptable bedding material for services on private property. Maximum bends shall be in accordance with manufacturer's specifications.

B. Show location of water services on plan and indicate size. Sizes shall be determined by the Developer per the Uniform Plumbing Code. ~~Minimum meter size is 5/8" x 3/4".~~ delete Same language in A.

C. Irrigation for commercial, institutional or industrial uses shall be by separate water meter installed by the City at the applicant's cost. Location and size of irrigation service shall be approved by the City. See dual service detail.

D. Static service pressures at ground floor elevation shall be determined at all lots/buildings to ensure compliance with system pressure standards. Minimum system pressure shall be 30 psi as measured at the meter location. System pressures in the range of 40-60 psi are desired.

E. Plan shall identify lots/buildings where builder/owner should install individual pressure reducing valves. Individual pressure reducing valves are required on customer side of service lines (after water meter box) when service pressures exceed 80 psi.

F. 2" and larger service installations shall include an adequate bypass.

6.1.14 BACKFLOW PREVENTION

"Per City Code 13.04.070, irrigation systems, fire sprinkler systems, and other water uses which may or will cause the contamination of the potable water supply by backflow, shall be required to install approved backflow prevention assemblies, and/or otherwise meet the requirements of the WAC 246-290-490 "Cross Connection Control Regulation in Washington State", and the recommendations of the PNWS-AWWA Cross Connection Control Manual, latest edition. Requirements may include premise, facility, or fixture isolation, or a combination of such, depending upon the degree of hazard. All backflow prevention assemblies installed shall be on the Washington State DOH list of approved backflow prevention assemblies, most recent edition at the time of installation, and shall be installed per the Standard Details.

Fire sprinkler system connections to the City's water system shall be owned and maintained by the property owner, beginning immediately downstream of the gate valve where the system connects to the City's water main.

All commercial buildings shall be required to install Reduced Pressure Backflow Assemblies as approved by the Washington State Department of Health.

The backflow prevention assembly on fire sprinkler system connections shall be located as close to the serving water main as possible, either on the owner's property or an easement dedicated to the owner's property.

Interior backflow prevention, when permitted, must meet the Uniform Plumbing Code requirements as administered by the Building Division. Such backflow prevention must also meet the requirements of the Black Diamond Utilities Department.

Multi-family projects require a double check valve assembly. Multi-family projects that have eight or more units will require a bypass with equal backflow prevention to avoid loss of service during maintenance and repair.

6.2 WATER MATERIALS

6.2.01 GENERAL

All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work.

Where reference is made to other specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.

All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA or the WSDOT Standard Specifications.

Approved manufacturers and model numbers of various materials are listed in the Approved Water Materials List published by the City. When specific manufacturers or models are listed, no substitutions will be allowed without prior approval by the City.

6.2.02 WATER PIPE

Water pipe shall be ductile iron pipe, minimum thickness Class 52, cement-lined unless otherwise specified and shall conform to ANSI/AWWA C151/A21.51 or as shown on plans.

Any installation requiring polyethylene encasement for ductile iron pipe, the encasement shall be installed in accordance with ANSI/SWWA C105/A2.5.

Rubber gasket pipe joints to be push-on-joint (Tyton) or mechanical joint (M.J.) in accordance with ANSI/AWWA C111/A21.11, unless otherwise specified.

Flanged joints shall conform to ANSI B16.1, class 125 drilling pattern, rated for 250 psi working pressure.

Standard thickness cement lining shall be in accordance with ANSI/AWWA C104/A21.4.

The Contractor shall furnish certification from the manufacturer of the pipe and gasket being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the above referenced standards.

6.2.03 WATER SAMPLING STATION

delete

One water sampling station shall be provided for developments in size of five to ten lots. The water sampling shall be ~~furnished and~~ installed at a location determined by the City. One additional sampling station shall be provided for each additional 50 lots or portion thereof. Model #88 Eclipse Sampling Station with aluminum enclosure shall be used.

if required

6.2.04 FITTINGS

All water main fittings shall be ductile iron, short body, cement lined, and for pressure rating of 350 psi for mechanical joint fittings and 250 psi for flange joint fittings, unless otherwise noted. Metal thickness and manufacturing process shall conform to applicable portions of ANSI/AWWA C110/A21.10. Mechanical joint, ductile iron, compact fittings 24" and less shall be in accordance with ANSI/AWWA C153/A21.53. Flanged fittings, cast or ductile iron, shall conform to ANSI B16.1, class 125 drilling pattern.

Standard cement lining shall be in accordance with ANSI/AWWA C104/A21.4.

Rubber gaskets for push-on-joints (Tyton) or mechanical joint (M.J.) shall be in accordance with ANSI/AWWA C111/A21.11.

Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl, or cloth-inserted rubber.

Type of connections shall be specified as push-on joint (Tyton), mechanical joint (M.J.), plain end (P.E.), flanged (FL), and threaded.

Approved manufacturers of brass fittings and valves up to 2" sizes include Ford, Mueller, and James Jones Company (except James Jones meter setters, which are not approved).

6.2.05 GALVANIZED IRON PIPE

Where galvanized iron pipe is specified, the pipe shall be standard weight, Schedule 40, steel pipe per Standard Specification for black and hot-dipped, zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses (ASTM A-120). Fittings shall be screwed malleable iron galvanized per ANSI B16.3. Galvanized pipe shall be used only for dry pipe in pressure relief vacuum breaker assemblies.

6.2.06 COUPLINGS

Flexible coupling and transition coupling cast components shall be ductile iron. Center rings and end rings shall be ductile iron in accordance with ASTM 536-80, Grade 65-45-12.

Gasket material shall be virgin SBR in accordance with ASTM D2000 3 BA715.

Bolts shall be high strength, low alloy steel trackhead bolts with national course rolled thread and heavy hex nuts. Steel shall meet ANSI/AWWA C111/A21.11 composition specifications.

Approved couplings include Romac, Smith-Blair (Rockwell), Mueller MaxiFit, and Mueller MaxiStep.

6.2.07 ADAPTERS

All flange by mechanical joint (FL x MJ) adapters shall be ductile iron.

6.2.08 BOLTS IN PIPING

Bolts shall be malleable iron, Cor-ten, or stainless steel.

Bolts and nuts for flanged pipe and fittings shall conform in size and length with ANSI/AWWA C115/A21.15. T-bolts shall be malleable iron or Cor-ten in accordance with ANSI/AWWA 111/A21.11. Stainless steel bolts shall meet the requirements of ASTM A-193, Grade B8. Shackle rods, nuts and washers shall be hot-dipped galvanized in accordance with AASHTO M 232 and coated thoroughly with asphaltic material. Stainless steel nuts, bolts and washers shall be type 304.

6.2.09 FLANGE GASKETS

Gasket material shall be neoprene, Buna N, chlorinated butyl, or cloth inserted rubber.

6.2.10 GATE VALVE

The minimum requirement for all gate valves, 2" to 12" shall conform to ANSI/AWWA C509-87 Standards for resilient-seated, high strength, bronze stemmed gate valves. The valves shall be iron-bodied, iron disk completely encapsulated with polyurethane rubber and bronze, non-rising stem with "O" ring seals. The polyurethane sealing rubber shall be fusion bonded to the wedge to meet ASTM tests for rubber to metal bond ASTM D429. The valves shall open counter-clockwise and be furnished with 2" square operating nuts except valves in vaults shall be furnished with handwheels. All surfaces, interior and exterior shall be fusion bonded epoxy coated, acceptable for potable water. Valves shall be rated 250 psi or higher.

The valves shall be set with stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

Valves 2" to 12" shall be Dresser, M&H, or Waterous. Valves larger than 12" must be approved by the City Engineer.

6.2.11 VALVE BOX

Each valve shall be provided with an adjustable two-piece cast iron valve box of 5" minimum inside diameter. Valve boxes shall have a top section with a 18" minimum length. The valve boxes lid shall be cast iron, 3 ½" deep, with recessed lifting handle, and the letter "W" cast into it. Valve box riser ears shall be installed with the ears parallel to the direction of water flow.

The valve box shall be set in a telescoping fashion around the 5" pipe cut to the correct length to allow future adjustment up or down.

6.2.12 VALVE OPERATING NUT EXTENSION

Use where valves are installed more than 3' below finished grade. Extensions are to be a minimum of 1' with only one extension per valve.

6.2.13 BUTTERFLY VALVE

Butterfly valves shall conform to ANSI/AWWA C504, Class 150B. Valves in chambers shall have a manual handwheel operation. Buried valves shall have a stem extension with AWWA 2" operating nut and suitable valve box. where to use on larger than 12"?

6.2.14 TAPPING SLEEVES AND TAPPING VALVES

The tapping sleeves shall be rated for a working pressure of 200 psi minimum and furnished complete with joint accessories. Tapping sleeves shall be constructed in two sections for ease of installation and shall be assembled around the main without interrupting service.

Mechanical joint style sleeves shall be ductile iron and is required for size-on-size connection to cast iron pipe. Mechanical joint sleeves shall be cast by Clow, Dresser, Mueller, Tyler, U.S. Pipe, or approved equal.

Fabricated steel style sleeves shall be fusion bonded coated, acceptable for potable water, and is acceptable for A.C. pipe taps only. Fabricated steel sleeves shall be manufactured by JCM, Romac or approved equal.

Tapping valves shall be provided with a standard mechanical joint outlet for use with ductile iron pipe and shall have oversized seat rings to permit entry of the tapping machine cutters. In all other respects, the tapping valves shall conform to the resilient seat gate valves herein specified with regards to operation and materials.

The installation of the tapping sleeves and valves shall be performed by a qualified contractor such as Spear Tap, Pacific Water Works, or owner approved equal.

6.2.15 AIR AND VACUUM RELEASE VALVE

Combination Air Valves shall be of the single housing style that combines the operating features of both an Air/Vacuum and Air Release Valve.

The Air/Vacuum portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allows air to re-enter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, power outage, pipeline break, etc.

The Air Release portion shall automatically release small pockets of air from the pipeline while the pipeline is in operation and under pressure.

The Combination Air Valve shall have minimum 1" NPT inlet and outlet connections and be able to withstand a working pressure of 300 PSI.

The valve body and cover shall be cast iron with stainless steel float.

Acceptable air and vacuum release valves include APCO No. 143-C, Val-Matic No. 201C, or Crispin UL10.

6.2.16 PRESSURE REDUCING STATION

The Station shall be sized by the Engineer using the City's hydraulic model. A pressure reducing valve shall maintain constant downstream pressure regardless of varying inlet pressure. Pressure reducing stations shall be GCS Systems Incorporated Pre-Assembled, Pre-Tested packaged systems. or equal

6.2.17 FIRE HYDRANT

All fire hydrants shall be approved by the National Board of Fire Underwriters and conform to AWWA Specification C502, break-away type, in which the valve will remain closed if the barrel is broken. The hydrant barrel shall have a diameter of not less than 8-1/2", and the valve diameter shall be not less than 5-1/4". Each hydrant shall be equipped with two 2-1/2" hose ports (National Standard Thread), and one 4" pumper connection (National Standard Thread), with permanent Storz hydrant adaptor and Storz blind cap. Each hydrant shall be equipped with a suitable positive acting drain valve and 1-1/4" pentagonal operating nut (counter-clockwise opening). The fire hydrants shall be M&H "Reliant" #929 or City approved equal. Equivalent fire hydrants shall utilize parts and tools as required for the M&H hydrants in order to facilitate operations and maintenance.

is this a standard size

The holding spools between the gate valve and fire hydrant shall be made from 6" Class 52 ductile iron pipe, 0.34" wall thickness. The hydrant and gate valve shall be anchored in place using holding spools and mechanical joint restraint device. Holding spools with length in excess of 17' shall be supplied with an M. J. sleeve and mechanical joint restraint device.

delete

The fire hydrants shall be painted ~~per fire marshal requirements~~ with two (2) coats of Preservative Brand caterpillar or international yellow paint. After installation, they shall be wire brushed and field painted with two additional coats of the same yellow enamel paint. Distance to the hydrant valve shall be clearly stenciled in black numerals 2" in height on the fire hydrant below the pumper port.

6.2.18 FIRE HYDRANT GUARD POSTS

Hydrant guard posts shall be 6" diameter concrete filled ductile iron pipe class 52, 6' long. Pipe shall be painted with two (2) coats of Preservative Brand caterpillar or international yellow paint.

6.2.19 METER SETTER

Meter setters shall have double purpose couplings, unless otherwise specified, and angle meter valve with drilled wings for padlock, 12" high. Equal to Ford VBH92-12W-11-33-A with a PVC spacer to reinforce the setter and to keep it aligned.

2" meter setters shall have vertical inlet and outlet tees with 1" lateral bypass, flanged ball meter valve on inlet, flanged key meter valve on outlet, ball valve on bypass, and padlock wings on all valves.

Acceptable meter setters are Ford 90 Series – VBH 92-12W-11-33-A, VBH 86-12B-11-66, or VBH 87-12B-11-77.

1-1/2" Angle meter valves for irrigation shall be type Ford FV13-666W or Mueller 1-1/2" H-14286.

2" Angle meter valves for irrigation shall be type Ford FV13-777W or Mueller 2" H-14286.

6.2.20 CORPORATION STOP / Service Saddles

Corporation stops shall be brass in accordance with AWWA Standard C800 with AWWA tapered thread (CC) inlet by compression fitting for poly iron pipe-size outlet, complete with coupling nut for poly service.

Corporation stops for 1", 1 1/2" and 2" tap shall be the ball valve type.

Service saddles for a 1" tap shall be type Romac 101S. Service saddles for a 1-1/2" tap or 2" tap shall be type Romac 202S. For use on PVC & asbestos pipe, Romac 101 for Ductile

1" Corporation stops shall be Ford F10000, FB1000, or Mueller No. H-15008.
1-1/2" Corporation stops shall be Ford Ballcorp FB400 or Mueller No. H-15008.
2" Corporation stops shall be Ford Ballcorp FB400 or Mueller Oriseal No. H-9968.

6.2.21 METER BOX

For 5/8", ¾", or 1" Water Meter, a high-density Polyethylene homogeneously molded as one unit meter box, Model MSBCF1324-18XL as manufactured by Mid-State Plastics, Inc. or approved equal (equal meeting the exact same measurements so lids are

interchangeable) shall be required. For 1-1/2" or 2" service, Model MSBCF1730-18XL shall be utilized. Ductile iron lids as manufactured by Carson Industries shall be required. All lids shall ~~be~~ have a 1-3/4" touch read hole, with a meter inspection lid.

6.2.22 PLASTIC SERVICE PIPE

Plastic service pipe shall be 1" Class 200 SDR-7. All connections with plastic pipe shall be made utilizing stainless steel inserts along with couplings or adapters. No joints will be allowed from the corporation stop to the setter.

Materials: Pipe shall be manufactured from ultrahigh molecular weight, high density polyethylene resin PE 3408. It shall meet the requirements of Type III, Class C, Category 5-P34-08 polyethylene as defined by ASTM specification D-1248 "Polyethylene Plastics Molding material", and pipe shall conform to product standard 11-70 or ASTM-D-2239.

Marking: Pipe shall be permanently imprinted with manufacturer's brand name, pipe size, product standard (pipe only), identification of the NSF approval, ASTM specification, recommended working pressure, and production code. Letters shall be at least 3/16 in. high and should appear on the pipe at intervals no less than every 24".

Dimensions: Pipe dimensions and tolerances shall correspond with the values listed in U.S. Department of Commerce PS-11-70 or ASTM-D-2239 for flexible plastic pipe with a standard dimension ratio (SDR) of 7 I.P.S.

Pressure: Pipe shall have working pressure of 200psi at 73.4°F.

Plastic service pipe shall be Drisco pipe 5100 ultra line or approved equal.

6.2.23 PIPE INSULATION

All pipe for above ground service shall have 2" thick foam insulation with an aluminum jacket. Aluminum jacketing shall be manufactured from Type 3003 or 5005 alloy; temper of H-14 gauge 0.016. Foam insulation shall conform to the following:

Foam insulation shall be closed cell polystyrene foam manufactured by extrusion process. Foam insulation shall be odorless, chemically inert, with no food value and shall be resistant to ground chemicals and microorganism. Foam insulation shall conform to the properties included in the following table.

PROPERTIES	ASTM TEST	AVERAGE
Thermal Conductivity "K" Factor BTU HR./SQ. FT./+F/IN. Mean Temp. 40+	C518-70 & C177-63	0.23
Moisture Resistance Water Absorption % By Volume	D2842-69	0.8
Water Vapor Transmission (Parm-Inch)	C355-64	0.9
Physical Density (lb./cu. ft.)	C303-56	1.8
Compressive Strength (PSI) Perpendicular to Board Face (5% Deflection or Yield)	D1621-64	40

6.2.24 CONCRETE BEDDING AND BLOCKING

Bedding, blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the City Engineer and shall have a 30-day compressive strength of not less than 2,500 psi. The mix shall contain five (5) sacks of cement per cubic yard. All concrete shall be mechanically mixed. All bolts and nuts shall be poly-wrapped prior to pouring concrete.

6.2.25 JOINT RESTRAINT

Acceptable joint restraint systems are as follows:

EBAA Iron (MEGALUG Series 1100)
Griffin Pipe Products Company (Snap-Lok, Bolt-Lok)
Romac (Grip Ring)
Star National Products (Shackle Products)
US Pipe (TR FLEX)
Uni-Flange Corporation (Series 1300 and 1390)

Where shackle restraint is used, all parts shall be hot-dipped galvanized.

6.2.26 INDIVIDUAL PRESSURE REDUCING VALVES

Individual pressure reducing valves shall be installed on individual services. Acceptable valves for residential use are Wilkins 600 with built-in bypass. Acceptable pressure reducing valves for commercial use are Wilkins 600 with built-in bypass. Acceptable pressure relief valves for commercial use are CLA-VAL 55F.

6.2.27 REDUCED PRESSURE BACKFLOW ASSEMBLY

All Reduced Pressure Backflow Assemblies shall be as listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State Department of Health (D.O.H.). The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

6.2.28 REDUCED PRESSURE BACKFLOW ASSEMBLY WITH DETECTOR

This assembly shall include a line-sized D.O.H. approved (listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State D.O.H.) Reduced Pressure Backflow Assembly with a parallel 3/4" meter and 3/4" D.O.H. approved Reduced Pressure Backflow Assembly. Each assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

6.2.29 DOUBLE CHECK VALVE ASSEMBLY

All Double Check Valve Assemblies shall be as listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State D.O.H. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

6.2.30 DOUBLE CHECK VALVE ASSEMBLY WITH DETECTOR

This assembly shall include a line sized D.O.H. approved (listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State D.O.H.) Double Check Valve Assembly with a parallel 3/4" meter and 3/4" D.O.H. approved double check Valve Assembly. Each assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test-cocks.

6.2.31 BACKFLOW DEVICE RESILIENT SEATED SHUT-OFF VALVES

Each valve shall be marked with model number with designation of resilient seat; such as "RS" or "R", which must be cast, molded, or affixed onto the body or bonnet of the valve. All ferrous-bodied valves shall be coated with a minimum of 4 mls. of epoxy or equivalent polymerized coating. 2" and smaller R.P.B.A.s and D.C.V.A.s shall use ball valves, and all 2-1/2" and larger R.P.B.A.s and D.C.V.A.s shall use resilient seated gate valves for domestic supply and resilient seated O.S. and Y. valves for firelines.

The minimum requirements for all resilient seated gate valves shall, in design, material and workmanship, conform to the standards of AWWA C509.

6.2.32 STEEL CASING

Steel casing shall be black steel pipe conforming to ASTM A53.

Casing wall thickness shall be 0.250" for casings 24" or less in diameter and 0.375" for casings over 24" in diameter.

Carrier pipe for water shall be Ductile Iron, Class 52.

6.2.33 CASING SPACER

Casing spacer shell shall be manufactured in two pieces from heavy gauge T-304 stainless steel or 14 gauge hot rolled pickled steel joined with ribbed flanges. The shell shall be lined with a PVC liner 0.090" thick with 85-90 durometer.

Carbon steel casing spacer shell and risers shall be coated with a heat fused polyvinyl chloride coating, or hot-dip galvanized.

Polyvinyl Chloride Coating Specifications:

Durometer - Shore A2 (10 Sec.) (ASTM D1706-61T)	-	80
Maximum operating temperature (constant)	-	150° (65°C)
Electrical properties (ASTM D149-61) (short time .010")	-	1380 V/Mil

Resistance:

Salt spray (ASTM B117)	-	Excellent
Acids	-	Good
Alkalies	-	Good

All nuts and bolts shall be 18-8 stainless steel.

Runners shall be supported by risers made from heavy gauge T-304 stainless steel or 12 gauge hot rolled pickled steel.

Runners shall be ultra high molecular weight polymer with high resistance to abrasion and sliding wear.

TYPICAL DATA			
PROPERTY	ASTM METHOD	UNITS	VALUE
Specific Gravity	D-792	gm/cc	.934
Tensile Strength (Break)	D-638	PSI	3500
Elongation (Break)	D-638	%	380
Izod Impact	D-256	Ft.Lbs./in. of notch	No break
Hardness	D-2240	Shore D	67
Coefficient of Friction	D-1894	-	0.11 - 0.13
Heat Distortion Temp. 66 PSI	D-648	C	88
Coefficient of Thermal	D-696	F-1	5.5 x 10-5
ABRASION CHARACTERISTICS:			
Taber Abrasion	D-1044	Mg/loss	N
Sand Slurry *			7

**Sand slurry condition - 7 hours in one part sand/ one part water slurry at 1725 RPM. Carbon steel - 100, Hifax - 15. The lower the value, the more resistant to abrasion.*

Casing spacers shall be "center positioning" type. Height of risers and runners combined shall be sufficient to keep the carrier pipe bell, couplings, or fittings at least 0.75" from the casing pipe wall at all times and provide at least 1" clearance between runners and top of casing wall, to prevent jamming during installation.

Acceptable casing spacers are:

Pipeline Seal and Insulator Co.:

8" band, carbon steel with fusion-bonded coating, Model C8G-2

12" band, carbon steel with fusion-bonded coating, Model C12G-2

Cascade Waterworks Mfg. Co.:

Stainless Steel or hot-dip galvanized carbon steel Casing Spacers (catalog number depends on size)

Advance Products & Systems, Inc.:

8" band, stainless steel, Model SSI8

12" band, stainless steel, Model SSI12

8" band, carbon steel with fusion-bonded coating, Model SI8

12" band, carbon steel with fusion-bonded coating, Model SI12

Acceptable Casing End Seals are:

Pipeline Seal and Insulator Co.:

Standard Pull-on (Model S)

Custom Pull-on (Model G)

Cascade Waterworks Mfg. Co.:

CCES End Seal

Advance Products & Systems, Inc.

Molded End Seal, Model AM

6.3 WATER METHODS OF CONSTRUCTION

6.3.01 GENERAL CONSTRUCTION REQUIREMENTS

The improvements shall be constructed as shown on the plans and in accordance with these Standards, Standard Details, and Standard Specifications. Manufacturer's equipment shall be installed in compliance with specifications of the manufacturer, except where a higher quality of workmanship is required by the plans and specifications. All materials and work shall be in strict accordance with any applicable regulations of the State, County and local authorities. The Contractor shall arrange for such inspection by these agencies as may be required and shall submit evidence of their approval, if requested by the Engineer.

The plans may show the approximate locations of various existing utilities known to the engineer, such as gas lines, water mains, storm drainage, power lines, telephone lines, television cables, and other obstructions based on information obtained from various sources. This information is not guaranteed to be accurate, and the Contractor is directed to check for interferences and obstructions by inquiry from the different utilities and by underground exploration ahead of his regular excavation.

The Contractor shall request field locates and notify the owners of underground facilities about the scheduled commencement of excavation through a one-call number:
(1-800-424-5555).

Notice shall be made to owners of underground utilities not less than three (3) business days or more than ten (10) business days prior to scheduled date of commencement of excavation.

The Contractor shall excavate around and under service pipes with special care and shall support and maintain them in service. Where it is necessary to cut, move or reconnect any service lines, arrangements shall be made with the respective utility.

6.3.02 ALIGNMENT & STAKING

All work done under a Project shall be to the lines shown on the plans or to approved revisions. All surveying and/or staking shall be performed by a surveying or engineering firm currently licensed by the State of Washington to perform said tasks. All construction staking shall be inspected by the City prior to construction. Cut sheets shall be delivered to the City prior to the commencement of construction. Video or DVD footage shall be provided to the City showing the pre-existing condition of the construction site and all staking of all proposed fire hydrants, blow-offs, air vac, tees, elbows, bends, valves, and meters, etc.

The minimum staking of water systems shall be as follows:

A. Provide staking sufficient to satisfy City Utilities Superintendent. In new plat development roadway centerline staking must be readily identifiable.

