

SECTION 3: Standards for Water System Improvements



3.0 STANDARDS FOR WATER SYSTEM IMPROVEMENTS

These Standards contain the design criteria and improvement standards for the extension or connections to the City of Kent Water System. The conditions as stated herein apply to all improvements made by public agencies and private Developers. These improvements may include the following:

- Watermain extensions, modifications and replacements
- Fire line and/or yard hydrant or fire hydrant connections to City mains
- Water service and water use only meter installations
- Cross connection control devices

3.1 EASEMENTS AND RIGHTS-OF-WAY

Permanent on-site easements for access, maintenance, and construction are required for all watermain extensions located outside of public right-of-way. Easements shall be provided by the Developer for all public water system infrastructure including the pipe, valves, backflow preventers, etc. Whenever an easement or right-of-way is fenced, a gate shall be installed matching the width of the easement and a City lock must be placed in "series" to facilitate access by the City. When easements are required, legal descriptions shall be prepared by a Professional Land Surveyor licensed by the State of Washington. A title report, dated within thirty (30) days, covering the properties to be encumbered by the easements shall accompany the description.

When off-site and/or on-site easements for the extension of approved comprehensive water plans are required, these easements shall be approved and recorded by the City before any civil construction permit is issued unless the easements are being dedicated to the City as a part of the recorded final subdivision.

Private improvements such as buildings, fences, garages, carports, retaining walls, utilities, signs, light standards, etc., are not allowed in public easements and rights-of-way. Watermain easements and rights-of-way are not allowed within the setbacks between two residential structures. Where an encroachment occurs, the Developer shall remove and relocate the conflicting private improvement immediately upon direction from the Engineer.

3.1.A Easement Requirements

Easements shall be accessible for construction equipment normally used for the operation and maintenance of the facility. Cross slopes exceeding 5 percent will require approval from the Engineer. The minimum easement widths, centered on the utility system, are as follows:

1. Watermain under 5' deep – 15' wide minimum
2. Watermain 5' – 9' deep – 25' wide minimum
3. Watermain over 9' deep – The formula for half of the width of the easement shall be the sum of the total depth from the top of pipe to

the surface, plus the pipe diameter, plus 3', rounded to the nearest even foot up to a maximum of 50' total width.

4. Special conditions or installation requirements may require greater easement widths as determined by the Engineer.
5. In easements with multiple utility systems, the easement width shall be increased by the minimum separation distance between the lines.

3.1.B Right-of-way

Where feasible, the utility system extensions shall be located within the City's right-of-way. Work inside adjacent City, County and/or State right-of-way requires special permits from the respective agencies. Adjacent City, County and State permits and others must be obtained by the Developer or the City if required by franchise prior to Engineering Plans approval by the City.

3.2 STANDARD SPECIFICATIONS

The installation of all watermains and appurtenances shall be in accordance with the applicable provisions of the latest edition of the Washington State Department of Health (WSDOH) Water System Design Manual, AWWA or WSDOT Standard Specifications. The manufacturer's recommended installation procedures should be adhered to and not conflict with AWWA or WSDOT Standard Specifications. In the event of conflict, the Engineer shall determine any exceptions to WSDOH, AWWA or WSDOT Standard Specifications.

3.3 WATERMAIN EXTENSION DESIGN REQUIREMENTS

All watermain extensions shall conform to these Standards and WSDOH. Main extensions are also subject to appropriate permits and plan review fees. Contact the City's Permit Center at 253-856-5300, or see the web site at www.ci.kent.wa.us for the latest permit fee schedules.

3.4 COMPREHENSIVE WATER SYSTEM PLAN

The Comprehensive Water System Plan (WSP) indicates the location and configuration of the major elements of the existing and proposed water supply mains, distribution system, inter-ties and loops. The exact location or configuration of this system may be modified, provided the proposed system remains consistent with the overall intent of the plan. Minor modifications to the WSP require specific approval by the Engineer. In some instances, where existing pressures are not met or cannot be provided, as determined by the Engineer, portions of the WSP may be the direct responsibility of the Developer to complete in order to meet the minimum development requirements. Specific conditions may be placed in the permit approval or conditions of approval for the project.