B. Stake locations of all proposed fire hydrant, blow-off, air-vac, tees, elbows, bends, valves, meters, etc. prior to construction.

move to section 6.3.17

6.3.03 CONNECTION TO EXISTING WATERMAIN

Points of connection to existing water mains shall be exposed prior to trenching of the new line, and not less than 48 hours prior to the anticipated connection time. The contractor shall notify the City 48 hours in advance prior to any watermain shut-off or connection. Watermain shut-offs shall not be scheduled to take place on Fridays, or on the day before a City holiday, unless otherwise approved by the City. The Contractor shall ensure that the existing fittings are in accordance with the Contract Plans and that the connection can be made in accordance with the Contract Plans. The Contractor shall immediately notify the Engineer if the connection cannot be made in accordance with the plans in order that the connection detail may be revised.

Connection to the existing main shall take place only after the new main is flushed, disinfected, has satisfactorily passed a hydrostatic pressure test, and satisfactory bacteriological sample results are obtained. An approved backflow prevention assembly shall be installed between the existing and new water lines during disinfection and flushing of new main. All connections to the existing system and all testing of the new line must be with the authorization of, and in the presence of, the authorized representative of the City. Opening and closing of valves and use of water from the City's system will be done only by the City. The backflow preventer and supply hose must be disconnected during hydrostatic pressure testing of new main.

Connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping tee to fit complete with tapping gate valve. Where a cut-in is permitted to be made in an existing pipe, the work shall be conducted at such a time and in such a manner as to minimize the interruption of service. Cut-in time must be approved by the City. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been shut off, the work shall be prosecuted vigorously and shall not be halted until the line is restored to service. The interiors of all pipe and fittings to be used in final connection shall be swabbed or sprayed with a 1% available chlorine solution.

Unless specifically provided for elsewhere in these specifications, the Contractor shall have the responsibility of giving at least forty-eight (48) hours notice to the City and affected water customers of intention to disrupt service.

6.3.04 LAYING DUCTILE IRON PIPE

Work shall be accomplished in accordance with AWWA Standard C600 and the manufacturer's recommendation.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with select backfill tamped under it. 5/8 minus gravel Precaution shall be taken to prevent dirt from entering the joint space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug. If water is in the trench when work resumes, the seal shall remain in place until the trench is completely dewatered. No pipe shall be laid in water or when trench conditions are unsuitable.

The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe or cement lining, and so as to leave a smooth end at right angles to the axis of the pipe. Pipe shall be laid with bell ends facing in the direction of the laying, unless approved or directed otherwise by the City. Wherever it is necessary to deflect pipe from a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations.

The bottom of the trench shall be finished to grade in such a manner that the pipe will have bearing along the entire length of the barrel. Bolts on mechanical pipe and fittings shall be tightened uniformly with a "Torque" wrench which measures the torque for mechanical joints shall be as follows:

8" - 24" pipe size 3/4" Bolts	60 - 90 ft-lbs torque

Installation of push-on joint (Tyton) pipe shall be in accordance with the manufacturer's instructions.

6.3.05 PIPE ZONE BEDDING AND BACKFILL

Pipe shall be placed on a prepared subgrade of imported material at least 6" deep below the barrel of the pipe and filled around the pipe as shown in the Standard Details. The imported material shall be 5/8" minus crushed rock in conformance with Section 9-03.4(2) of the 2008 WSDOT Standard Specifications. After preparation of the subgrade, bell holes shall be excavated so the pipe, when laid, will have a uniform bearing under the full length of the pipe. The Contractor shall be responsible for adequate support and bedding for the pipe. The trench shall be hand backfilled and compacted from the spring line of the pipe to 6" above the top of the pipe as shown in the Standard Detail. The material shall be placed and compacted to no less than 95 percent of the maximum theoretical density as measured by ASTM D-1557 prior to placement of the next layer.

Where the undisturbed trench below the bedding is unstable, the unstable materials shall be removed and backfilled ~~with 5/8" minus crushed~~ rock as necessary to produce a stable foundation upon which to place the bedding. The Contractor shall be responsible for providing a stable foundation for placing of the bedding.

with a Geotech or engineers recommendation

Boulders, rocks, and other obstructions shall be entirely removed or cut out the full width of the trench and to a depth 6" below the pipe bottom and backfilled as provided above.

Whenever the trench is excavated below the depth required for proper bedding, it shall be backfilled with 5/8" minus crushed rock and compacted.

6.3.06 TRENCH BACKFILL

Trench backfill for waterline construction shall be in accordance with Section 3.3.09 of these Standards. Compaction of backfill from the bottom of the trench to 6" above the top of the pipe shall be as specified in Section 3.3.08, Pipe Bedding.

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100' are left exposed during construction hours without approval of the City. Backfill shall not be deposited in the trench in any manner which will damage or disturb the pipe or the initial backfill. Compaction of the backfill may be accomplished by mechanical tamper, by vibrating, rolling, jetting, or a combination of these methods, as approved by the City. The Contractor shall provide the services of a testing laboratory acceptable to the Engineer to perform in place density tests to show that the specified density has been obtained. The approval of the compaction method and the achievement of the specified density shall, in no way, relieve the Contractor of responsibility for all repairs caused by settlement of the backfill prior to acceptance and during the two-year period after acceptance of the project.

All trenching shall be backfilled with bank run gravel for trench backfill materials conforming to the WSDOT Standard Specifications Section 9-03.19, unless otherwise approved by the City. The City shall be the sole judge of approving materials to be utilized for backfill. All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, frozen soil, or other unsuitable material.

Backfill shall be compacted to 95% of the maximum density in traveled areas and road prisms, driveways, roadways, shoulders, parking lots or other traveled areas and 90% in all other areas. Backfill compaction shall be performed in 8" to 12" lifts. Compaction test results shall be supplied to the City for review and approval prior to paving.

6.3.07 FIRE HYDRANT INSTALLATION

Fire hydrants shall be set as shown in the Standard Details and AWWA Standard C600. Hydrant and the gate valve must have lugs. The tee on the main line shall not be considered as part of the assembly. The portion of the hydrants above the ground shall be painted with Preservative Brand Caterpillar or International yellow paint. The hydrant run shall be restrained with MEGALUG restrainer at M.J. end on hydrant and gate

valve. If more than one pipe is required on hydrant run, connect pipes with mechanical joint sleeve and MEGALUG restrainers.

Between the time that the fire hydrant is installed and the completed facility is placed in operation, the fire hydrant shall at all times be wrapped in burlap, or covered in some other suitable manner to clearly indicate that the fire hydrant is not in service.

6.3.08 AIR VACUUM INSTALLATION

Iron piping and fittings shall be galvanized. Location of the air release valves as shown on the plans is approximate. The installation shall be set at the high point of the line. The water line must be constructed so the air release valve may be installed in a convenient location.

6.3.09 VALVE INSTALLATION

Before installation, valves shall be cleaned of all foreign material. Such blocking as the Engineer may deem necessary shall be provided. The valve and valve box shall be set plumb with the valve box centered on the valve. The top of the valve box shall be set with all valves except auxiliary valves for hydrants. Where valve operating nut is more than 3' below finished grade, a stem extension must be installed. Tapping valves shall be water tested prior to tapping water main.

The top of the valve box base section shall be located a minimum of 6" and maximum of 9" below finished grade. A polyethylene sheet, 8-mils thick, shall be placed between the top and base valve box sections to prevent metal to metal contact where the sections overlap.

Valve box top sections shall be adjusted flush with the finished pavement and, in those areas to be excavated for future roadway grades, enough adjustment shall be provided in the valve box to allow the top of the box to be adjusted to the required grade.

6.3.10 VALVE BOX MARKER INSTALLATION

Preservative Brand #0.43-616 yellow enamel

Concrete marker posts, painted with two coats ~~Rust-Oleum No. 2766 Hi-Gloss white~~ paint, shall be set for all valves except auxiliary hydrant valves. The marker shall be set on a line through the valve at right angles to the center line of the road. The marker shall generally be set on the property line unless the Engineer decides another location is safer or more conspicuous. Distance to the valves shall be neatly stenciled on the post with 2" numerals. Valve markers shall be installed only in unimproved or unpaved areas.

6.3.11 VAULT INSTALLATION

Vaults for water facilities (pressure reducing station, water service, backflow device, etc.) shall be constructed at the locations shown in the plan and as staked. It shall be constructed as shown in the plans, Standard Details and as directed by the Engineer.

The excavation shall have minimum 1' clearance between the vault outer surfaces and the earth bank. The vault shall be placed on firm soil. If the foundation material is inadequate, the contractor shall use foundation gravel or bedding concrete to support the vault. The vault shall be plumb and watertight. The access cover shall be seated properly to prevent rocking and shall be adjusted to match the finished grade.

Vault floor shall drain to daylight, or to location shown on the plan. Drain pipe shall be minimum 4" diameter.

Where knockout locations for pipe do not coincide with locations of pipe penetrations into the vault, the Contractor shall core drill openings for pipe.

6.3.12 ~~SERVICE LINES~~ change Heading to Tapping Sleeves

6.3.12.1 NEW SERVICE INSTALLATIONS

Tapping sleeves shall be rated for a working pressure of 200 psi minimum and furnished complete with joint accessories. Tapping sleeves shall be constructed in two sections for ease of installation and shall be assembled around the main without interrupting service.

Mechanical joint style sleeves shall be ductile iron and is required for size-on-size connection to cast-iron pipe. Mechanical joint sleeves shall be cast by Clow, Dresser, Mueller, Tyler, U.S. Pipe, or owner approved equal.

Fabricated steel style sleeves shall be fusion bonded coated, acceptable for potable water, and is acceptable for A.C. pipe taps only. Fabricated steel sleeves shall be manufactured by JCM, Romac, or approved equal.

~~Where a saddle is used in lieu of direct tapping, make a cut in the taped area large enough to accommodate the gasket directly in contact with the ductile iron pipe. Make necessary repair for damaged encasement.~~

delete this section

6.3.12.2 ~~RECONNECTING EXISTING~~ SERVICES Lines change heading

Install service connections under paving by boring. Bore or tunnel under sidewalks and curbs. Damages shall be repaired by

all service lines shall be one-inch minimum, 200 PSI poly pipe, and shall be continuous from the corporation stop to meter setter.

Contractor. Provide 30" minimum cover on service lines. Install service at 90-degrees horizontally to the main to intercept the existing meters. A deviation of not more than 3-degrees will be allowed. Blow off service prior to connection to meter.

Install meter setter and boxes as shown on the Standard Detail and where directed by the Engineer.

Service connections shall not be transferred to the new main until it has been successfully flushed, disinfected and tested. When transferring services from the existing main to the new main, the Contractor shall take sanitary precautions to protect the potable water supply in both the existing and new mains.

No reconnection to sub-standard service lines shall be allowed.

Substandard plastic service pipe is usually 160 psi or below polyethylene or cast iron. The Engineer shall decide if existing service lines are substandard.

6.3.13 CONCRETE BLOCKING

All bends, tees, and valves shall be blocked in accordance with the Standard Details. All poured in place blocking shall have a minimum measurement of 12" between the pipe and the undisturbed bank. The Contractor shall install blocking which is adequate to withstand full test pressure, as well as, to continuously withstand operating pressures under all conditions of service. All concrete shall be mechanically mixed and shall be a minimum of 2,500 psi.

6.3.14 INSPECTIONS & TESTS

A. The City intends to have an inspector on site for the purpose of inspecting and testing. The Contractor shall provide proper facilities, equipment, and access and such inspection and testing.

B. If any work is covered up without approval or consent of the City, it must, if required by the City, be uncovered for inspection.

C. Before a performance test is to be observed by the City the Contractor shall make whatever preliminary tests are necessary to assure that the material and/or equipment are in accordance with the plans and specifications.

D. Written notice of deficiencies, adequately describing the same, shall be given to the Contractor upon completion of each inspection and the Contractor shall correct such deficiencies within seven days of the notice and before final

inspection will be made by the City, unless otherwise approved.

E. If the Contractor wants to work on the weekend or after hours, they will ~~be~~ make prior arrangements with the city and be responsible for all overtime costs.

F. The Contractor shall provide the City notice when the project will be shut down, the days and working hours and when the project is to start up again.

6.3.15 WATER QUALITY

The Contractor is required to implement water pollution controls and maintain these until the project is accepted by the City. The Contractor shall familiarize himself with the requirement of the Department of Ecology and other regulatory agencies having jurisdiction over such matters.

The following list of requirements is a summary of the construction activity requirements of the Department of Ecology and is provided as a guide to the Contractor. The Department of Ecology may have additional requirements with which the Contractor shall comply.

6.3.15.1 CHLORINE RESIDUAL FROM WATER MAIN TESTING OR DISINFECTION

Water with chlorine residual shall be disposed of by the Contractor. Methods of disposal include through sanitary sewers, storing and aerating or percolation into the ground. Water containing a chlorine residual shall not be disposed of into the storm drainage system or any waterway. Disposal may be made to the sanitary sewer system upon approval by the City, provided that the rate of disposal will not overload the sewer. Water shall be discharged to the storm drainage system only after dechlorination.

6.3.15.2 OIL AND CHEMICAL STORAGE AND HANDLING

Storage area shall be diked. No disposal of oil products or waste on the site, including oil filters. The Contractor shall provide a waste oil disposal tank, if needed.

6.3.16 WATER PIPE TESTING AND DISINFECTING

All pipelines shall be tested and disinfected prior to acceptance of work. A water hydrant meter shall be required and procured from the City for all water utilized for flushing pipelines. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Contractor. Feed for the pump shall be from a barrel or other container within the actual amount of "makeup" water, so that it can be measured periodically during the test period.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure

before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking. As soon as pipe is secured against movement under pressure, it may be filled with water. Satisfactory performance of air valves shall be checked while the line is filling.

Contractor shall pre-flush all water mains after water has remained in the main for ~~24~~ 3 days or ~~hours~~ and before ~~pressure testing the main~~. connecting to the ~~new~~ existing water main

After the pipe is filled and all air expelled, it shall be pumped to a test pressure of ~~200~~ 250 psi, and this pressure shall be maintained for a period of not less than fifteen (15) minutes to insure the integrity of the thrust and anchor blocks. The contractor/developer is cautioned regarding pressure limitations on butterfly valves. All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at 150 psi for a period of not less than one (1) hour. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which:

L = Allowable leakage, gallons/hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, psi

Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Contractor at the Contractor's expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Contractor's expense until a satisfactory test is obtained.

As sections of pipe are constructed and before pipelines are placed in service, they shall be sterilized in conformance with the requirements of the State of Washington Department of Health Services.

The Contractor shall be responsible for flushing all water mains prior to water samples being acquired. The water mains shall be flushed at a rate to provide a minimum 2.5 feet per second velocity in the main.

In all disinfection processes, the Contractor shall take particular care in flushing and wasting the chlorinated water from the mains to assure that the flushed and chlorinated water does no physical or environmental damage to property, streams, storm sewers or any waterways. The Contractor shall chemically or otherwise treat the chlorinated water to prevent damage to the affected environment, particularly aquatic and fish life of receiving streams.

Chlorine shall be applied in the following manner, to secure a concentration in the pipe of at least 50 ppm.

1) Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled, and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration;

After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for a period of twenty-four (24) hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line shall not be placed in service until a satisfactory bacteriological report has been received.

City forces only will be allowed to operate existing and new tie-in valves. The Contractor's forces are expressly forbidden to operate any valve on any section of line which has been accepted by the City.

6.3.17 ADJUST EXISTING STRUCTURE TO GRADE

6.3.17.1 VAULT COVER ADJUSTMENT

Existing vault covers affected by a pavement overlay, or adjustment in surface grade, shall be adjusted to grade within three working days

6.3.17.2 VALVE BOX ADJUSTMENT - PAVEMENT OVERLAYS AND SIDEWALKS

Raising the existing valve box cover less than 2" shall be accomplished by adjusting the existing top section of the valve box.

Raising the existing valve box cover 2" or more, shall be accomplished by either adjusting the existing top section or by inserting a valve box paving riser into the existing valve box top. The paving riser shall be epoxied to the valve box.

If the valve box base section needs to be extended, the contractor shall install a 4" diameter cast iron soil pipe, with bell-end of the soil pipe inserted over the top of the existing valve box base section. The spigot-end of the soil pipe shall be located a minimum of 6" and maximum of 9" below finished grade. The valve box top section shall be slipped over the soil pipe and adjusted to final grade. A polyethylene sheet, 8-mils thick, shall be placed between the valve box and soil pipe to prevent metal to metal contact where the sections overlap.

Final box adjustment shall leave the top of the valve box no higher than final grade, and no lower than 0.5" below final grade.

In asphalt concrete pavement overlay areas, excavation of the valve box to be raised shall be accomplished by sawcutting or neat-line jackhammering the pavement a minimum of 12" around the perimeter of the valve box.

Final adjustment of valve boxes shall be made within 20 calendar days following the final overlay.

6.3.17.3 VALVE BOX ADJUSTMENT - UNIMPROVED AREAS

Adjustment of valve box covers located outside paved areas or sidewalks can be accomplished using a 12" valve box adjusting sleeve inserted into the existing valve box top section.

6.3.18 ABANDONING FACILITIES

W3.18.1 ABANDONING PIPE IN PLACE

The Contractor shall plug the open ends of all pipes, fittings, etc. to be abandoned with end cap coupling on asbestos cement or steel pipe, with mechanical joint cap or plug on cast or ductile iron pipe.

W3.18.2 ABANDONING STRUCTURES

Abandonment of structures shall be completed only after piped systems have been properly abandoned. Structures within the public right-of-way, a public easement or which are part of the publicly-owned and maintained system must be:

- Removed completely; or
- Abandoned, provided no conflicts with new utilities or improvements arise.

6.3.19 HIGHWAY AND RAILROAD CROSSINGS

Interstate, state, or county highway and railroad crossings require the placing of steel, cast iron or concrete pipe casing by jacking or tunneling and laying the carrier pipe within the casing.

6.3.20 BORING AND JACKING STEEL CASING

The Contractor shall verify the vertical and horizontal location of existing utilities. If required to avoid conflicts and maintain minimum clearances, adjustment shall be made to the grade of the casing.

The pipe shall be bored and jacked where indicated. The Contractor shall remove or penetrate all obstructions encountered. If groundwater is found to be a problem during boring operations, the Contractor shall do all that is necessary to control the flow sufficiently to protect the excavation, pipe and equipment so that the work is not

impaired. Any pipe damaged during the boring and jacking operation shall be repaired by the Contractor in a manner approved by the Engineer.

Special care shall be taken during the installation of the bored and jacked pipe to ensure that no settlement or caving be caused to the above surface. Any such caving caused by the placement of the pipe shall be the Contractor's responsibility and he shall repair any area so affected as directed by the Engineer.

During the jacking operations, particular care shall be exercised to prevent caving ahead of the pipe which will cause voids outside of the pipe. If voids exist, the Contractor shall drill through the wall of the pipe and fill the voids with a pumped cement grout. All voids shall be filled to the satisfaction of the Engineer.

The carrier pipe shall be installed in the casing. The Contractor shall support carrier pipe with casing spacers. The casing pipe shall not be backfilled with sand and grout. The casing ends shall be sealed with asphaltic material 1' minimum on each end, or with manufactured rubber end seal device.

Boring pits shall be backfilled with select native material and compacted to 95% maximum dry density as determined by ASTM D-1557. The contractor shall provide sufficient select backfill material to make up for the rejected material.

All disturbed ground shall be restored to its original condition or better.

6.3.21 WORKING WITH ASBESOS CEMENT PIPE

When working with asbestos cement pipe, the Contractor is required to maintain workers' exposure to asbestos material at or below the exposure limit as prescribed in WAC 296-62-07705 and adhere to all State and Federal Guidelines and Certification.

6.3.22 ASBESTOS CEMENT WATERMAIN CROSSINGS

Where directed by the City, the trench shall be backfilled with controlled density fill (CDF, aka flowable fill) from bottom of trench to bottom of the AC main. If the AC main appears to be damaged or at risk of failure, the City will require section replacement according to the Standard Detail for "Typical AC Watermain Crossing Replacement Detail".

6.3.23 CLEARANCES / OTHER UTILITIES

Required clearance from other utilities are outlined in Section 6.1.08. If the minimum vertical distance between utility pipes is less than 6" and such installation is approved by the City, a pad shall be placed between the pipes. The pad shall be O.D. x O.D. x 2.5" thick minimum or as required to protect the pipes. Above O.D. is equal to the

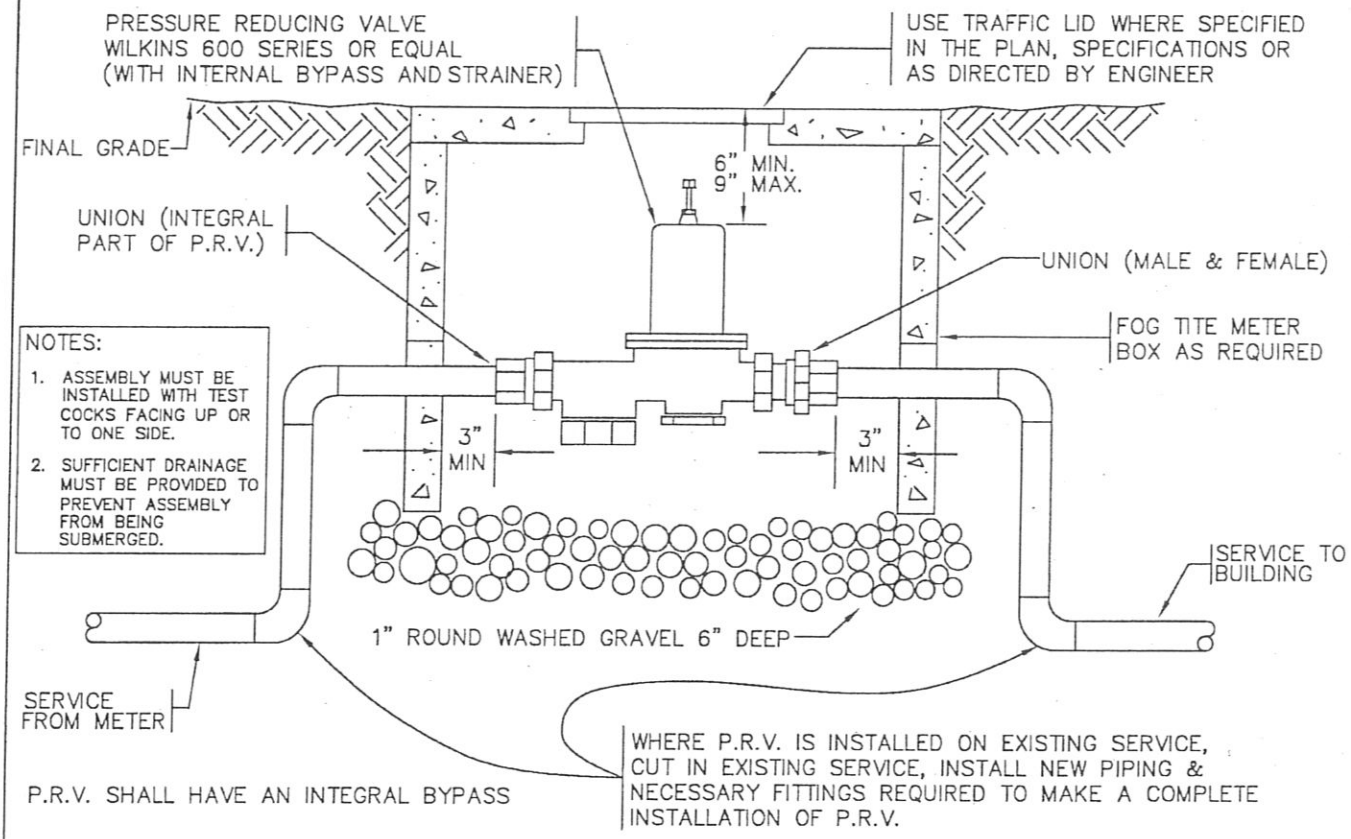
outside diameter of the larger pipe. The pad shall be a polyethylene foam plank (Dow Plastics Ethafoam[tm] 220), or approved equal. Additional measures may be necessary to ensure system integrity and may be required as evaluated by the City on a case by case basis.