3.5 MAINLINE WATER EXTENSIONS

Mainline extensions will be required when the property does not front on a watermain, or when the existing main is deemed inadequate for the proposed use. The extension shall be in accordance with the latest adopted WSP and these Standards.

The watermain must be extended to the far edge of the property to be serviced, as approved by the Engineer, regardless of where the service connection is to be made to serve properties in the same service area.

3.6 WATER SYSTEM DESIGN STANDARDS

3.6.A Improvements and/or Alterations

All improvements and/or alteration to the water system must be designed to incorporate the standards described below:

1. The desirable system working pressure shall be approximately 60-70 pounds per square inch (psi), but not less than 35 psi under peak hourly demand (PHD). The minimum pressure in the water system under fire flow conditions shall be 20 psi.
2. A pressure reducing valve (PRV) shall be installed and maintained on water service lines by the property owner when system pressures are in excess of 80 psi. See Standard Plan 3-13 for service applications up to 2" in size.
3. The minimum diameter of watermain for commercial, industrial, multi-family and residential developments shall be 8", except as described in Section 3.6.A.7 below. The minimum pipe diameter may also be reduced to be consistent with the existing water system if the existing pipe is smaller, in good condition, and provides the required fire flows and pressures. The size of the main in all cases must meet fire flow requirements as determined by the Fire Marshal.
4. Connections to existing watermains shall be accomplished by "extension", "wet tap" or "cut in" when mainline valves are required on the existing main. Once the new valve has been installed on the existing watermain, the City Water Section shall be responsible for placing a lock on the connecting valve and any operations. The Developer shall not operate the connecting valve for any reason. The Developer shall contact the Inspector assigned to the project for filling or flushing of the new main, or any other need for operation of the connecting valve. No direct connection to the City's existing water system will be allowed until all purity and leakage testing results for the new water main extension have met the requirements of WAC 246.290.125.2b for purity.
5. Two cubes for "cubing" shall be installed in the new watermain at the initial connection and at each lateral from the new watermain. The Water Section shall provide the cubes, which can be picked up by the

Developer at the Water Section Shop located at 5821 South 240th Street.

6. Dead end mains shall be avoided whenever possible. Where dead end mains are unavoidable, a minimum 6" blowoff assembly is required. The diameter of the blowoff and tap must be sized to achieve a minimum flow of 2.5 fps in the watermain. Where cubes for "cubing" are required in the main installation, the watermain shall terminate with a fire hydrant as long as pressures and flows meet the minimum requirements for a fire hydrant. If these requirements are not met, then a blowoff assembly shall be used.
7. The City may approve a 4" diameter dead end watermain for a single-family residential area serving less than fifteen (15) single-family residences, providing the following conditions are met:
 - a. There is no potential for a future looped system.
 - b. The project is not within an area of known low pressure.
 - c. The proposed 4" diameter watermain extends or "branches" from a looped system. The 4" watermain shall not extend from a line that starts as a larger diameter watermain and then reduces down to 4" diameter.
 - d. No fire hydrants are required to be connected to the 4" diameter watermain.
 - e. The total length of the 4" diameter watermain is no longer than 350'.
 - f. If a 4" diameter watermain is approved by the City, a 4" blowoff assembly shall be installed at the end of the watermain for cubing.

3.6.B Watermain Locations

1. Watermains shall be installed at least 10' horizontally from any existing or proposed sanitary sewer. The distance shall be measured from the outside edge of an existing or proposed watermain. Any deviation from this requirement shall meet DOE and WSDOH requirements and be allowed only upon approval of the Engineer.
2. Perpendicular watermain crossings of sanitary sewers shall be installed to provide a minimum vertical distance of 18" above the sewer line, measured from the bottom of the water line to the top of the sewer line with no joint in the watermain within 10' of the sewer line. Where separation between the water line and sewer line is less than 18", the sewer line shall be PVC C900 or ductile iron per Section 4.7.B Gravity Sewer Pipe. All sanitary sewer lines which cross above a watermain, regardless of the separation, shall be PVC C900 or ductile iron, with no joints within 10' of the watermain.