6.3.24 RECORD DRAWINGS

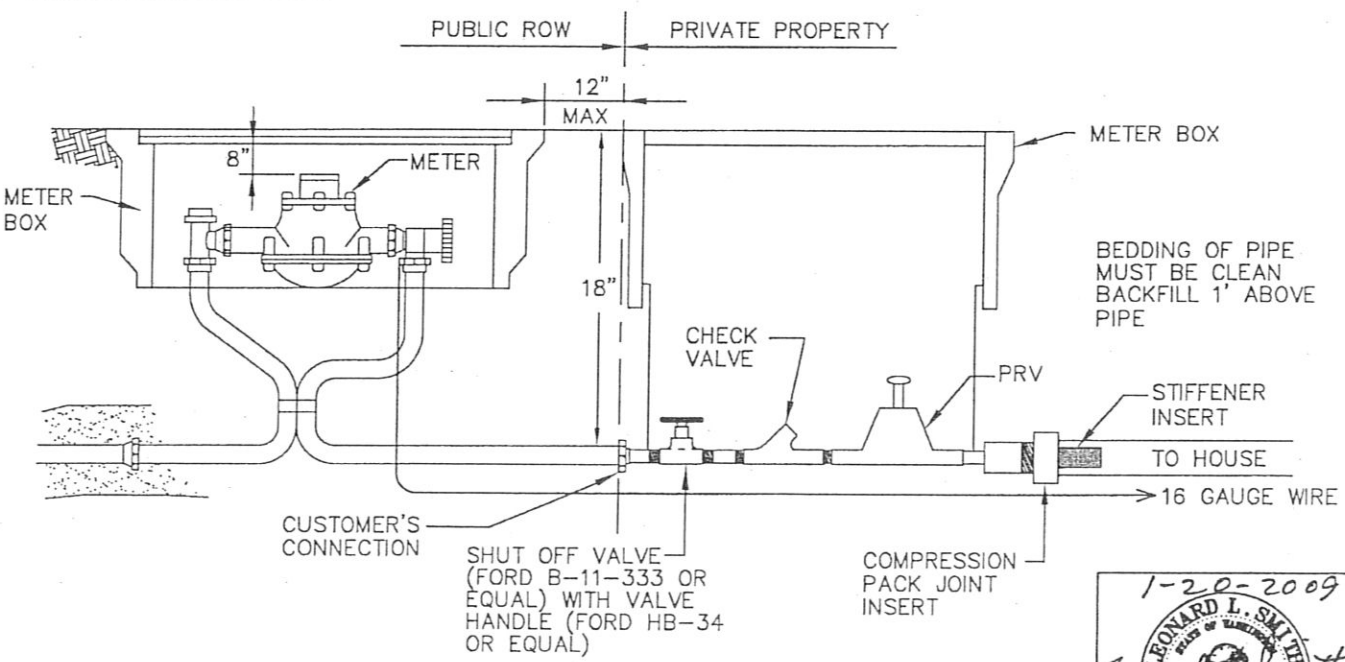
Record drawings shall be submitted to the City Engineer reflecting "as-built" conditions for all improvements within the City right-of-way. Record drawings shall be submitted to the City within thirty (30) calendar days after completion of the work. Record drawings shall be submitted on permanent, stable, reproducible mylar with a signature and data which verifies the "as-built" condition of the project.

Index missing

INDIVIDUAL PRESSURE REDUCING VALVE ASSEMLY (RESIDENTIAL)



CUSTOMER WATER SERVICE



METER BOX – SET TO FINAL GRADE
SHUT OFF VALVE – B-11-333 OR EQUAL
VALVE HANDLE – HB-34
SINGLE CHECK VALVE

PRV TO CONTROL LINE PRESSURE UP TO 180 PSI
16 GAUGE LOCATING WIRE
200 PSI POLY PIPE SIDR 3408
ALL FITTINGS MUST BE BRASS

1-20-2009

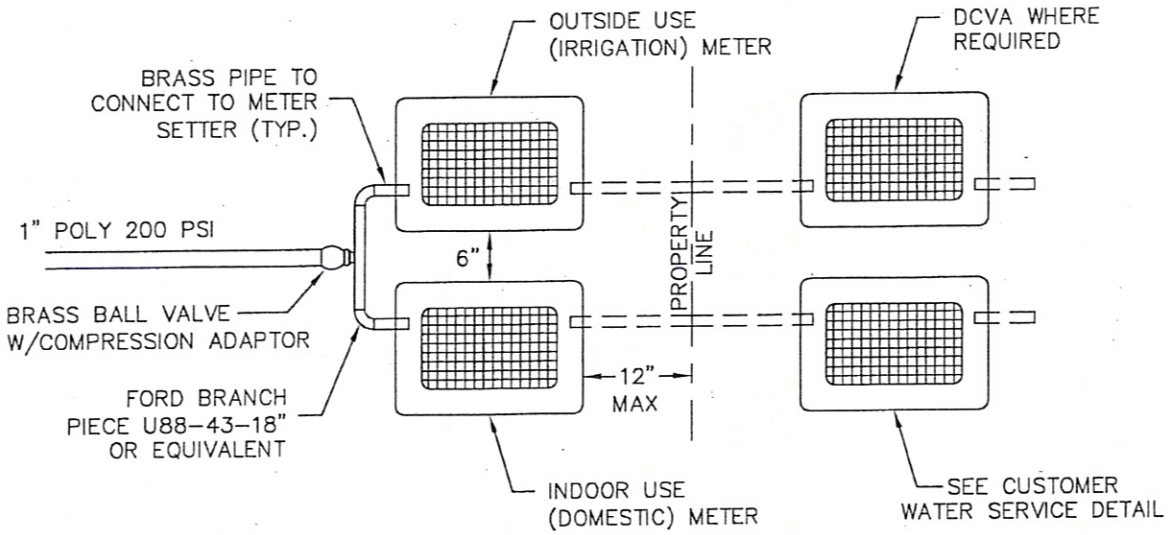
LEONARD L. SMITH
STATE OF WASHINGTON
20320
REGISTERED
PROFESSIONAL ENGINEER

CITY OF BLACK DIAMOND

CUSTOMER WATER SERVICE WITH INDIVIDUAL PRESSURE REDUCING VALVE ASSEMBLY (RESIDENTIAL)

STANDARD DWG W-01	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



NOTES:

1. ON EXISTING WATER SERVICES, THE CITY WILL INSTALL DUAL SERVICE AT APPLICANTS EXPENSE. BOTH SERVICES WILL REQUIRE A 12" SETTER EQUAL TO FORD 90 SERIES VBH 92-12W-11-33-A.
2. A ~~PVR~~ PRV SHALL BE INSTALLED ON INDOOR USE SERVICE (AND OUTDOOR USE IF REQUIRED BY UPC) WHERE PRESSURE EXCEEDS 80 PSI.
3. D.O.H. APPROVED DOUBLE CHECK VALVE ASSEMBLY (DCVA) IS REQUIRED FOR IRRIGATION USE.

1-30-2009

LEONARD L. SMITH
STATE OF WASHINGTON
20530
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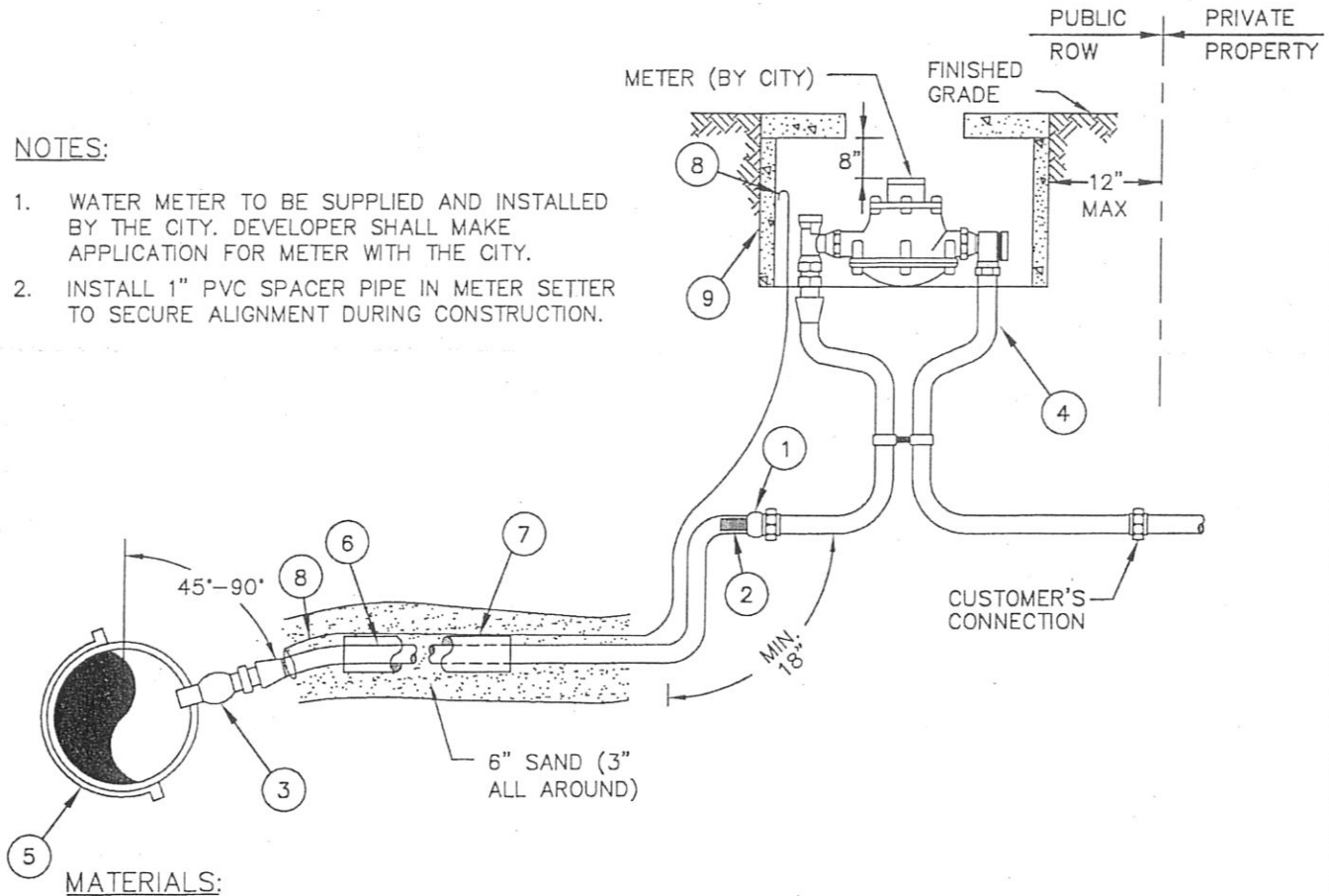
PROFESSIONAL ENGINEER

CITY OF
BLACK DIAMOND

DUAL METER INSTALLATION or
Commercial irrigation meter

STANDARD DWG W-02	NOT TO SCALE	01/01/08

PacWest Engineering
Fife, Washington



NOTES:

1. WATER METER TO BE SUPPLIED AND INSTALLED BY THE CITY. DEVELOPER SHALL MAKE APPLICATION FOR METER WITH THE CITY.
2. INSTALL 1" PVC SPACER PIPE IN METER SETTER TO SECURE ALIGNMENT DURING CONSTRUCTION.

MATERIALS:

(1.) BRASS BALL VALVE CORP STOP WITH COMPRESSION ADAPTER.

(2.) 1" POLY INSERT STIFFENERS.

(3.) 1" CC BALL VALVE CORP STOP WITH COMPRESSION ADAPTER FOR POLY PIPE EQUAL TO MUELLER OR FORD. INSTALL WITH KEY FACING UP.

(4.) 12" COPPER SETTER EQUAL TO FORD 90 SERIES VBH 92–12W–11–33–A EQUIPPED AS FOLLOWS:

- PADLOCK WINGS ON ANGLE BALL VALVE
- ANGLE CHECK ON METER OUTLET
- DUAL PURPOSE CONNECTIONS ON SETTER INLET & OUTLET
- COMPRESSION ADAPTER ON SETTER INLET
- 15" EXTENDED OUTLET TUBE
- INSTALL STREET ELL ON INLET AS NEEDED

COPPER SETTER SHALL BE SET LEVEL AND CENTERED IN THE METER BOX.

(5.) ROMAC SADDLE SINGLE STRAP FOR PIPE DIAMETERS LESS THAN 10" AND DOUBLE STRAP FOR PIPE DIAMETERS 10" AND LARGER. DOUBLE STAINLESS STEEL ON AC & PVC PIPE

(6.) 1" "POLY" PIPE–200 PSI (LENGTH AS REQUIRED). (1" MINIMUM DIAMETER)

(7.) INSTALL SERVICE LINE IN 2" PVC GUARD PIPE (SCH–80) WHEN CROSSING ROADWAY (BENEATH PAVEMENT SECTION).

(8.) 14 GAUGE WIRE FROM MAINLINE TAP TO METER BOX AND EXPOSE 6" MINIMUM IN BOX. (RUN INSIDE 2" PVC GUARD CONDUIT WHERE APPLICABLE.)

(9.) MID–STATE PLASTICS METER BOX MODEL MSBCF1324–18XL WITH DUCTILE IRON LID MANUFACTURED BY CARSON INDUSTRIES.

1-20-2004

LEONARD L. SMITH
STATE OF WASHINGTON
20930
REGISTERED
PROFESSIONAL ENGINEER

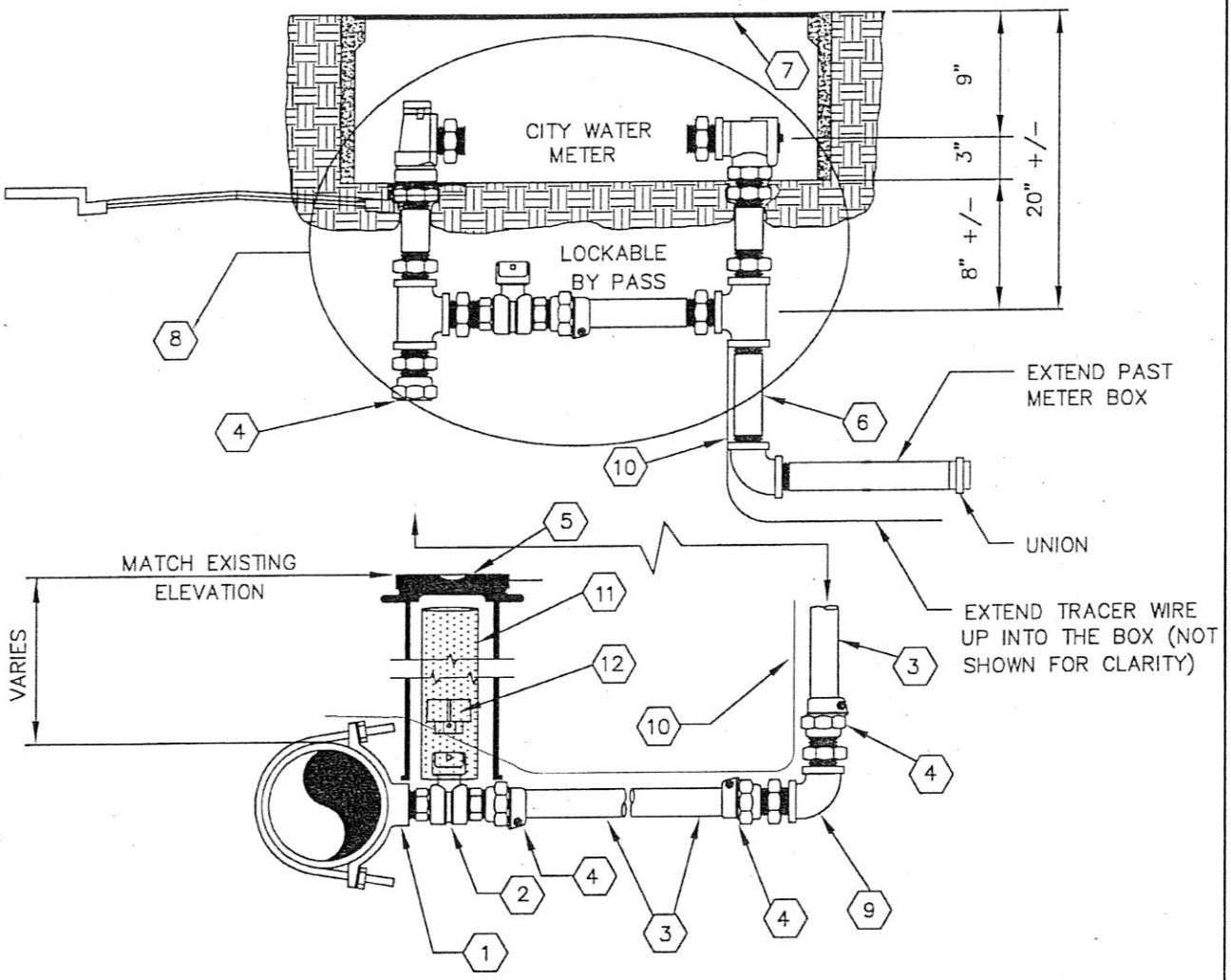
Leonard L. Smith

CITY OF BLACK DIAMOND

5/8", 3/4", AND 1" WATER SERVICE

STANDARD DWG W-03	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



DESCRIPTION	MAKER OR RATING	1–1/2"	2"
1. Double Strap Saddle	Romac or Equal	202 IPT	202 IPT
2. Ball Valve w/ 2" Operating Nut	Ford or equal	B11–666 w/Qt67	B11–777 w/Qt67
3. Pipe – High Molecular Polyethylene Pipe (I.P.S.)	SDR7 (200PSI)		
4. Coupling Male	Ford or Equal	C84–66	C84–77
5. Valve Box	Rich or Equal		
6. Nipple Brass		1–1/2" x 6"	2" x 6"
7. Meter Box	Mid–State Plastics	MSBCF1730–18XL	MSBCF1730–18XL
8. Meter Setter w/Lockable Bypass	Ford or Equal	VBH 86–12B–11–66	VBH 87–12B–11–77
9. Brass 90° Elbow		1–1/2"	2"
10. Tracer Wire	14 Gauge Copper Wire	Solid	Solid
11. PVC Sleeve Beneath Pavement	PVC–SCH 80	4" Dia.	4" Dia.
12. TOUCH–READ	Precision Touch Reed		

NOTES:

1. TEMPORARILY INSTALL "SPACER" IN METER SETTER UNTIL METER IS INSTALLED.
2. INSTALL 2" PLUG IN UNION UNTIL SERVICE IS INSTALLED.

1-20-2009

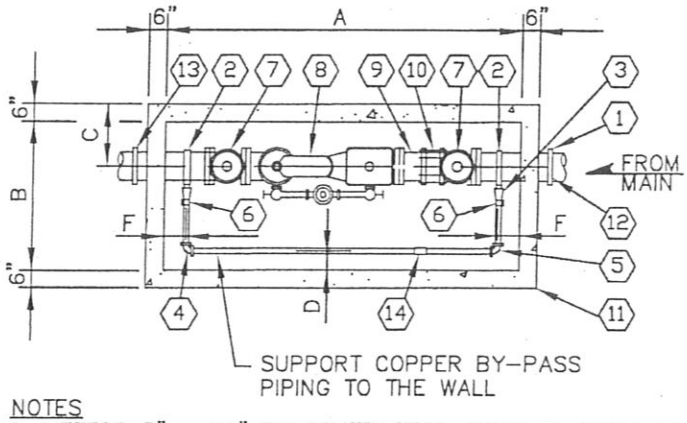
LEONARD L. SMITH
STATE OF WASHINGTON
20810
REGISTERED
PROFESSIONAL ENGINEER

CITY OF BLACK DIAMOND

1-1/2" & 2" WATER SERVICE

STANDARD DWG W-04	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington

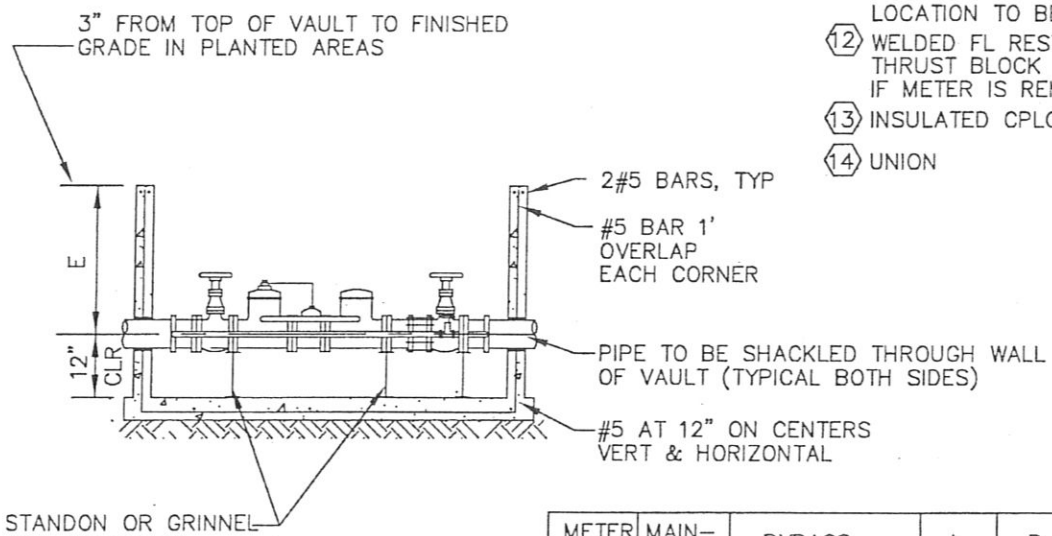


NOTES

1. METERS 3" – 10" BY CONTRACTOR, READ IN CUBIC FEET.
2. VAULT SHALL BE PRECAST, UTILITY VAULT OR OWNER APPROVED EQUAL
3. ALL PIPE & FITTINGS 4" AND LARGER SHALL BE CEMENT LINED.
4. PIPING FROM MAIN TO VAULT SHALL BE 4" ON 3" METER INSTALLATION, TEE WITH VALVE ON EXISTING MAIN REQUIRED.

MATERIAL LIST:

1. 2–FLEX CPLG TO FIT ROCKWELL 441 (4" X 3" REDUCER, M.J. FOR 3" METER)
2. 2–DOUBLE STRAP SERVICE CLAMPS, ROMAC 101 WITH IPS TAP, OR EQUAL
3. 3–STRAIGHT CPLG. BRASS TO OUTSIDE I.P. THREAD MUELLER H–15425,H–15428 110 COMP., OR EQUAL
4. BEND CPLG BRASS TO BRASS MUELLER H–15525.
5. BEND CPLG, BRASS TO OUTSIDE I.P. THREAD MUELLER H–15530, OR EQUAL.
6. 1 BALL VALVE WITH PADLOCK WING OR LOCK CAP, FORD B21–444W OR B–21–666 WITH LOCK CAP OR B21–777 WITH LOCK CAP.
7. 2–RESILIENT SEAT GATE VALVE, FL X FL (RISING STEM)
8. 1–3" TO 10" METER AS SPECIFIED BY CITY SHALL BE FURNISHED BY CONTRACTOR/DEVELOPER.
9. 1 C.I. ADPT. FL X PE (LENGTH TO FIT)
10. 1–CPLG. ADAPT., FL ROCKWELL 912, OR OWNER EQUAL.
11. PRECAST CONCRETE VAULT W/TRAFFIC LID FOR H20 LOADING (HATCH SIZE & LOCATION TO BE APPROVED BY CITY)
12. WELDED FL RESTRAINT OR SHAKLE TO THRUST BLOCK TO PREVENT MOVEMENT IF METER IS REMOVED
13. INSULATED CPLG. TO 3" CU SERVICE.
14. UNION



METER SIZE	MAIN–LINE	BYPASS	A	B	C	D	E	F
3"	4" DI.	1 1/2" BRASS	7'–6"	3'–0"	9"	4"	2'–8"	9"
4"	4" DI.	1 1/2" BRASS	7'–6"	3'–0"	12"	4"	2'–8"	9"
6"	6" DI.	2" BRASS	9'–6"	3'–6"	18"	4"	2'–8"	9"
8"	8" DI.	4" DI.	11'–0"	4'–0"	24"	6"	3'–6"	14"
10"	10" DI.	4" DI.	13'–0"	5'–0"	30"	6"	4'–0"	16"

NOTES:

INSTALL 4" DRAIN PIPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM. 1% MIN. SLOPE.

BACKFLOW PREVENTOR REQUIRED FOR ALL FIRE LINES AND IRRIGATION LINES, IN SEPERATE VAULTS.

BRASS DOES NOT NEED TO BE PAINTED, ALL OTHER PIPE TO BE PAINTED WITH MARINE ENAMEL, MARATHON 1065 TAHOE BLUE.