3. Installation of watermains near other potential sources of contamination may be subject to written approval by the Engineer on a case-by-case basis. The sources may include, but are not limited to, storage ponds, land disposal sites for wastewater or industrial process water containing toxic materials or pathogenic organisms, solid waste disposal sites, or any other facility where failure of the facility would subject the water in the main to toxic chemical or pathogenic contamination.
4. Watermains shall be located at least 5' away from any other utility system, including, but not limited to, storm drains, other watermains, power, natural gas, cable television (CATV), private fire lines, etc.

3.6.C Water Valves

1. Water valves are required at the following locations:
 - a. 400' maximum spacing in commercial/industrial and multi-family residential areas. Locations involving hospitals, medical clinics, and others determined by the City to be critical applications may be required to have the spacing reduced.
 - b. 800' maximum spacing in residential areas.
 - c. All sides of mainline tees and crosses.
 - d. At all fire line and hydrant connections to the City's watermain system. When fire hydrants are installed on a fire line run, a valve is required prior to the fire line vault but after the fire hydrant connections.
 - e. At both sides of all bridge crossings, railroad crossings and casings/bores.
 - f. Existing gate valves may be subject to replacement with a new resilient wedge gate valve installed at the discretion of the Engineer.
2. Water Valve Types:
 - a. 16" diameter valves and smaller shall be resilient wedge gate valves.
 - b. Valves larger than 16" shall be butterfly valves and have a bypass with a 6" gate valve. See Standard Plan 3-8.

3.6.D Combination Air/Vacuum Release Valves

Combination air/vacuum release valves shall be located at high points along the main. As a guide, valves are necessary where the difference in elevation between high and low point is 2' or more on a gradual rise, or any abrupt rise. Actual locations shall be approved by the Engineer. The air inlet/discharge opening shall be 36" above finished grade and provided with a screened downward facing vent opening. It shall be located outside of traffic and sidewalk areas, and installed to prevent damage to

landscaping or hazards to pedestrians and bicyclists. See Standard Plan 3-20.

3.6.E Blowoffs

1. Blowoffs shall be located at the dead end of all mains for flushing and "cubing" purposes. Blowoff assemblies must be sized and designed to achieve a minimum flow of 2.5 fps in the watermain. These flows are to be used as a guideline but do not relieve the Developer from assuring a clean line. The minimum blowoff size for a permanent installation is 4" for 4" diameter watermain and 6" for pipe diameters from 6" to 12". Temporary blowoff assembly installations may be reduced to a 2" size. See Standard Plan 3-19.
2. Where cubes for "cubing" are required in the main line installation, the watermain shall terminate with a fire hydrant as long as pressures and flows meet the minimum requirements for a fire hydrant. If these requirements are not met, then a blowoff assembly shall be used. See Standard Plan 3-19.
3. Using water from blowoffs requires a temporary hydrant meter and check valve assembly, issued by the Water Section. Persons using water illegally will be prosecuted.

3.6.F Fire Hydrants

1. Location:

Proposed fire hydrant locations shall be reviewed and approved by the Fire Marshal prior to engineering plan approval. In general, fire hydrants shall be installed at the following locations:

- a. At all street intersections.
- b. 600' maximum spacing in single-family residential areas.
- c. 300' foot spacing in multi-family and commercial areas.
- d. At locations noted on approved project plans.
- e. Within 50' of the fire department connection.
- f. At other locations as directed by the Engineer and/or the Fire Marshal.

Fire hydrants shall not be installed in areas with contaminated soils unless there are no other feasible options. If a fire hydrant must be installed within an area with contaminated soils, it shall be isolated from the City's water system with an approved backflow prevention device per Section 3.16 Backflow Prevention.