1-20-2009

LEONARD L. SMITH
STATE OF WASHINGTON
20930
REGISTERED
PROFESSIONAL ENGINEER

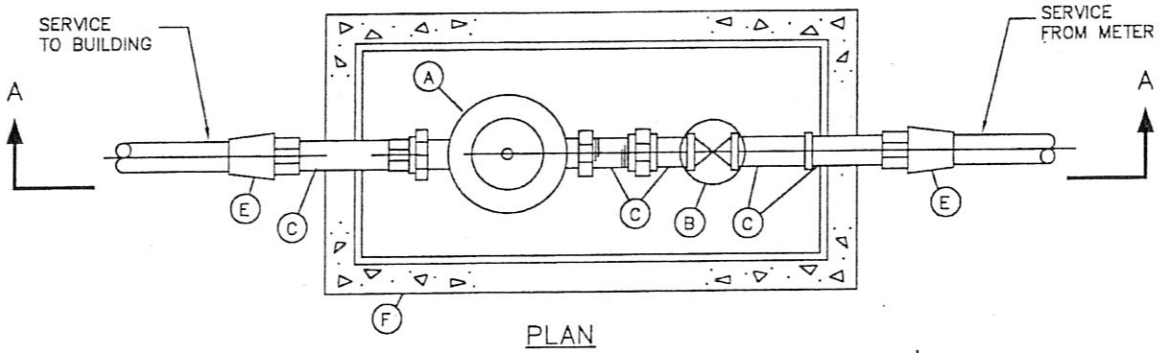
Leonard L. Smith

CITY OF BLACK DIAMOND

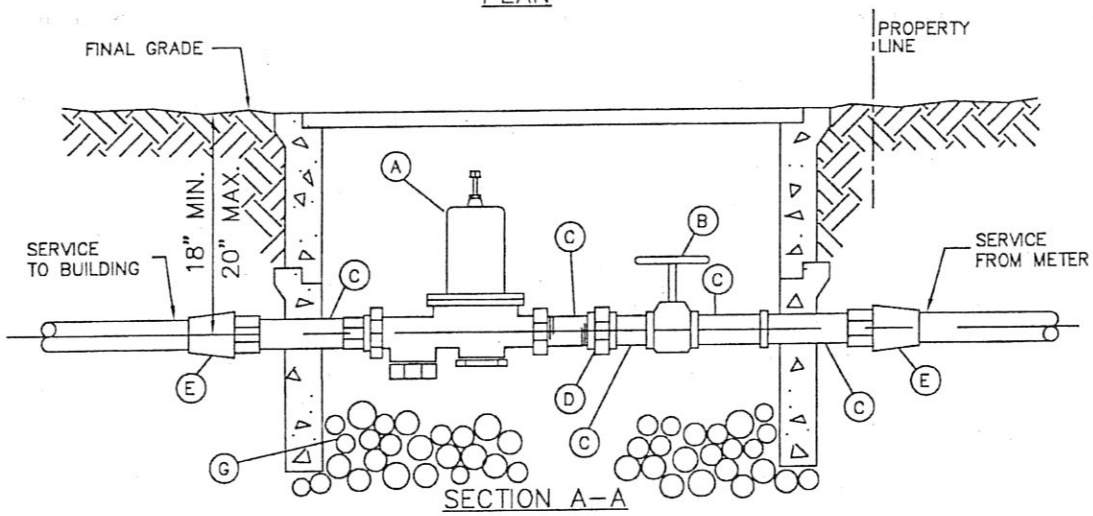
3" TO 10" WATER SERVICE

STANDARD DWG W-05	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



PLAN



SECTION A–A

BILL OF MATERIALS

- (A) PRESSURE REGULATOR – WILKINS 600 SERIES OR EQUAL (WITH INTERNAL BYPASS AND STRAINER)
- (B) BRONZE GATE VALVE, 125–POUND, SOLID WEDGE OR DOUBLE DISC, WITH HANDWHEEL, OHIO BRASS, GRINNELL, OR EQUAL
- (C) NIPPLE x 2 1/2" LONG, MALE.
- (D) UNION, FEMALE.
- (E) ADAPTER.
- (F) METER BOX
- (G) 1" ROUND WASHED GRAVEL, 8" MIN. DEPTH.

NOTES:

1. PRESSURE REGULATOR SIZE AS SPECIFIED OR SHOWN ON PLAN.
2. SIZES FOR ITEMS (B) THROUGH (E) SHALL CORRESPOND TO THE SPECIFIED SIZE OF THE PRESSURE REGULATOR.
3. ALL FITTINGS AND NIPPLES ARE BRASS WITH IRON PIPE THREADS.

1-20-2009

LEONARD L. SMITH
STATE OF WASHINGTON
20930
REGISTERED
PROFESSIONAL ENGINEER

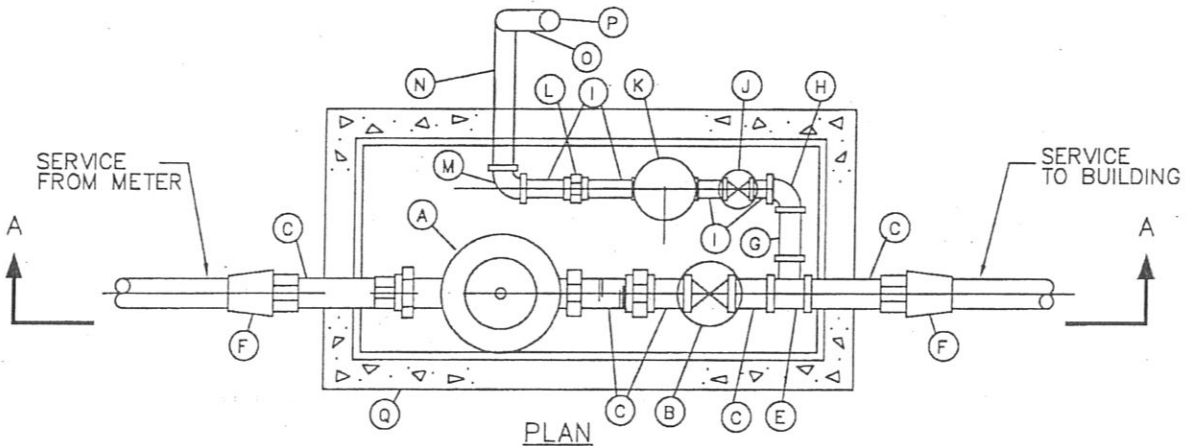
Leonard Smith

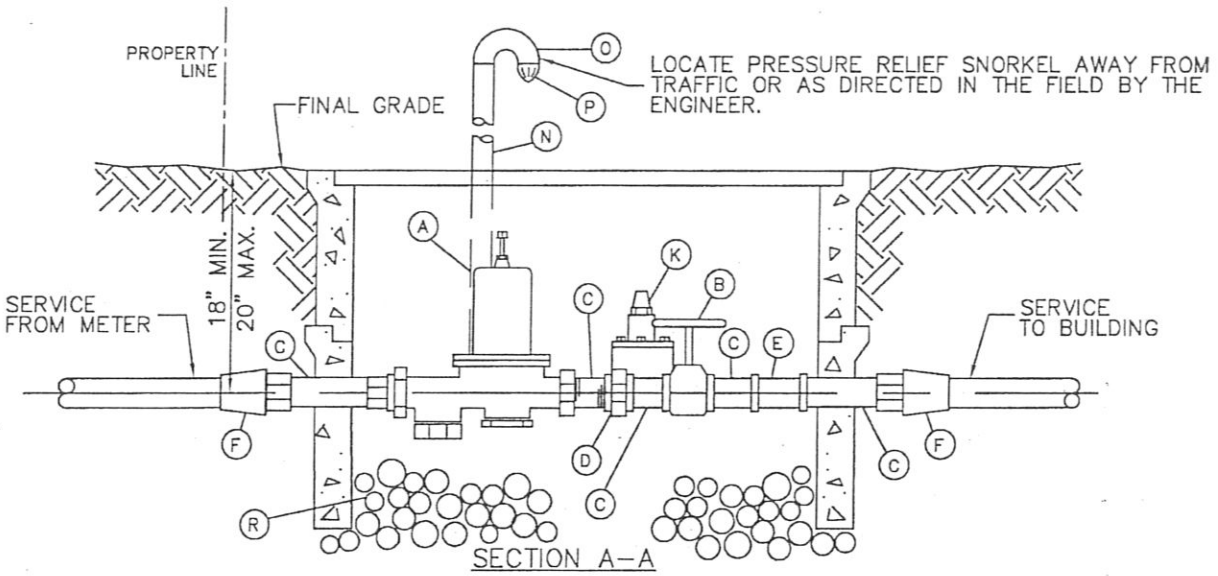
CITY OF BLACK DIAMOND

INDIVIDUAL PRESSURE REDUCING VALVE ASSEMBLY (MULTI-FAMILY OR COMMERCIAL)

STANDARD DWG W-06	NOT TO SCALE	01/01/08

PacWest Engineering
Fife, Washington





BILL OF MATERIALS

- (A) PRESSURE REGULATOR – WILKINS 600 SERIES OR EQUAL (WITH INTEGRAL BYPASS AND STRAINER)
- (B) BRONZE GATE VALVE, 125–POUND, SOLID WEDGE OR DOUBLE DISC, W/HANDWHEEL, OHIO BRASS, GRINNELL OR EQUAL.
- (C) NIPPLE x 2 1/2" LONG MALE.
- (D) UNION, FEMALE.
- (E) REDUCING TEE x 3/4" DIAMETER BRANCH, FEMALE.
- (F) ADAPTER.
- (G) 3/4" NIPPLE x LENGTH TO FIT, MALE.
- (H) 3/4" x 90° ELBOW, FEMALE.
- (I) 3/4" x 2 1/2" NIPPLE, MALE.
- (J) 3/4" BRONZE GATE VALVE, SOLID WEDGE TYPE – MUELLER H–10914.
- (K) 3/4" PRESSURE RELIEF VALVE – CLAVAL 55 F
- (L) 3/4" UNION, FEMALE.
- (M) 2"x 3/4" 90° ELBOW, FEMALE.
- (N) 2" G.I. PIPE x LENGTH TO FIT AS DIRECTED, 10' MAX. INTEGRATED LENGTH.
- (O) 2" OPEN PATTERN RETURN BEND, G.I.
- (P) 2" BEEHIVE STRAINER.
- (Q) 17"x 30" METER BOX W/ TRAFFIC COVER AND 12" RISER. (SEE NOTE 4.)
- (R) 1" ROUND WASHED GRAVEL, 8" MIN. DEPTH.

NOTES:

1. PRESSURE REGULATOR SIZE AS SPECIFIED OR SHOWN ON PLAN.
2. SIZES FOR ITEMS (B) THROUGH (F) SHALL CORRESPOND TO THE SPECIFIED SIZE OF THE PRESSURE REGULATOR.
3. FITTINGS AND NIPPLES ARE BRASS WITH IRON PIPE THREADS, UNLESS OTHERWISE SHOWN.
4. FOR 2" INSTALLATION, LARGER METER BOX IS REQUIRED, MINIMUM INSIDE LENGTH OF BOX SHALL BE 32".

1-20-2009

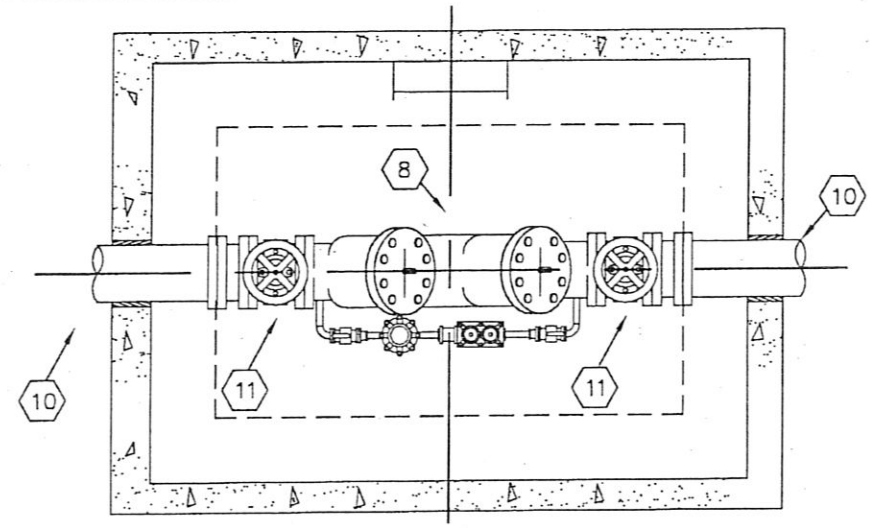
LEONARD L. SMITH
STATE OF WASHINGTON
20930
REGISTERED
PROFESSIONAL ENGINEER

CITY OF BLACK DIAMOND

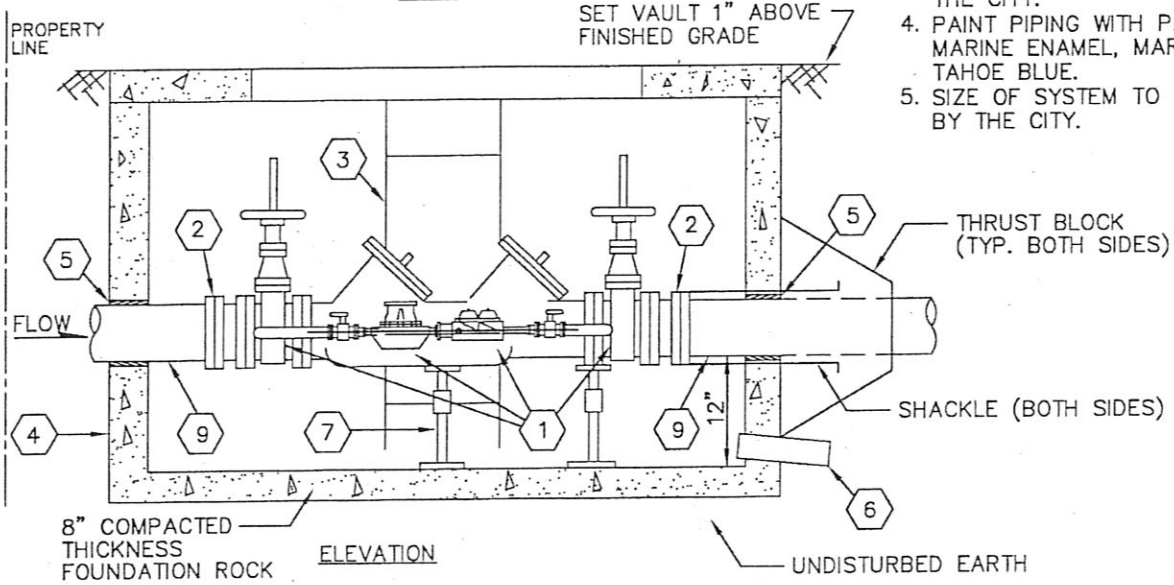
INDIVIDUAL PRESSURE REDUCING VALVE ASSEMBLY W/ PRESSURE RELIEF (MULTI-FAMILY OR COMMERCIAL)

STANDARD DWG W-07	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



PLAN



NOTES:

1. ASSEMBLY SHALL BE MAINTAINED BY PROPERTY OWNER AND ANNUAL CERTIFICATION REQUIRED.
2. FIRELINE SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION DEVICE IS APPROVED BY THE DISTRICT.
3. A REDUCED PRESSURE BACKFLOW PREVENTION DEVICE MAY BE REQUIRED BY THE DIRECTION OF THE CITY.
4. PAINT PIPING WITH PARKER PAINT MARINE ENAMEL, MARATHON 1065, TAHOE BLUE.
5. SIZE OF SYSTEM TO BE APPROVED BY THE CITY.

(1) DETECTOR DOUBLE CHECK VALVE ASSEMBLY. MODEL TO BE PRE-APPROVED BY CITY.

(2) UNI-FLANGE WITH SET SCREWS

(3) TELESCOPIC ALUMINUM LADDER TO BE SECURED TO VAULT WITH STAINLESS STEEL FASTENERS AT 3-FT MAX. INTERVALS.

(4) CONCRETE VAULT (5'x 9'x 7'-2" INSIDE DIMENSIONS) , WITH WATERTIGHT BILCO COVER (H20 LOADING)

(5) WATER-TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH WELDED FLANGE OR SHACKLE TO THRUST BLOCK TO PREVENT. SHACKEL THROUGH VAULT IF CHECK VALVE ASSEMBLY IS REMOVED.

(6) 4" DRAIN TO DAYLIGHT OR STORM WHERE APPLICABLE. MINIMUM SLOPE 1%.

(7) ADJUSTABLE PIPE STANCHION, GRINELL PIPE SUPPORTS. (SECURE TO FLOOR)

(8) VALVE ASSEMBLY TO BE CENTERED IN VAULT

(9) CL. 53 D.I., MJ WITH MEGALUGS

(10) STAINLESS STEEL SHACKLES AND THRUST BLOCK (3000PSI) AT BOTH ENDS OF VAULT.

(11) R.S. GATE VALVE WITH HAND WHEEL OPERATION.

1-20-2009

LEONARD L. SMITH — STATE OF WASHINGTON — 20830 — REGISTERED PROFESSIONAL ENGINEER

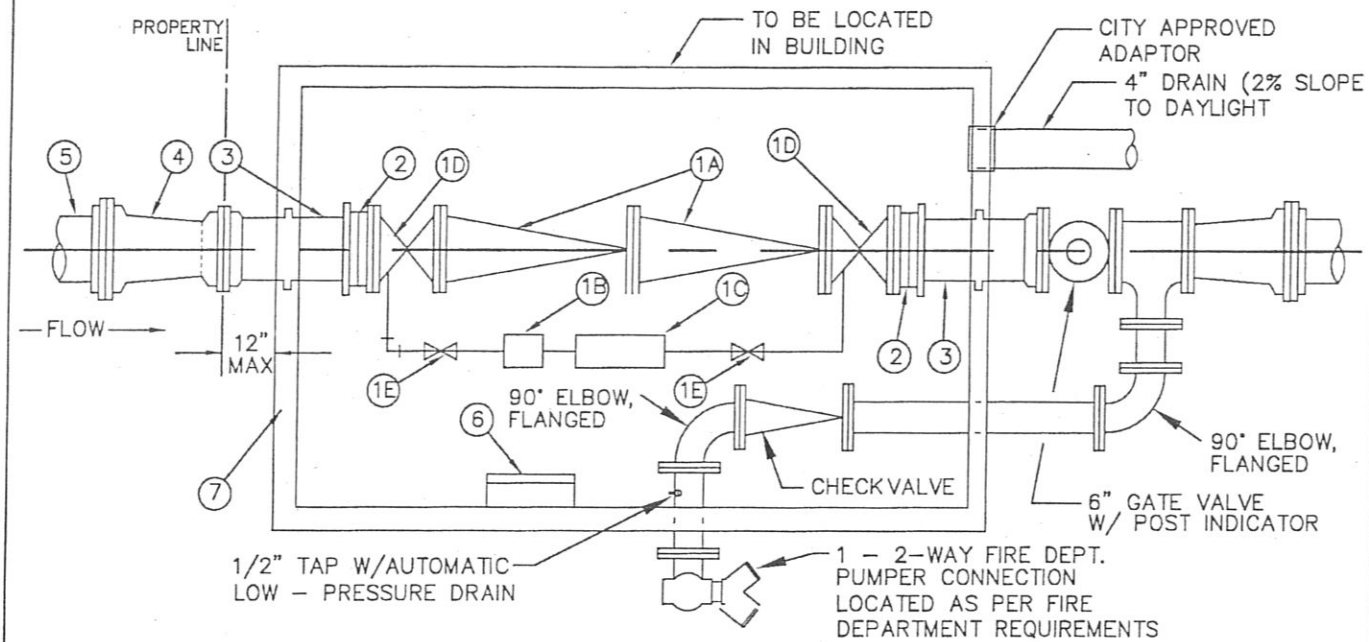
CITY OF BLACK DIAMOND

DETECTOR DOUBLE CHECK VALVE ASSEMBLY

STANDARD DWG W-08	NOT TO SCALE	01/01/08

PWE

PacWest Engineering
Fife, Washington



LEGEND

(1.) DOUBLE–CHECK DETECTOR VALVE ASSEMBLY CAPABLE OF METERING WATER USAGE UNDER LOW FLOW CONDITIONS. 10.0 P.S.I. HEAD LOSS AT 1600 GPM FOR 8" SIZE. ASSEMBLY TO BE STATE DOH APPROVED. SIZE AS SPECIFIED ON PLANS (SENSUS TOUCH READ)

- 1A. 2 – CHECK VALVES, (FL)
- 1B. 1 – BY–PASS METER 5/8" X 3/4" SENSUS C.F. READING METER COMPLETE WITH SPUD NU
- 1C. 1 – DOUBLE CHECK VALVE ASSEMBLY, (DOH APPROVED.) 3/4" FOR 8" D.D.C.V.
- 1D. 2 – GATE VALVES, (FL) W/HAND WHEEL; RISING STEM, RESILIENT SEATED AS PER STATE REQUIREMENTS.
- 1E. 2 – GATE VALVES, (FL) W/HAND WHEEL; RISING STEM, RESILIENT SEATED AS PER STATE REQUIREMENTS.

(2.) 2 – FLANGED COUPLING ADAPTER, SIZE AS SPECIFIED ON PLANS. (LOCATE MINIMUM 6" FROM INNER WALL)

(3.) 2 – PIPE SPOOLS, PLAIN END. SAME SIZE AS SPECIFIED ON PLANS.

(4.) 1– REDUCER (MJ X MJ), IF REQUIRED. SIZE AS SPECIFIED ON PLANS.

(5.) WATER MAIN CL52, SIZE AS SPECIFIED ON PLANS.

(6.) ALUMINUM (TELESCOPING) LADDER, LOCATE AS DIRECTED BY CITY. USE STAINLESS STEEL FASTENERS AT 3' MAX. SPACING.

(7.) UTILITY VAULT CO. VAULT OR APPROVED EQUAL. HINGED AND SPRING LOCKED STEEL DIAMOND P/L COVER 2–332P, (DOUBLE HATCH COVER) 4" C.I. FLOOR DRAIN INTO 6" PVC DRAIN LINE. DAYLIGHT OR STORM SYSTEM CONNECTION. (NO SUMP PUMPS) CHECK VAULT SIZE REQUIRED FOR ENCLOSING COMPLETE ASSEMBLIES.

(8.) PROVIDE GRINNEL PIPE SUPPORTS, TO INCLUDE STEEL YOKE, BOLT TO VAULT FLOOR USING RECOMMENDED CONNECTION AND SIZES.

MIN. VAULT SIZES:

4"	5106 LA	––	5'–0" X 10'–6" X 6'–3" HIGH
6"	5106 LA	––	5'–0" X 10'–6" X 6'–3" HIGH
8"	612 LA	––	6'–0" X 12'–0" X 6'–6 1/2" HIGH
10'	612 LA	––	6'–0" X 12'–0" X 6'–6 1/2" HIGH

NOTE:

1. PAINT ALL PIPING WITH PARKER PAINT MARINE ENAMEL, MARATHON 1065 TAHOE BLUE.
2. PROVIDE GRINNEL PIPE SUPPORTS WHERE REQUIRED (3" MIN.)
3. GATE VALVE TO BE LOCATED AT MAIN AND AT LOCATION THAT SEPARATES PUBLIC WATER LINE FROM PRIVATE WATER LINE.

1-20-2009

LEONARD L. SMITH STATE OF WASHINGTON 20830 REGISTERED PROFESSIONAL ENGINEER

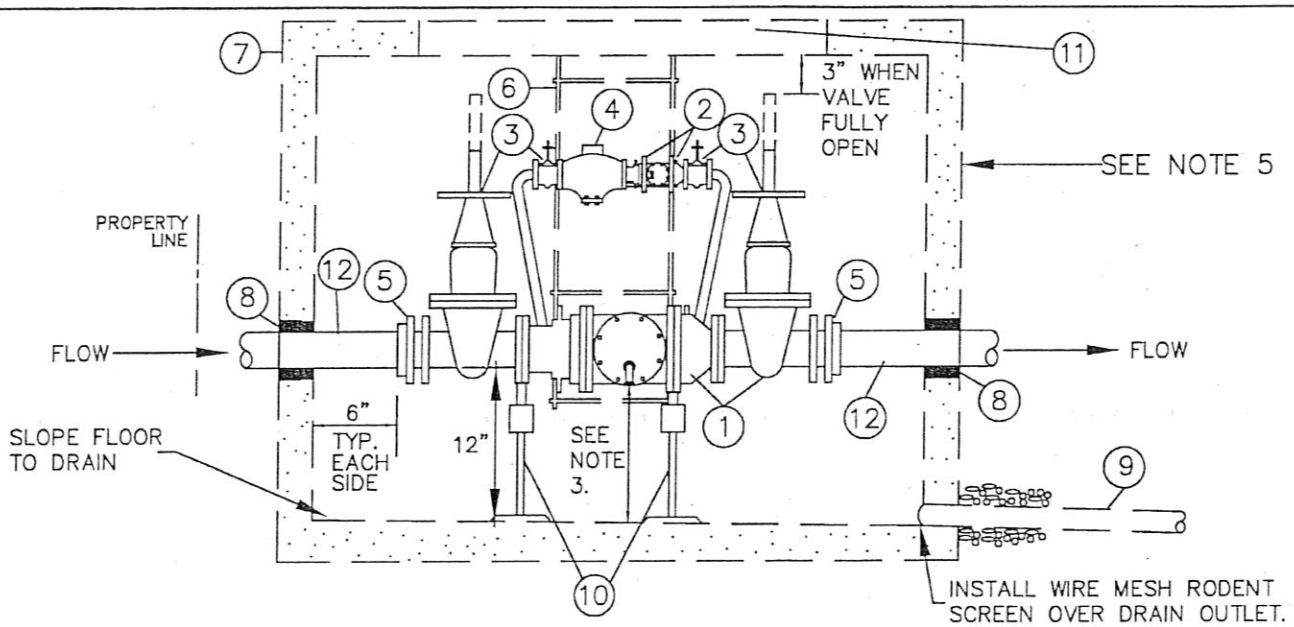
Leonard L. Smith

CITY OF BLACK DIAMOND

DOUBLE CHECK DETECTOR WITH FIRE CONNECTION

STANDARD DWG W-09	NOT TO SCALE	01/01/08

PWE PacWest Engineering Fife, Washington



PROFILE

1. STATE APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES AND (4) RESILIENT SEATED TEST COCKS, AND BRASS OR COPPER DETECTOR BY-PASS, CENTERED IN VAULT.
2. STATE APPROVED 3/4" REDUCED PRESSURE PRINCIPLE ASSEMBLY ON BY-PASS, COMPLETE WITH (2) RESILIENT SEATED BALL VALVES AND (4) RESILIENT SEATED TEST COCKS.
3. EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MIN. OF 4MLS. EPOXY OR EQUIVALENT POLYMERIZED COATING.
4. 3/4" METER (CUBIC FEET READING) AS REQUIRED.
5. UNI-FLANGE WITH SETSCREWS.
6. ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT.
7. CONCRETE VAULT WITH A MINIMUM OF 2, 3'x3' DIAMOND PLATE DOORS RATED FOR H-20 LOADING, MARKED "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODEL LISTED IN TABLE BELOW.
8. WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH WELDED FLANGE OR ANCHOR BLOCK.
9. DRAIN, SLOPE TO DAYLIGHT OR STORM. TO BE LAID IN LINE ON GRADE, DRAIN TO BE TWICE THE DIAMETER OF THE RP DEVICE MINIMUM.
10. TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
11. ACCESS TO BE CENTERED OVER METER.
12. CL. 52 D.I., M.J. WITH RETAINER GLANDS.

SIZE	MIN. VAULT SIZE (INSIDE) W	L	H	UTIL. VAULT CO. MODEL	UTIL. VAULT CO. COVER
3"	4'-9"	4'-8"	3'-11"	675-WA	675-2-332P
4"	5'-0"	5'-3"	4'-7"	675-WA	675-2-332P
6"	5'-1"	6'-6"	5'-5"	676-WA	676-2-332P
8"	5'-9"	7'-7"	7'-1"	687-LA	687-TL-2-332
10"	5'-10"	8'-8"	8'-0"	612-2X	612-3-332P

NOTES:

1. DAYLIGHT DRAIN MUST BE ABLE TO BE LINE SIGHTED, INSTALLED ABOVE MAXIMUM FLOOD LEVEL, AND BE ABLE TO HANDLE THE VOLUME OF WATER THAT CAN BE DISCHARGED FROM THE RELIEF VALVE PORT.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ALLOW 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR.
4. ASSEMBLY TO BE MAINTAINED BY OWNER AND ANNUAL CERTIFICATION REQUIRED.
5. REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY WILL BE ALLOWED TO BE INSTALLED IN VAULTS ONLY IN CASES WHERE NO OTHER MEANS OF INSTALLATION IS AVAILABLE AND AS APPROVED BY THE CITY OF BLACK DIAMOND.
6. FIRELINE SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION ASSEMBLY IS APPROVED BY THE CITY OF BLACK DIAMOND.
7. MINIMUM CLEARANCE BETWEEN ASSEMBLY AND WALL ON LADDER SIDE OF VAULT IS 24". MINIMUM CLEARANCE FROM OPPOSITE WALL 12". ALL CLEARANCES SHOWN ARE MINIMUM.
8. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
9. TEE AND GATE VALVE REQUIRED ON MAIN.
10. FDC & PIV TO BE LOCATED DOWNSTREAM OF RPBA.

1-20-2009

LEONARD L. SMITH STATE OF WASHINGTON 20830 REGISTERED PROFESSIONAL ENGINEER

Leonard Smith

CITY OF BLACK DIAMOND

REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY W/DETECTOR

STANDARD DWG W-10	NOT TO SCALE	01/01/08

PWE

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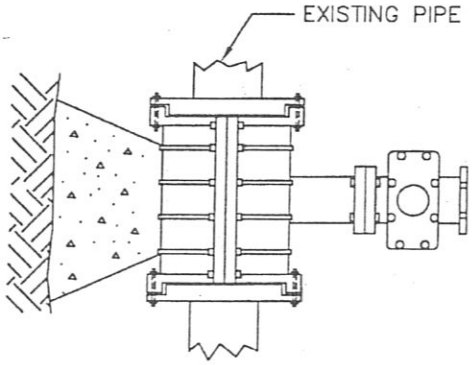
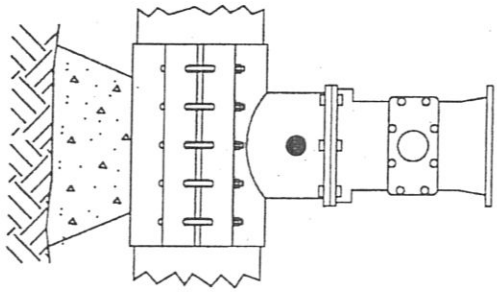
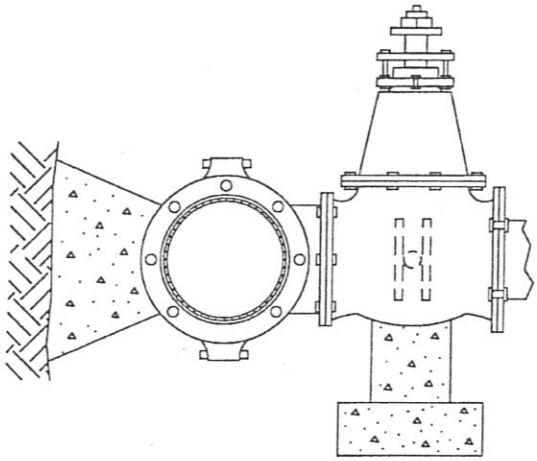
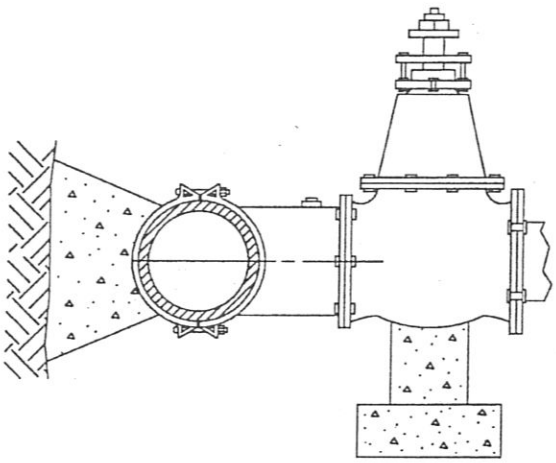
Fife, Washington









CAST IRON TAPPING TEE MECHANICAL JOINT SLEEVE

INSTALLED ON ASBESTOS CEMENT PIPE, CAST IRON PIPE AND DUCTILE IRON PIPE.

STAINLESS STEEL OR STEEL TAPPING TEE

STAINLESS STEEL TAPPING TEE

INSTALLED ON ASBESTOS CEMENT PIPE, CAST IRON PIPE AND DUCTILE IRON PIPE.

STEEL TAPPING TEE

INSTALLED ON DUCTILE IRON PIPE ONLY.

NOTES:

1. STAINLESS STEEL TAPPING TEES SHALL HAVE FULL CIRCLE SEAL. BOLTS AND NUTS SHALL BE STAINLESS STEEL.
2. STEEL TAPPING TEES SHALL BE EPOXY COATED. BOLTS AND NUTS SHALL BE COR-TEN, OR STAINLESS STEEL.
3. ALL TEES AND VALVES TO BE WATER TESTED BEFORE TAP.
4. TAP SHALL BE AT LEAST 2" SMALLER DIAMETER THAN THE EXISTING MAIN. (NO SAME SIZE TAPS SHALL BE ALLOWED.)
5. OPERATION OF GATE VALVE SHALL BE BY CITY PERSONNEL ONLY. CONTRACTOR SHALL NOT OPERATE VALVE.
6. VALVE BOX TO HAVE A LOCKING LID UNTIL ACCEPTED BY CITY.

1-30-2009

LEONARD L. SMITH
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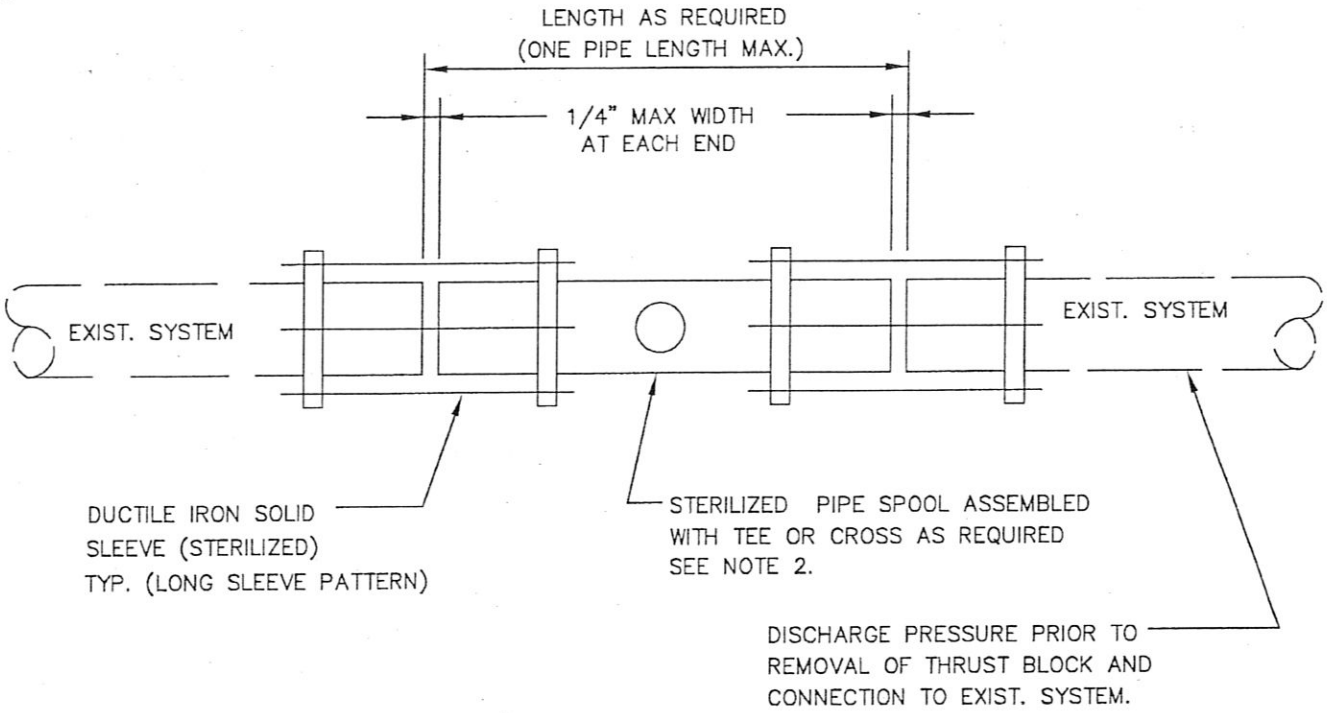
CITY OF BLACK DIAMOND

TAPPING TEES

STANDARD DWG W-11	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



NOTE:

1. NO DEFLECTION SHALL BE ALLOWED AT EITHER COUPLING.
2. CUT-IN CONNECTIONS ON STEEL PIPE TO USE D.I. X O.D. STEEL TRANSITION COUPLINGS, ROMAC OR EQUAL.
3. IN-LINE VALVE(S) IN EXISTING SYSTEM MAY BE REQUIRED AT THE SOLE DISCRETION OF THE CITY AT ALL NEW INTERTIE LOCATIONS. (NOTE: VALVE(S) ARE NOT SHOWN ABOVE FOR CLARITY.)

1-20-2009

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CITY OF BLACK DIAMOND

CUT IN CONNECTION

STANDARD DWG W-12	NOT TO SCALE	01/01/08

PWE
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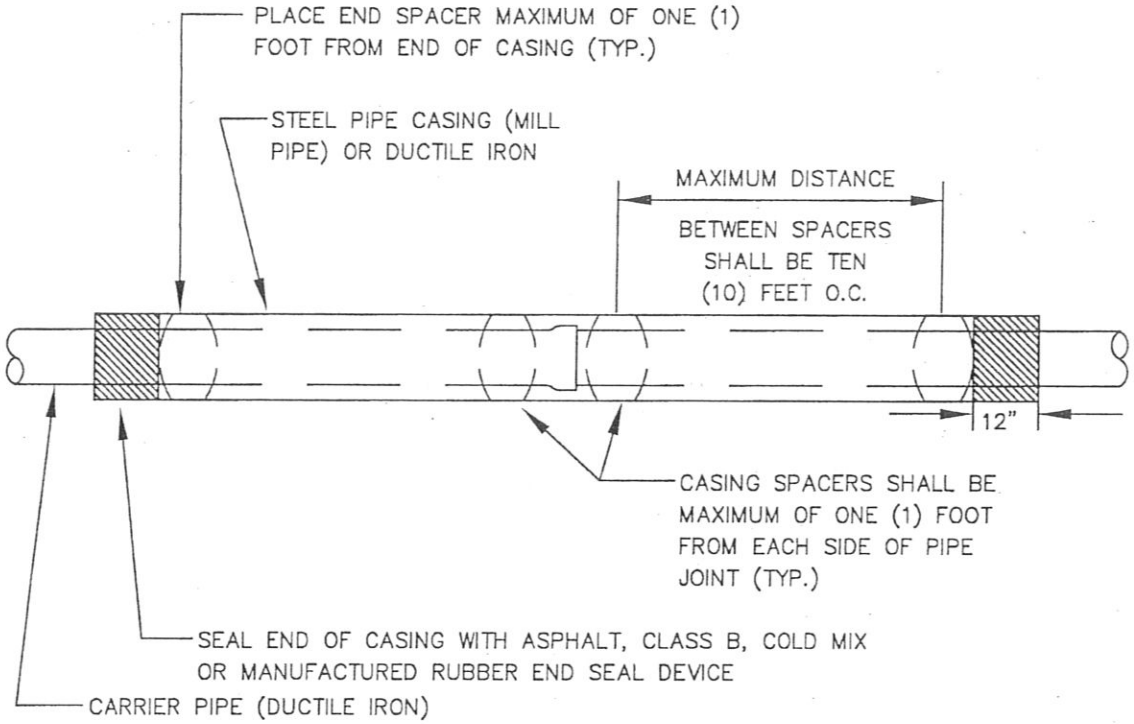
Fife, Washington



CASING SPACERS (SEE APPROVED MATERIALS LIST)

CARRIER PIPE DIAMETER	4"	6"	8"	10"	12"
CASING DIAMETER (PUSH-ON JOINT CARRIER PIPE)	10"	12"	14"	16"	20"
CASING DIAMETER (MJ/MEGALUG JOINT CARRIER PIPE)	14"	16"	18"	20"	22" *
STEEL CASING THICKNESS	0.25"	0.25"	0.25"	0.25"	0.25"
SPACER BAND WIDTH	8"	8"	8"	8"	8"

* 24" FOR DUCTILE IRON CASING.

ANTICORROSIVE COATING THICKNESS:
CARRIER – 8 MILLS DFT
CASING – 8 MILLS DFT

NOTES:

1. CASING SPACERS SHALL BE "CENTER POSITIONING" TYPE.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES.
3. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
   A. MINIMUM 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
   B. MINIMUM 1" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL TO PREVENT JAMMING DURING INSTALLATION.
4. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" & LARGER.
5. SPACER BAND WIDTH SHALL BE 12" FOR CARRIER PIPES THAT ARE 36" DIAMETER OR GREATER.
6. FILL CASING PIPE WITH SAND

1-20-2009
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CASING INSTALLATION

STANDARD DWG W-13	NOT TO SCALE	01/01/08

PacWest Engineering
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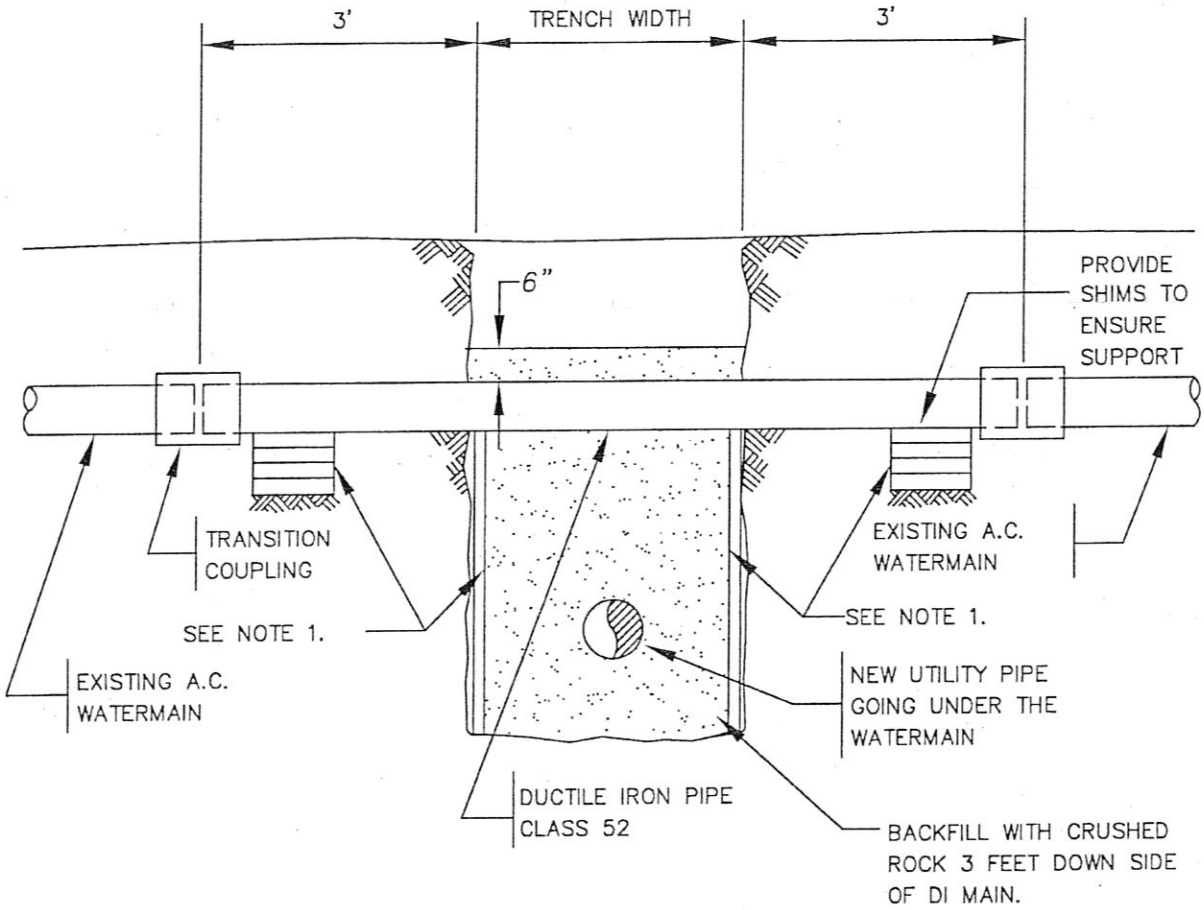

NOTES:

1. D.I. PIPE SHALL REST ON FIRM BEARING EARTH: SHORE TRENCH WALL UNDER WATERMAIN AS SHOWN, OR SUPPORT PIPE WITH PATIO BLOCKS (8"x16"X 2"). STACK BLOCKS AS REQUIRED TO REST ON FIRM BEARING SOIL.
2. THE CONTRACTOR IS REQUIRED TO MAINTAIN WORKERS' EXPOSURE TO ASBESTOS MATERIAL AT OR BELOW THE LIMIT PRESCRIBED IN WAC 296-62-07705.
3. ASBESTOS CEMENT PIPE SHALL BE CUT WITH A HAND-OPERATED CARBIDE BLADE CUTTER WITH CONTROLLED FLOWING WATER.
4. THIS DETAIL SHALL BE APPLICABLE IF REQUIRED BY THE CITY. BACKFILLING OF THE AC WATERLINE TRENCH WITH APPROVED MATERIALS MAY BE SUFFICIENT, AT THE SOLE DISCRETION OF THE CITY.

1-20-2009

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TYPICAL A.C. WATERMAIN CROSSING REPLACEMENT DETAIL

STANDARD DWG W-14	NOT TO SCALE	01/01/08

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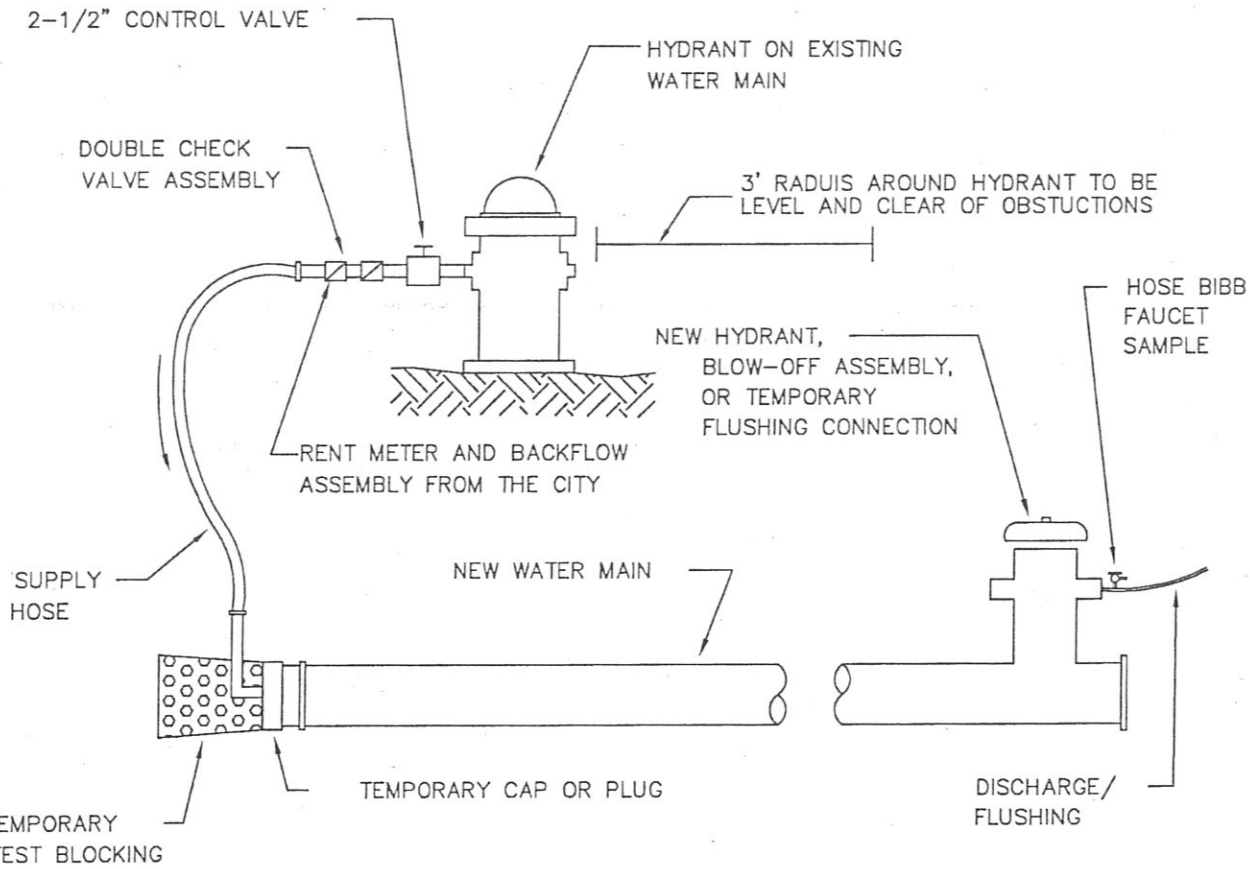

NOTES:

1. AN APPROVED BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED BETWEEN THE EXISTING AND NEW WATER LINES DURING DISINFECTION AND FLUSHING OF NEW WATERMAIN.
2. THE BACKFLOW PREVENTION ASSEMBLY AND SUPPLY HOSE MUST BE DISCONNECTED DURING HYDROSTATIC PRESSURE TESTING OF THE NEW MAIN.
3. THE NEW WATERMAIN SHALL BE CONNECTED TO THE EXISTING SYSTEM ONLY AFTER NEW MAIN IS FLUSHED, DISINFECTED AND SATISFACTORY BACTERIOLOGICAL SAMPLE RESULTS ARE OBTAINED.
4. THE INTERIORS OF ALL PIPES AND FITTINGS TO BE USED IN FINAL CONNECTION MUST BE SWABBED OR SPRAYED WITH A 1% AVAILABLE CHLORINE SOLUTION.