2. Connection to Existing Main:

- a. Hydrant lead shall be Class 52 ductile iron.
- b. Hydrant lead shall not exceed 50' in length.

- c. Wet tap connection with heavy-duty full circumference ductile iron or stainless steel long tapping sleeve and resilient wedge tapping valve is required. No size on size wet tapping will be allowed. No service connections are allowed to hydrant leads.
 - d. Using water from hydrants requires a temporary hydrant meter and check valve assembly issued by the Water Section. Persons using water illegally will be prosecuted.
 - e. No bends will be allowed on hydrant leads.
 - f. The breakaway connection shall be installed no higher than 4" above the finished grade of the surrounding area.
3. Assemblies:
- Fire hydrant assemblies shall be shackled on runs of 18' or less, or restrained with an approved type of mechanical restrained joint on runs longer than 18', to the mainline per Standard Plan 3-1.
- a. Public fire hydrants shall be painted white.
 - b. Private fire hydrants shall be painted yellow.
 - c. Private fire hydrant assemblies require an approved double check detector assembly (DCDA) located on private property as near as possible to the right-of-way line. Installation of the DCDA shall be per Section 3.16 Backflow Prevention and Standard Plan 3-18
 - d. An isolation valve shall be installed at the connection to the City watermain.

3.6.G Access Roads

Access roads to all appurtenances are required for maintenance. Access and/or maintenance roads (where required) shall be 15' wide and shall accommodate turning movements for a BUS-40 design vehicle. Access and/or maintenance roads will require an approved all-weather surface, and shall be designed to support an HS-20 vehicle load. The profile grade of an access road shall not exceed 15 percent. Access roads with grades exceeding 12 percent shall be paved. All access roads longer than 150' from the nearest face of curb or edge of pavement of the connecting street shall have approved standard hammerhead turnaround per Standard Plan 3-21, or shall be looped to connect back to a public street. Whenever an easement or right-of-way is fenced, a gate shall be installed matching the width of the easement and a City lock must be placed in "series".

3.6.H Casings

Where a water line passes under or through a retaining wall or is attached to a bridge structure, the pipe shall be cased in steel pipe at least 4" larger than the largest outer diameter of the bell or joint of the water line. No pipe joints will be allowed within the casing, except on bridge

structures or unless otherwise approved by the Engineer. The casing shall extend on either side of the wall a distance equal to the height of the retaining wall, plus 4'. All voids within the casing shall be filled with blown sand except on bridge structures. Casing spacers shall be Cascade Waterworks Manufacturing Company stainless steel casing spacers or approved equal. The casing spacers shall be installed such that the water line is centered and restrained within the casing and spaced such that a uniform profile grade will be maintained within the casing.

3.7 DELETION OF MAINS, STUBS, VALVES AND WATER SERVICES

The Developer shall be responsible for abandoning existing watermains, stubs, valves, water services, and/or appurtenances adjacent to the property being developed when there is no further need for them, or when required by the Engineer as described below:

3.7.A Watermains and Appurtenances

Watermains and appurtenances shall be abandoned by removal and disposal, capping, and/or plugging the cut ends with concrete at the discretion of the Engineer. The plug shall be a minimum of two and one-half (2.5) times as long as the inside diameter of the pipe being abandoned. Any asbestos cement pipe which is to be removed or abandoned in place shall be done in accordance with State and Federal regulations.

3.7.B Stubs, Stub Valves and Appurtenances

Stubs, their valves and appurtenances shall be removed and disposed of, and the tee shall be plugged with a mechanical joint plug or blind flange.

3.7.C Gate Valves

Gate valves on stubs to properties being served by the proposed development not meeting these Standards shall be removed and replaced with new resilient wedge gate valves.

3.7.D Water Services Deletion

1. The Developer must write a letter to the City of Kent Finance Customer Service Section requesting that the service be deleted. The water service(s) shall then be abandoned by turning the corporation stop off at the main, cutting and removing a minimum 1' section of the service line from the corporation stop and capping the corporation stop with a brass cap. The City will remove the meter once the Developer has removed the 1' of service line and capped the service.
2. Water services larger than 2" shall be abandoned per Section 3.7.A above.