1-20-2009
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CITY OF BLACK DIAMOND

FILLING NEW WATER MAINS

STANDARD DWG W-15	NOT TO SCALE	01/01/08

PWE
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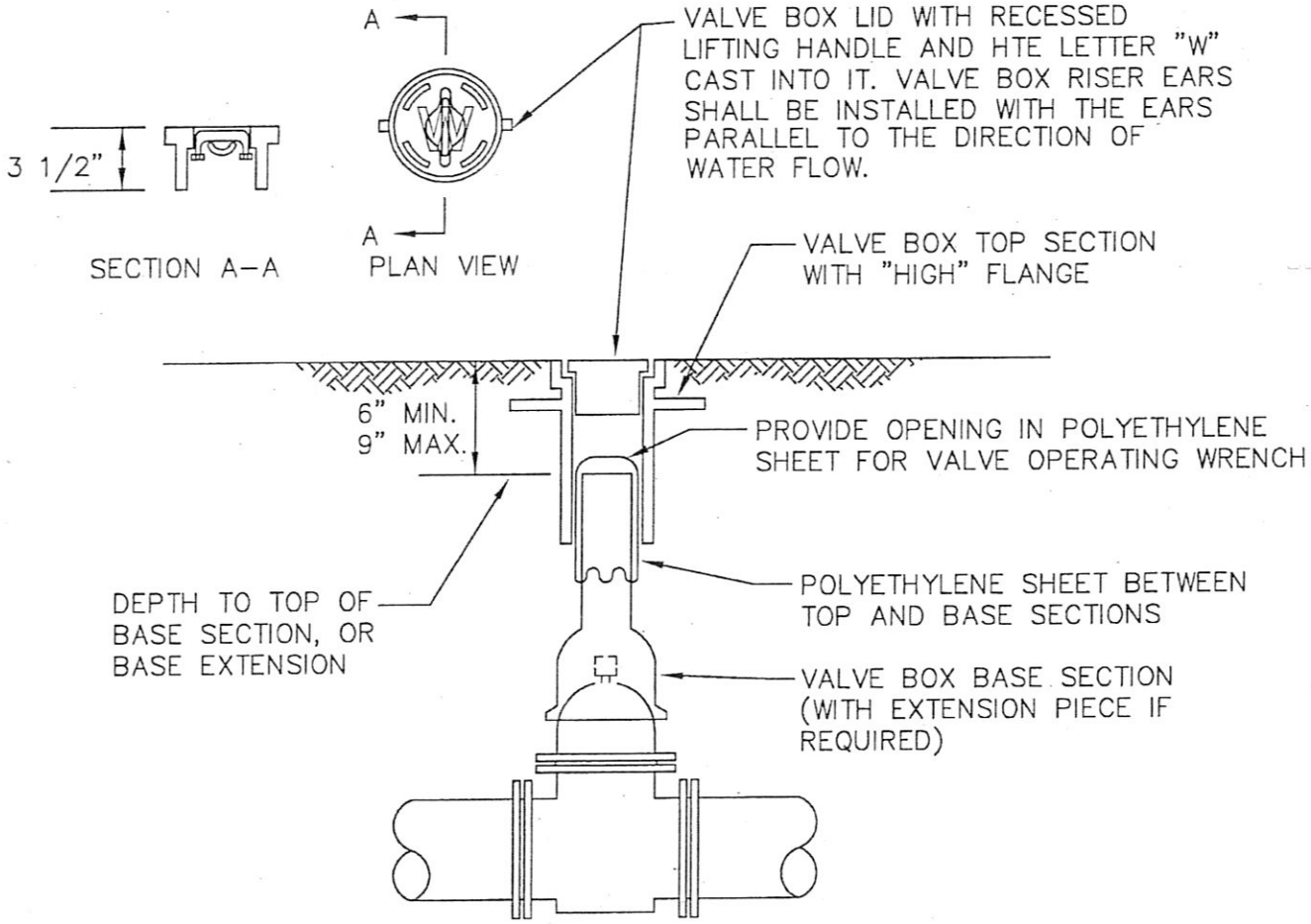

ALL PARTS SHALL BE CAST OR DUCTILE IRON AND COATED WITH ASPHALTIC VARNISH.

OLYMPIC FOUNDRY INC:
TOP AND BASE SECTION

RICH (VANRICH CASTING CORP.):
TOP SECTION AND
WITH RICH STANDARD BASE

INLAND FOUNDRY CO., INC.:
VALVE BOX PAVING RISER #2052–3, #2052–4, #2052–5 (PAVING RISER SHALL BE EPOXIED TO EXISTING VALVE BOX TOP SECTION)

12" ADJUSTING SLEEVE #044A

1-20-2009
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VALVE BOX INSTALLATION

STANDARD DWG W-16	NOT TO SCALE	01/01/08

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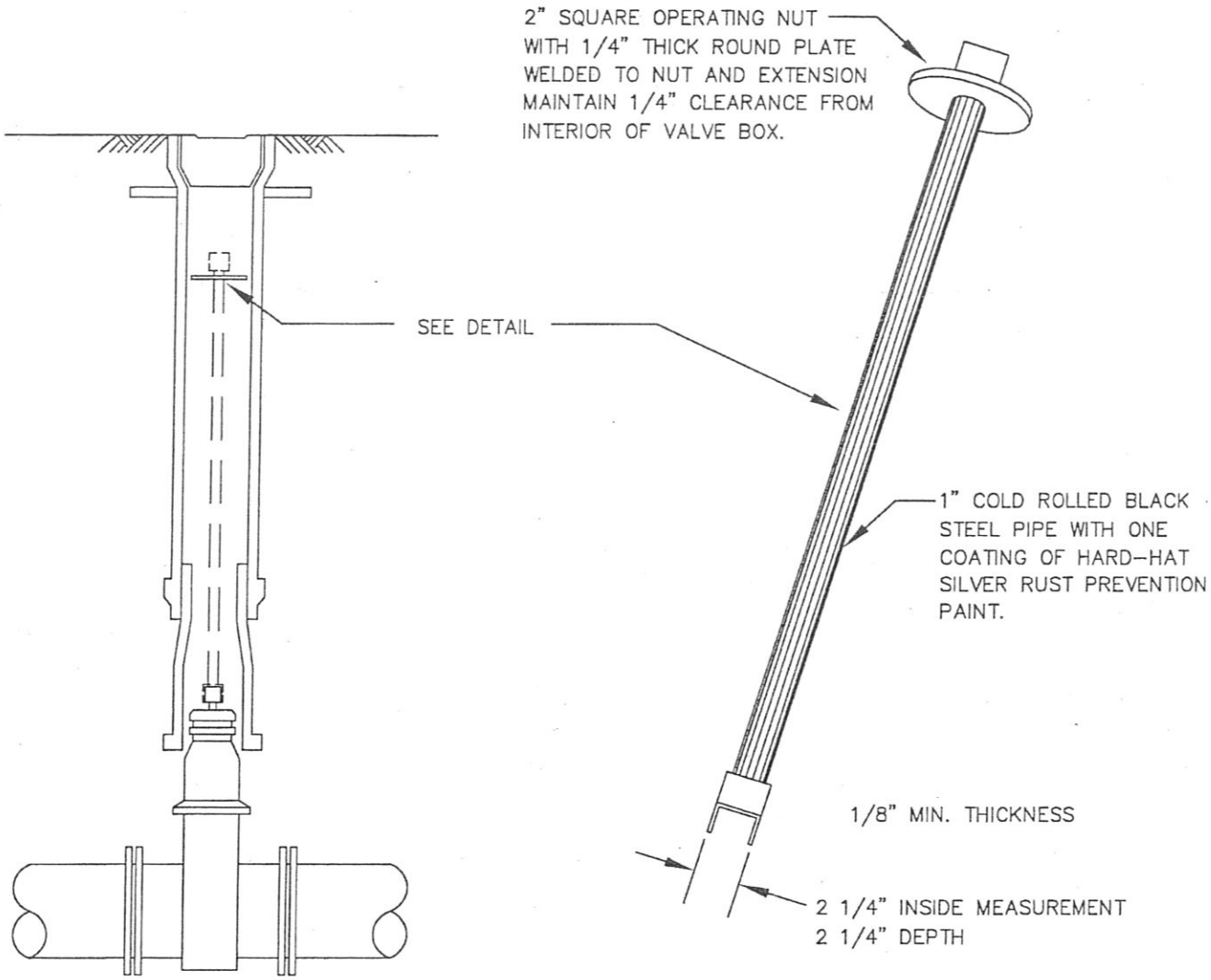
Fife, Washington



VALVE OPERATING NUT EXTENSION

EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN THREE (3) FEET BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF ONE (1) FOOT LONG. ONLY ONE EXTENSION TO BE USED PER VALVE.

NOTES:

1. ALL EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND PAINTED WITH TWO COATS OF METAL PAINT.

1-20-2009
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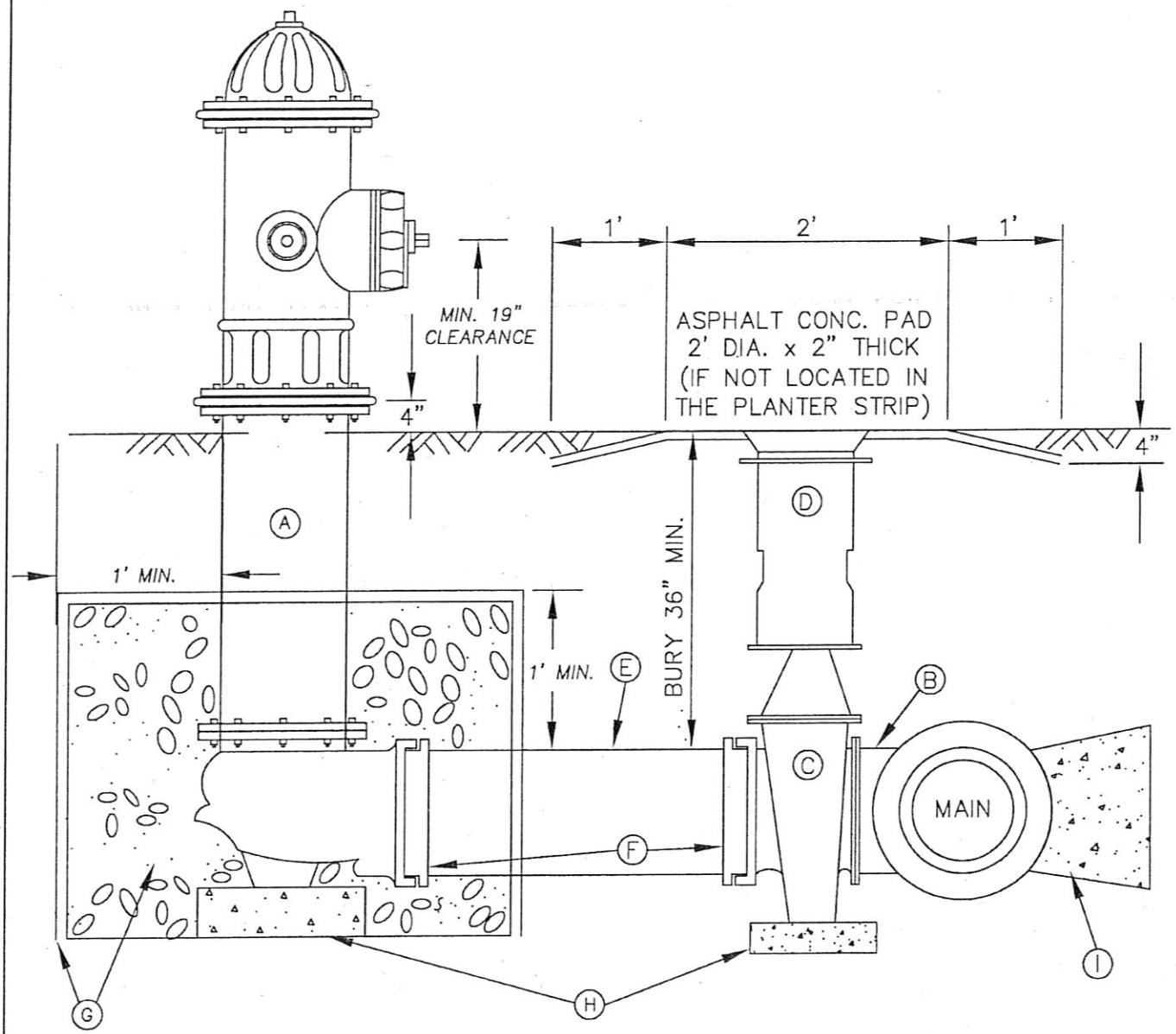
VALVE OPERATING EXTENSION

STANDARD DWG W-17	NOT TO SCALE	01/01/08

PacWest Engineering
Fife, Washington



A. 1–5 1/4" M.V.O. HYDRANT WITH 2–2 1/2" (N.S.T.) AND 1–4" PUMPER PORT (N.S.T.), WITH PERMANENT 4" STORZ HYDRANT ADAPTOR AND STORZ BLIND CAP. FIRE HYDRANT TO BE PAINTED WITH PRESERVATIVE BRAND CATERPILLAR OR INTERNATIONAL YELLOW PAINT. PUMPER PORT TO FACE STREET, OR AS DIRECTED BY THE FIRE DEPARTMENT.
B. 6" FLANGE OUTLET ON CAST OR DUCTILE IRON TEE.
C. 1–AUXILIARY GATE VALVE: 6" AWWA C509, RESILIENT SEAT, M.J.xFL. WITH LUGS.
D. 1–TWO–PIECE CAST IRON VALVE BOX EQUAL TO RICH TYPE #045 WITH RECESSED HANDLE LID.
E. 1–6" DUCTILE IRON CLASS 52 CEMENT–LINED PIPE, LENGTH TO FIT. WHERE MORE THAN ONE LENGTH OF PIPE IS REQUIRED, CONNECT PIPES WITH MECHANICAL JOINT SLEEVE, RESTRAIN PIPE AND SLEEVE WITH MEGALUG RESTRAINERS, OR RESTRAIN PIPES WITH UNI–FLANGE SERIES 1300 & 1390 JOINT RESTRAINERS.
F. RESTRAIN MECHANICAL JOINTS WITH MEGALUG RESTRAINERS.
G. 1/2 YARD WASHED DRAIN ROCK (3" TO 3/8"), MIN. 1' ABOVE BOOT FLANGE PLACE FILTER FABRIC ENCASEMENT AROUND GRAVEL.
H. 16"X8"X4" MIN. SIZE CONCRETE BLOCK UNDER HYDRANT AND VALVE.
I. CONC. BLOCKING.
J. INSTALL BLUE LANE REFLECTOR IN PAVEMENT.

9-20-2009

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CITY OF BLACK DIAMOND

FIRE HYDRANT ASSEMBLY

STANDARD DWG W-18	NOT TO SCALE	01/01/08

PWE
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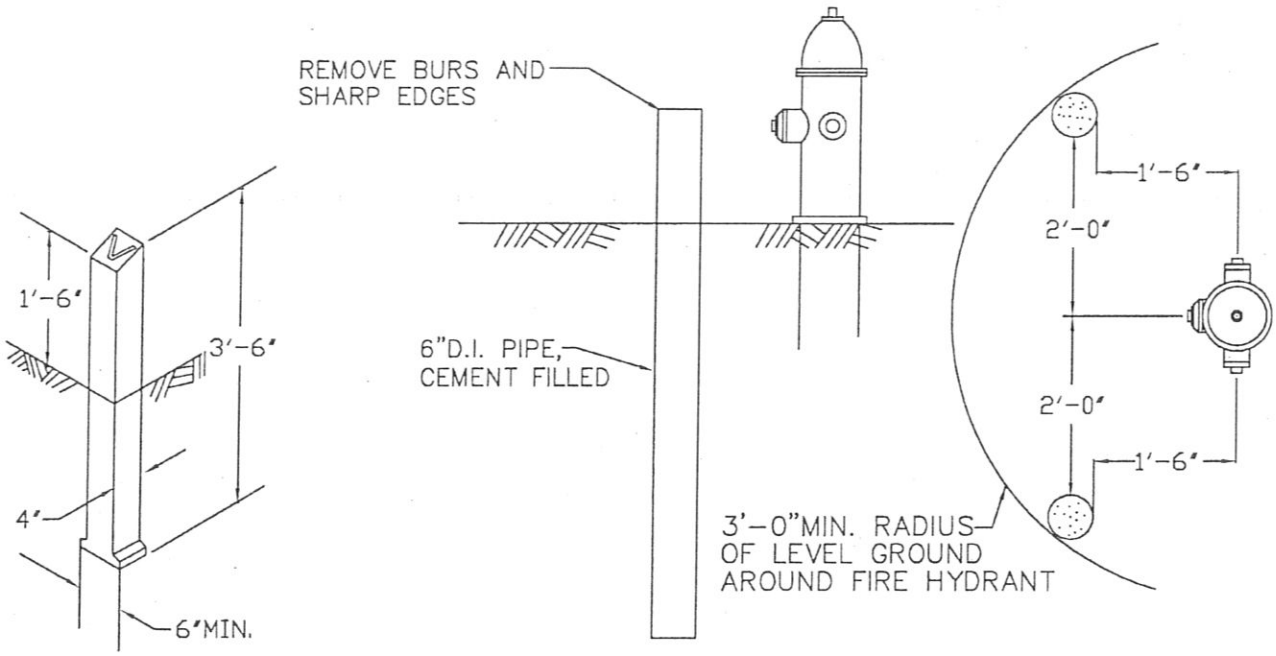

VALVE MARKER POST

FIRE HYDRANT GUARD POST

NOTES:

1. GUARD POST SHALL BE 6" CL.52 D.I. PIPE, 6' LONG, FILLED WITH CEMENT. PAINT WITH TWO COATS OF RUSTOLEUM HIGH GLOSS WHITE PAINT.
2. VALVE MARKER POST SHALL BE EQUAL TO FOG TITE METER SEAL COMPANY. PAINT WITH TWO COATS OF PRESERVATIVE BRAND CATERPILLAR OR INTERNATIONAL YELLOW PAINT. PAINT DISTANCE FROM THE VALVE MARKER TO THE VALVE ON THE POST WITH BLACK ENAMEL PAINT.
3. VALVE MARKER POST TO BE USED FOR ALL MAINLINE VALVES OUTSIDE PAVED AREAS.
4. HYDRANT VALVES SHALL BE LOCATED IN PLANTER STRIP AREA IF POSSIBLE.

1-20-2009

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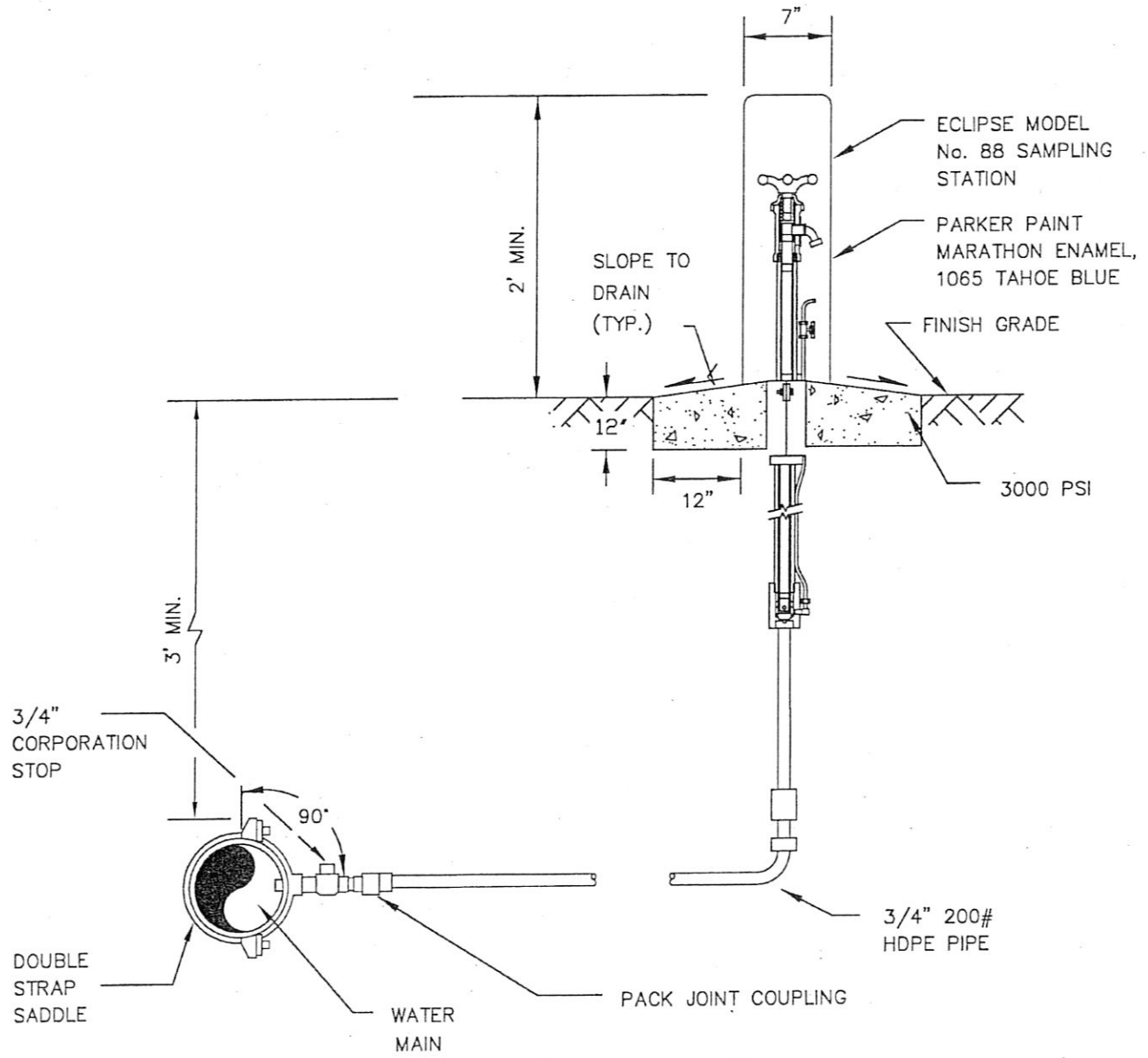
CITY OF
BLACK DIAMOND

FIRE HYDRANT GUARD POST &
VALVE MARKER POST

STANDARD DWG W-19	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



NOTE:

INSTALL 14 GAUGE TRACER WIRE FROM CORP STOP TO SAMPLING STATION.

9-20-2009

LEONARD L. SMITH
STATE OF WASHINGTON
20630
REGISTERED
PROFESSIONAL ENGINEER

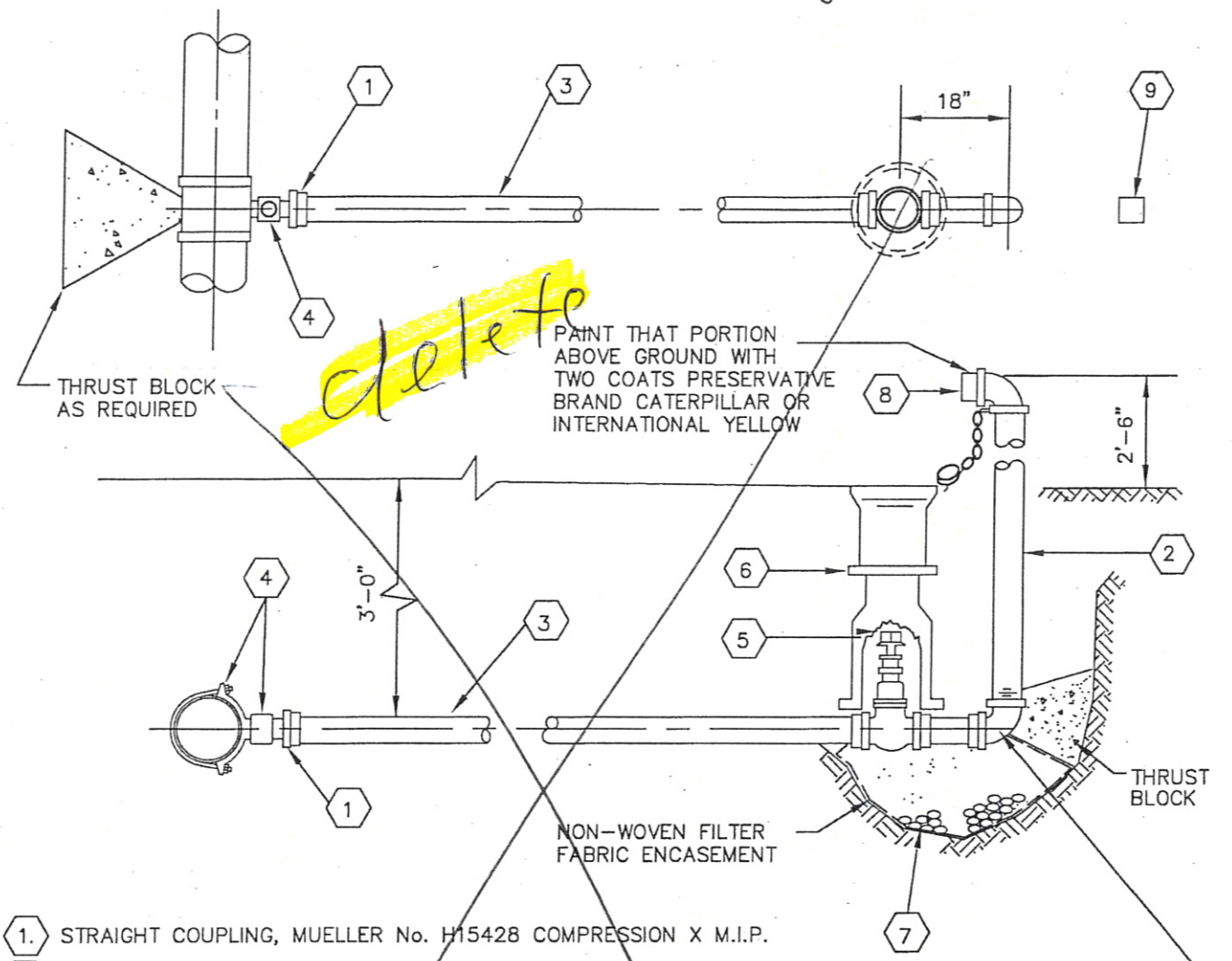
CITY OF BLACK DIAMOND

WATER SAMPLING STATION

STANDARD DWG W-20	NOT TO SCALE	01/01/08

PacWest Engineering
Fife, Washington

SEE Attached Page



1. STRAIGHT COUPLING, MUELLER No. H15428 COMPRESSION X M.I.P.
2. 2" GALVANIZED PIPE
3. 2" POLY PIPE
4. DOUBLE STRAP SADDLE (WITH CORP) TO FIT
5. 2" AWWA RESILIENT SEAT GATE VALVE W/OPERATING NUT.
6. CAST IRON VALVE BOX
7. 1/4 CUBIC YARD CRUSHED ROCK.
8. 2" x 2-1/2" HOSE THREADS BRASS INSERT WITH CAP AND CHAIN
9. VALVE MARKER POST

NOTES:

1. TURN NOZZEL TOWARDS ROADSIDE DITCH
2. INSTALL DIELECTRIC COUPLINGS AT DISSIMILAR METALS.
3. ENGINEER SHALL BE RESPONSIBLE TO DETERMINE IF A 2" BLOW-OFF ASSEMBLY IS ADEQUATE FOR LARGER THAN 8" DIAMETER WATERLINES. FIRE HYDRANT INSTALLATION SHALL BE REQUIRED FOR 12" DIAMETER & LARGER WATERLINES.

1-20-2009

LEONARD L. SMITH STATE OF WASHINGTON 20830 REGISTERED PROFESSIONAL ENGINEER

Leonard L. Smith

CITY OF BLACK DIAMOND

BLOW-OFF ASSEMBLY

STANDARD DWG W-21	NOT TO SCALE	01/01/08

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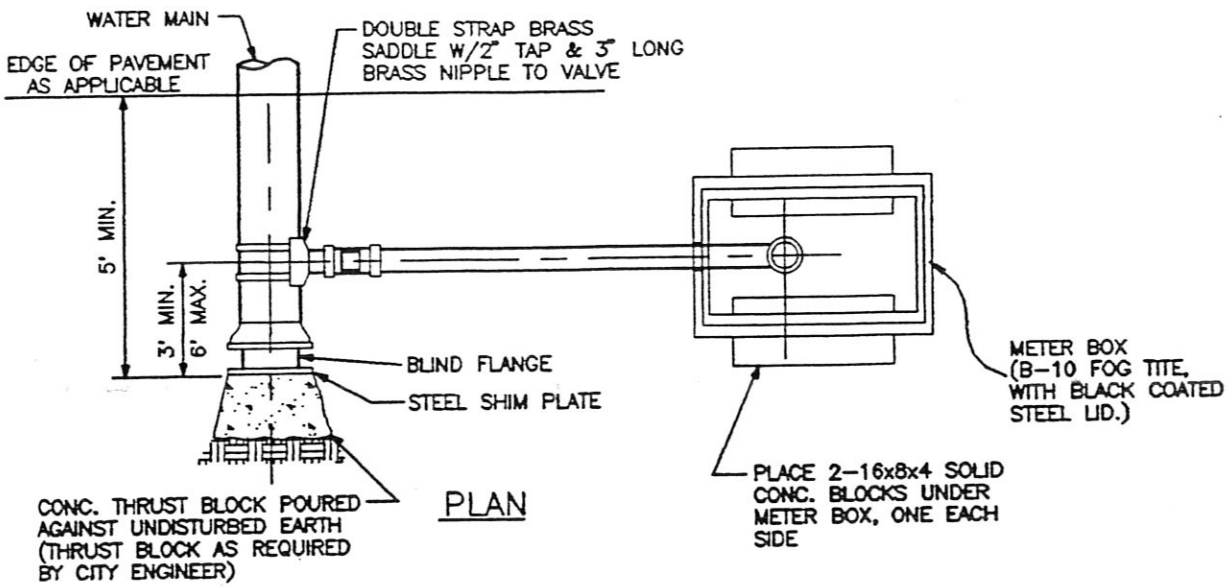
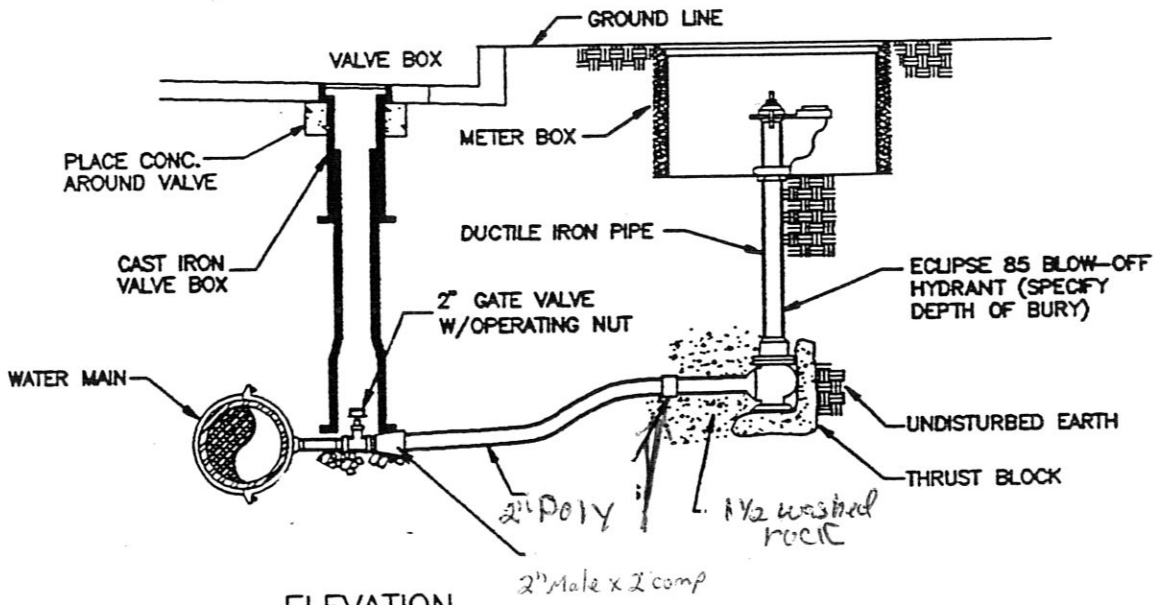


PLAN

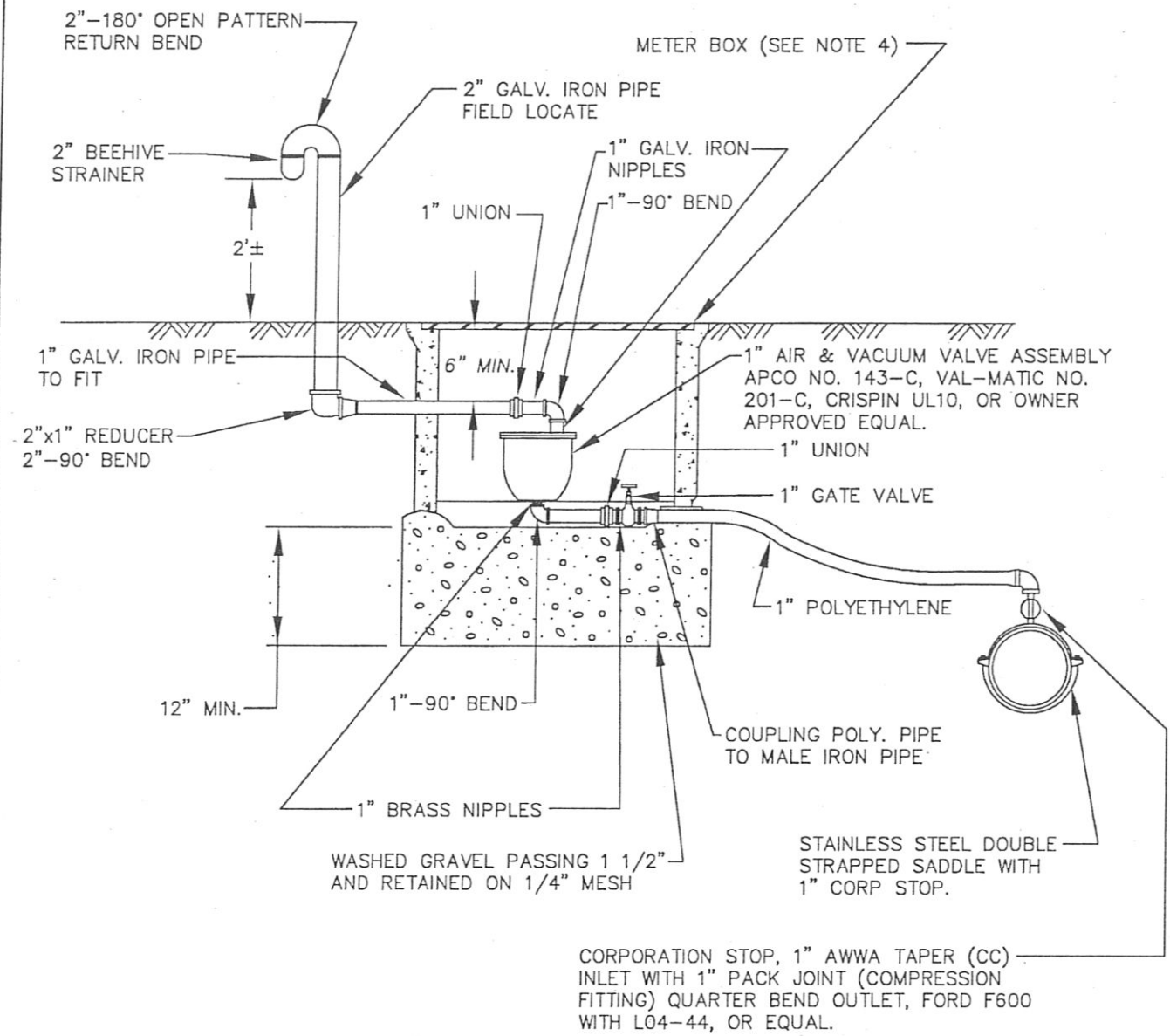


ELEVATION

BLOW-OFF HYDRANTS SHALL BE NON-FREEZING, SELF-DRAINING TYPE.

1. SET UNDERGROUND IN CITY APPROVED METER BOX, THESE HYDRANTS WILL BE FURNISHED WITH A 2" FIP INLET, A NON-TURNING OPERATING ROD, AND SHALL OPEN TO THE DESIGN, AND BE SERVICEABLE FROM ABOVE GRADE WITH NO DIGGING.
2. THE OUTLET SHALL ALSO BE BRONZE AND BE 2-1/2" NST.
3. HYDRANTS SHALL BE LOCKABLE TO PREVENT UNAUTHORIZED USE.
4. Fire Hydrant installation shall be required for 12" diameter & larger water lines. (SPECIFY OVERALL LENGTH 6" SHORTER THAN NORMAL DEPTH OF BURY. MINIMUM OPENING IN METER BOX SHALL BE 10".)

CITY OF BLACK DIAMOND			
PERMANENT IN-LINE BLOW OFF ASSEMBLY			
APPROVED: _____ CITY ADMINISTRATOR 04/25/05 DATE			DWG. NO. PILBOA
DATE: 2/95	DRWN: R.L.O.	CHKD: T.J.O.	SCALE: NONE



NOTES:

1. ALL FITTINGS TO BE BRASS OR COPPER FROM WATER MAIN TO 1" AIR & VACUUM ASSEMBLY.
2. 2" GALVANIZED PIPE ABOVE GRADE TO BE PAINTED WITH 2 COATS PRESERVATIVE BRAND CATERPILLAR OR INTERNATIONAL YELLOW PAINT.
3. AIR & VACUUM RELEASE VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF LINE. IF HIGH POINT FALLS IN A LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED.
4. LOCATE AIR & VACUUM METER BOX OUTSIDE OF TRAFFIC AREAS, BEHIND CURB OR SIDEWALK.

1-20-2009

LEONARD L. SMITH — STATE OF WASHINGTON — 20830 — REGISTERED PROFESSIONAL ENGINEER

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CITY OF BLACK DIAMOND

1" AIR & VACUUM RELEASE VALVE ASSEMBLY

STANDARD DWG W-22	NOT TO SCALE	01/01/08

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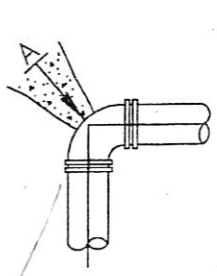
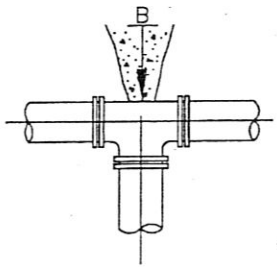
Fife, Washington

Replace with attached page

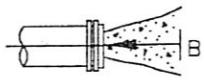
THRUST BLOCK – TABLE							
		MINIUM BEARING AREA AGAINST UNDISTURBED SOIL SQUARE FEET					
PIPE SIZE	PRESSURE PSI	A	B	C	D	E	X (100 PSI)
4"	200 300	2/(1) 3/(2)	1/(NONE) 2/(2)	1/(NONE) 2/(1)	NONE 1/(1)	NONE NONE	NONE
6"	200 300	4/(3) 6/(4)	3/(2) 4/(3)	3/(1) 3/(2)	1/(1) 2/(1)	1/(NONE) 1/(NONE)	NONE
8"	200 300	7/(5) 11/(8)	5/(3) 8/(5)	4/(3) 6/(4)	2/(2) 3/(2)	1/(1) 2/(1)	3/(2)
10"	200 275	11/(8) 16/(11)	8/(6) 11/(7)	6/(4) 9/(6)	3/(2) 5/(3)	2/(1) 3/(2)	4/(3)
12"	200 250	16/(11) 24/(16)	11/(8) 17/(11)	9/(6) 13/(9)	5/(3) 7/(5)	3/(2) 4/(3)	5/(4)
14"	200 250	22/(13) 33/(22)	16/(11) 23/(16)	12/(8) 18/(12)	6/(4) 9/(6)	3/(2) 5/(3)	7/(6)
16"	200 225	29/(19) 32/(21)	21/(14) 23/(16)	16/(11) 17/(12)	8/(6) 9/(6)	5/(3) 5/(3)	10/(7)
18"	200	36/(24)	26/(17)	20/(13)	10/(7)	5/(4)	13/(9)
20"	200	45/(29)	32/(21)	24/(16)	13/(8)	7/(4)	16/(11)
24"	200	64/(43)	46/(30)	35/(23)	18/(12)	9/(6)	23/(16)



90° BEND



TEE



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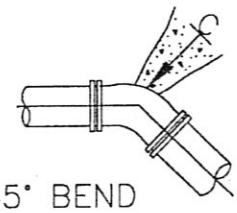
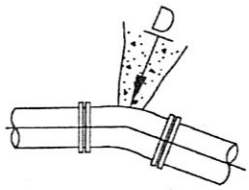
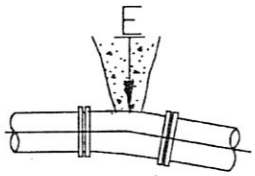


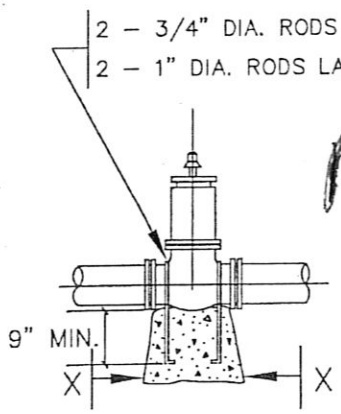
45° BEND



22 1/2° BEND



11 1/4° BEND



GATE VALVE

Replace

NOTE: ADDITIONAL BLOCKING MUST BE PROVIDED IF GATE VALVE IS AT END OF LINE DURING TESTING.

NOTES:
1. SQUARE FEET OF CONCRETE THRUSTS – BLOCK AREA BASED ON SAFE BEARING LOAD OF 2000/(3000) LBS. PER SQ. FT.
2. AREAS MUST BE ADJUSTED FOR OTHER SIZE PIPE, PRESSURES & SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE & HAVE MIN. OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
4. BLOCK SHALL BEAR AGAINST FITTINGS ONLY & SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING JOINT. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH 20 LB. TAR PAPER, PLASTIC OR SIMILAR MATERIAL.
5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE BEARING LOADS IN LB./SQ. FT.
THE SAFE BEARING LOADS GIVEN IN THE FOLLOWING TABLE ARE FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET.

SOIL	SAFE BEARING LOAD LB. PER SQ. FT.
* MUCK, PEAT, ETC.	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

* IN MUCK OR PEAT, ALL THRUSTS SHALL BE RESTRAINED BY PILES OR TIE RODS TO SOLID FOUNDATIONS OR BY REMOVAL OF MUCK OR PEAT AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THRUST.

1-20-2009
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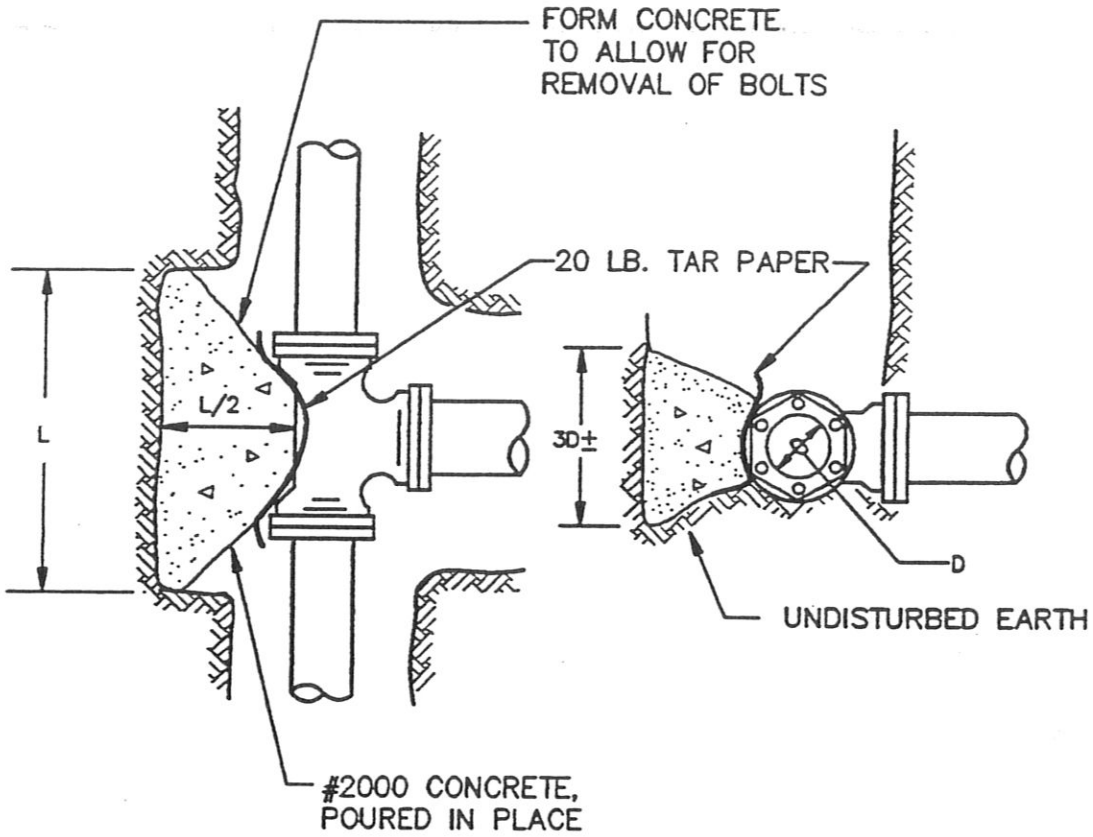
CITY OF BLACK DIAMOND

CONCRETE BLOCKING

STANDARD DWG W-23	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington

MINIMUM BEARING AREA TABLE					
FITTING D	TEE	90°	45°	22 1/2°	11 1/4°
6"	4 SQ.FT.	6 SQ.FT.	3 SQ.FT.	2 SQ.FT.	2 SQ.FT.
8"	7 SQ.FT.	10 SQ.FT.	6 SQ.FT.	3 SQ.FT.	2 SQ.FT.
10"	10 SQ.FT.	15 SQ.FT.	9 SQ.FT.	5 SQ.FT.	3 SQ.FT.
12"	14 SQ.FT.	22 SQ.FT.	12 SQ.FT.	6 SQ.FT.	4 SQ.FT.
16"	25 SQ.FT.	38 SQ.FT.	21 SQ.FT.	11 SQ.FT.	7 SQ.FT.
18"	32 SQ.FT.	48 SQ.FT.	27 SQ.FT.	14 SQ.FT.	8 SQ.FT.

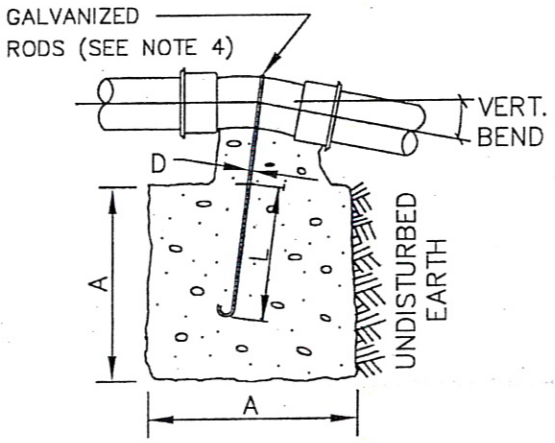


PLAN **ELEVATION**

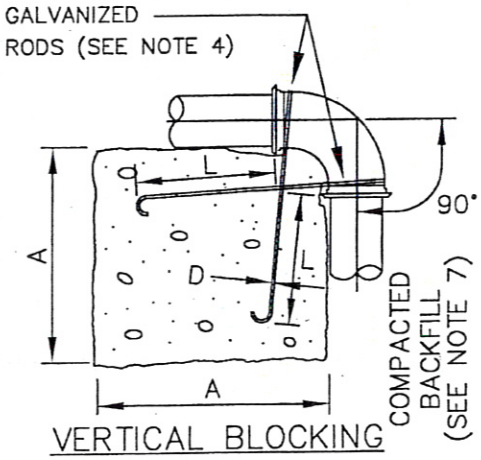
NOTE:
BEARING AREA TABLE BASED ON 250 PSI PRESSURE AND 2000 PSF SOIL BEARING. IF PRESSURE IS GREATER OR SOIL BEARING IS LESS, THE THRUST BLOCK SIZE SHALL BE INCREASED.

THIS TABLE REPRESENTS THE "MINIMUM" CONSTRUCTION STANDARDS. THE DEVELOPER'S ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING THE APPROPRIATE SIZE OF ALL THRUST BLOCKS BASED ON EXISTING AND LOCAL CONDITIONS.

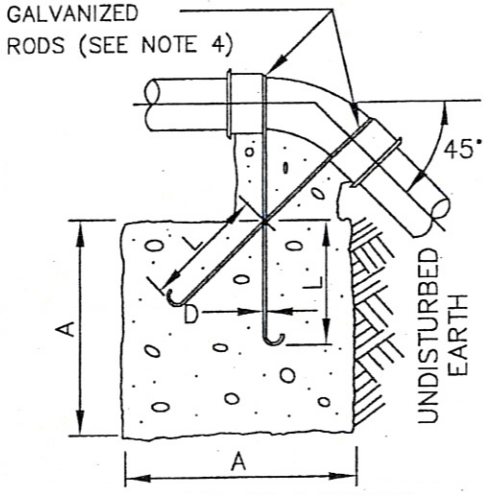
CITY OF BLACK DIAMOND			
THRUST BLOCKS (FOR WATER MAINS)			
APPROVED: CITY ADMINISTRATOR 04/25/95 DATE			DWG. NO. TB
DATE: 2/95	DRWN: R.L.O.	CHKD: T.J.O.	SCALE: NONE



VERTICAL BLOCKING
11 1/4° & 22 1/2° BENDS



VERTICAL BLOCKING
FOR 90° BENDS
(SEE NOTE 6)



VERTICAL BLOCKING
FOR 45° BENDS

VERTICAL BLOCKING SIZE W/RESTRAINED JOINTS SOIL TYPE = COHESIVE GRANULAR [GC+SC] SAND, GRAVEL, CLAY MIXTURE					
PIPE SIZE	V B	CU FT	A	D	L
4"	11 1/4°	*			
	22 1/2°	*			
	45°	*			
	90°	16	2.5'	3/4"	2.0'
6"	11 1/4°	*			
	22 1/2°	*			
	45°	13	2.3'	3/4"	2.0'
	90°	43	3.5'	3/4"	2.0'
8"	11 1/4°	*			
	22 1/2°	*			
	45°	33	3.2'	3/4"	2.0'
	90°	86	4.4'	3/4"	2.0'
10"	11 1/4°	*			
	22 1/2°	13	2.3'	3/4"	2.0'
	45°	64	4.0'	3/4"	2.0'
	90°	141	5.2'	1"	3.5'
12"	11 1/4°	*			
	22 1/2°	20	2.7'	3/4"	2.0'
	45°	111	4.8'	3/4"	2.0'
	90°	206	5.9'	1 1/8"	4.0'

* BLOCKING NOT REQUIRED IF 36 FEET OF PIPE IS RESTRAINED ON EACH SIDE OF BEND.

delete

NOTES:

1. NO CHANGE IN PIPE DIRECTION OR DIAMETER SHALL OCCUR WITHIN 36 FEET OF THE VERTICAL BEND. BENDS, TEES, REDUCERS, ETC. BEYOND THE 36 FOOT LIMIT SHALL BE RESTRAINED BY STANDARD CONCRETE BLOCKING PER STD. DTL. W-1 & W-3.
2. CONCRETE BLOCKING SIZES BASED ON:
   - 36 FEET OF PIPE RESTRAINED EACH SIDE OF BEND.
   - THRUST BLOCK AREAS BASED ON SAFE BEARING LOAD OF 1,000 PSF.
   - 2,500 PSI CONCRETE.
   - MINIMUM 3 FEET OF COVER.
   - PIPE THRUST BASED ON 200 PSI PRESSURE.
   - VERTICAL BLOCK SIZE BASED ON CONCRETE WEIGHT OF 150 POUNDS PER CUBIC FOOT.
   - TRENCH CONDITIONS BASED ON TYPE 2, FLAT BOTTOM TRENCH WITH LIGHTLY CONSOLIDATED BACKFILL, PER ANSI/AWWA C150/A21.50.
   - FACTOR OF SAFETY IS 1.5.
   - SOIL FRICTIONAL RESISTANCE BASED ON COHESIVE GRANULAR SOIL TYPE (GC+SC). SAND, GRAVEL, CLAY MIXTURE.
3. BLOCKING DESIGN MUST BE ADJUSTED FOR OTHER SIZE PIPE, PRESSURES & SOIL CONDITIONS.
4. DEFORMED REINFORCEMENT BARS SHALL BE IN ACCORDANCE WITH ASTM A 615. BARS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 767.
5. LINE SHALL NOT BE PRESSURIZED UNTIL ALL TRENCHING WITHIN 100 FT. OF VERTICAL BEND IS BACKFILLED AND COMPACTED TO MINIMUM COVER OF 3 FT. OVER PIPE.
6. 90° VERTICAL BENDS SHALL ONLY BE INSTALLED WHERE GIVEN PRIOR APPROVAL BY THE CITY.
7. BACKFILL TRENCH BEYOND 90° VERTICAL BLOCK WITH CRUSHED SURFACING TOP COURSE MATERIAL COMPACTED TO 95% MINIMUM DENSITY. CRUSHED BACKFILL SHALL EXTEND 20 FEET BEYOND BLOCK OR TO FIRM BEARING TRENCH WALL, WHICHEVER IS LESS.

8-20-2009

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PROFESSIONAL ENGINEER

Leonard L. Smith

CITY OF BLACK DIAMOND

VERTICAL BLOCKING WITH RESTRAINED JOINTS FOR NEW LINES

STANDARD DWG W-24	NOT TO SCALE	01/01/08

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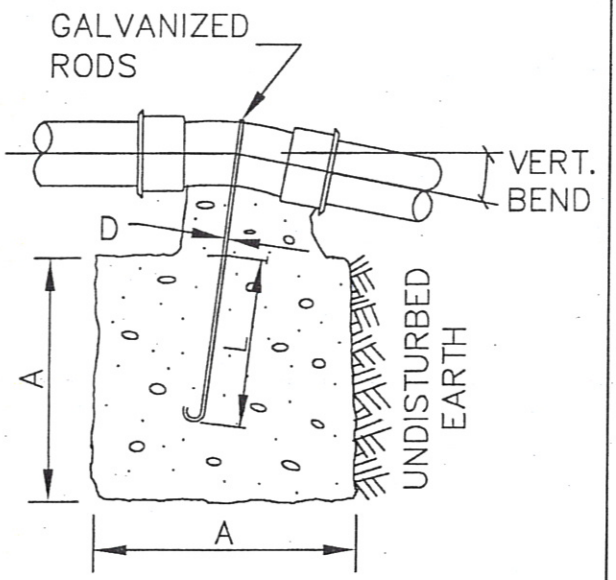
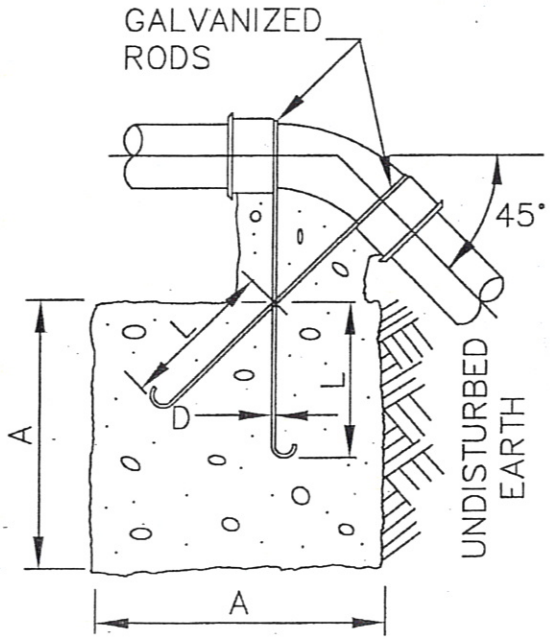
VERTICAL BLOCKING FOR 11 1/4°–22 1/2°–30° BENDS					
PIPE SIZE	V B	CU FT	A	D	L
4"	11 1/4°	8	2.0'	3/4"	1.5'
	22 1/2°	11	2.2'		2.0'
	30°	17	2.6'		
6"	11 1/4°	11	2.2'	3/4"	2.0'
	22 1/2°	25	2.9'		
	30°	41	3.5'		
8"	11 1/4°	16	2.5'	3/4"	2.0'
	22 1/2°	47	3.6'		
	30°	70	4.1'	3/4"	2.5'
12"	11 1/4°	32	3.2'	3/4"	2.0'
	22 1/2°	88	4.5'	7/8"	3.0'
	30°	132	5.1'		
16"	11 1/4°	70	4.1'	7/8"	3.0'
	22 1/2°	184	5.7'	1 1/8"	4.0'
	30°	275	6.5'	1 1/4"	
20"	11 1/4°	91	4.5'	7/8"	3.0'
	22 1/2°	225	6.1'	1 1/4"	4.0'
	30°	330	6.9'	1 3/8"	4.5'
24"	11 1/4°	128	5.0'	1"	3.5'
	22 1/2°	320	6.8'	1 3/8"	4.5'
	30°	480	7.9'	1 5/8"	5.5'
VERTICAL BLOCKING FOR 45° BENDS					
4"	45°	30	3.1'	3/4"	2.0'
6"		68	4.1'		
8"		123	5.0'		
12"		232	6.1'	3/4"	2.5'
16"		478	7.8'	1 1/8"	4.0'
20"		560	8.2'	1 1/4"	
24"		820	9.4'	1 3/8"	4.5'



VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, & 30° BENDS



VERTICAL BLOCKING FOR 45° BENDS

NOTES: CONCRETE BLOCKING BASED ON 200 PSI PRESSURE AND 2500 PSI CONCRETE.

1-20-2009
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CITY OF BLACK DIAMOND

VERTICAL BLOCKING FOR CONNECTING TO EXISTING MAIN without restrained joints

STANDARD DWG W-25	NOT TO SCALE	01/01/08

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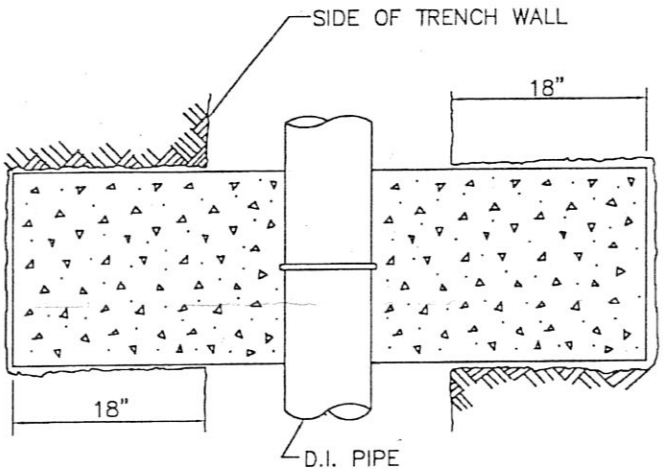
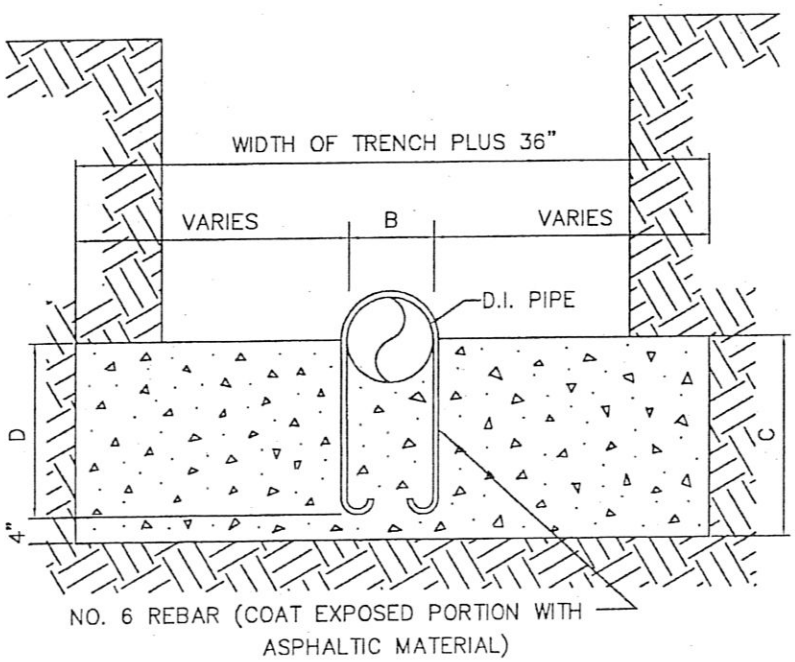
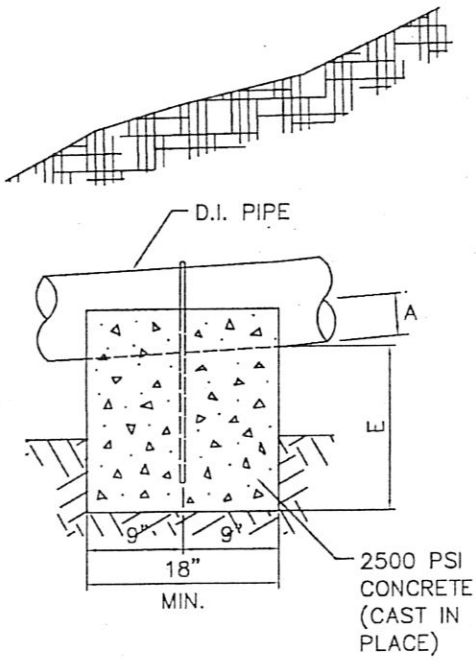


PIPE SIZE	DIMENSIONS (INCHES)				
	A	B	C	D	E
4"	2.4	4.8	17	13	14.6
6"	3.5	6.9	18	14	14.5
8"	4.5	9.1	19	15	14.5
10"	5.6	11.1	20	16	14.4
12"	6.6	13.2	21	17	14.4
14"	7.7	15.3	22	18	14.3
16"	8.7	17.4	23	19	14.3
18"	9.8	19.5	24	20	14.2





SLOPES > 20% – PROVIDE CONCRETE SLOPE ANCHORS (25'MINIMUM ON CENTER)

1-20-2009
LEONARD L. SMITH
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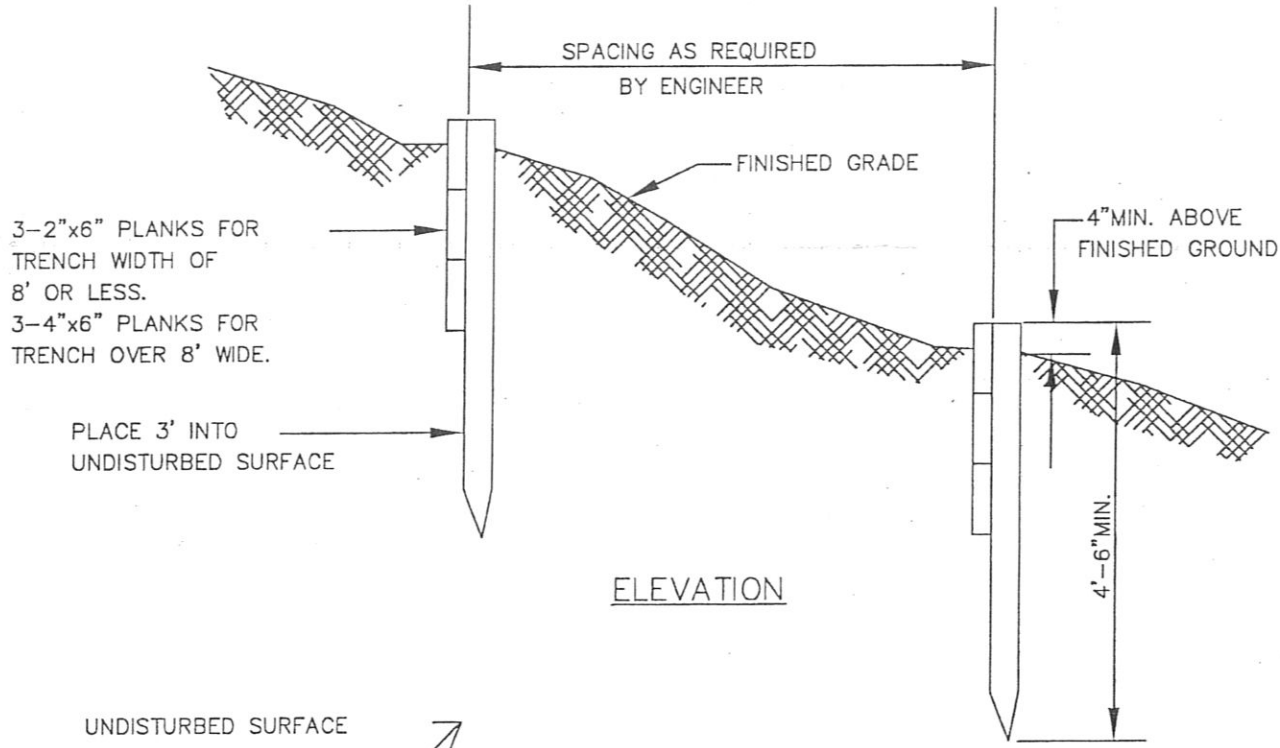
CITY OF BLACK DIAMOND

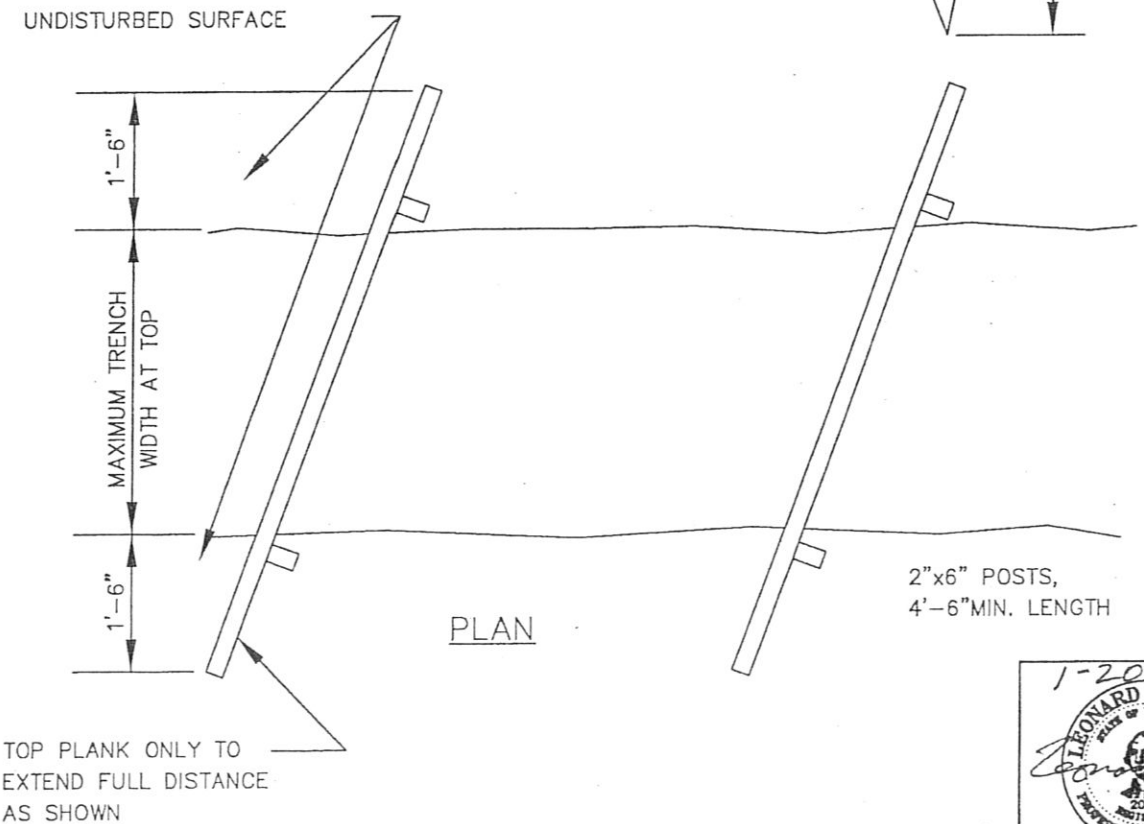
CONCRETE SLOPE ANCHOR DETAIL

STANDARD DWG W-26	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington



ELEVATION



PLAN

1-20-2009

LEONARD L. SMITH
STATE OF WASHINGTON
20930
REGISTERED
PROFESSIONAL ENGINEER

Leonard L. Smith

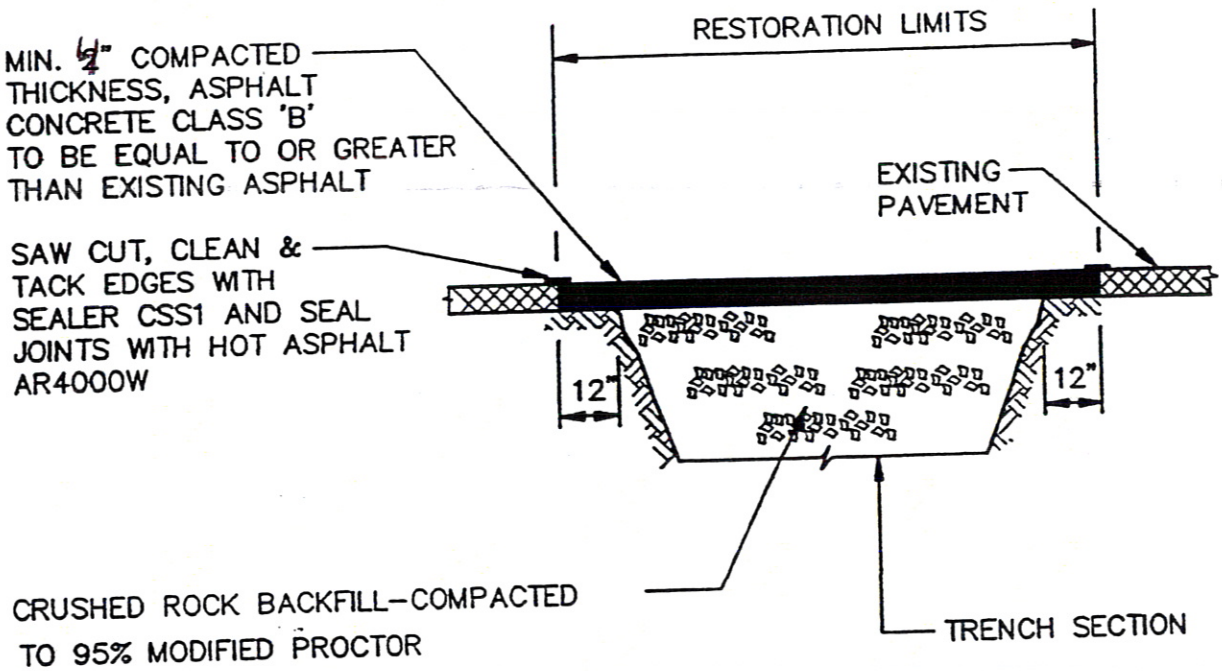
CITY OF
BLACK DIAMOND

TIMBER BAFFLE/HILL HOLDER

STANDARD DWG W-27	NOT TO SCALE	01/01/08

PWE
PacWest Engineering
Fife, Washington

ADD a detail from Pac West Street Standard for asphalt pavement repair



NOTES:

1. KING COUNTY PUBLIC WORKS R.O.W CONSTRUCTION PERMITS MAY REQUIRE ALTERNATE RESTORATION
2. 100% CRUSHED ROCK BACKFILL REQUIRED ON ALL ROADWAY CUTS

CITY OF BLACK DIAMOND			
ASPHALT PAVEMENT REPAIR			
APPROVED: CITY ADMINISTRATOR 04/25/95 DATE			DWG. NO. TRDIP
DATE: 2/95	DRWN: R.L.O.	CHKD: T.J.O.	SCALE: NONE