3. The Engineer or designee reserves the right to change the above requirements to better fit unforeseen existing conditions in the field as they are discovered.

3.8 PRIVATE FIRE SYSTEMS

Backflow prevention assemblies shall be installed at each fire service connection to the City watermain. All backflow assemblies shall be from the latest approved list from the WSDOH, and approved by the Engineer prior to installation.

The double check detector assembly, reduced pressure detector assembly, or double check valve assembly shall be designed in accordance with the latest edition of the AWWA's "Cross Connection Control Manual" Pacific Northwest Section; and the Standard Plans. Single detector check assemblies are not allowed by the City as backflow prevention assemblies.

3.8.A Double Check Detector Assemblies (DCDA)

Approved DCDA's are required on the following fire protection systems:

1. Wet systems including those with an in-line booster pump or buildings over 30' high.
2. Systems with a pumper connection within seventeen hundred (1,700') of an approved auxiliary water supply source, as designated by the Fire Marshal and the Engineer.
3. Private looped systems or any system with private yard hydrants.

3.8.B Reduced Pressure Detector Assembly (RPDA)

Approved RPDA's are required for all high hazard fire systems including, but not limited to, the following:

1. Systems where an unapproved (non-City potable) source is permanently connected to the fire system, including private storage reservoirs.
2. All foamite or chemically charged installations.
3. Systems in which anti-freeze is allowed.

3.8.C Double Check Valve Assembly (DCVA)

Approved DCVA's are required for all residential fire systems including, but not limited to, the following:

1. When grades exceed 12 percent on accessible routes of travel from designated fire department locations.
2. When the residence exceeds 3,600 square feet.
3. Where fire hydrants are not within acceptable limits from the residence as determined by the Fire Marshal.

4. Where fire flows are less than 1,500 gallons per minute.

3.8.D Installation Requirements

The required backflow prevention assembly shall be installed in accordance with the following:

1. DCDAs shall be located on private property, at or as near as possible to the edge of the City right-of-way, in a location approved by the Engineer in an above ground enclosure of adequate size and structural design for the specific Site application, as indicated on Standard Plan 3-18. DCDAs may be allowed in a below grade reinforced concrete vault per Standard Plan 3-18, only with the approval of the Engineer.
2. The DCDA may be installed in a building only where zoning allows for a 0' setback in the Downtown Overlay District. See Standard Plan 3-18.

3.8.E System Upgrade

Where an existing fire line and/or yard hydrant system is extended to serve a new building or a building addition, the existing fire line, fire hydrant(s) and/or yard hydrant and all related backflow protection assemblies shall be upgraded to comply with current City codes, these Standards, Standard Plan 3-18 and the latest edition of the AWWA "Cross Connection Control Manual" Pacific Northwest Section.

3.9 DOMESTIC WATER SERVICE

Each service connection to the City watermain shall be metered. Unless specifically approved otherwise, all buildings shall have a separate service connection and a single meter.

All domestic and industrial consumption of water, except for fire systems, shall be metered. Water service connections and plumbing shall conform to relevant Washington State Plumbing Codes and these Standards. All domestic water service connections require an approved water permit from the City. The City shall own and maintain the water service from the watermain to, and including, the water meter, as well as the meter box and setter. The service line, from the connection to the setter to the premises or building is the sole responsibility of the Developer per Kent City Code 7.02.040.

3.10 WATER METERS

All water meters shall be located within an easement or right-of-way, and shall be located in such a manner as to provide easy access for the meter reader and maintenance and operations crews.

3.10.A Service Installation

The Developer shall be responsible for the installation of all new domestic water services from the water main. The Developer shall also be responsible for relocation, reconnection, replacement and abandonment of existing services. All new construction, service upsizing, or service relocations shall require the service to be renewed back to the main. Water services may be required to be upgraded to these Standards at the discretion of the Engineer when a remodel, demolition, or change in type of use is made. Existing services no longer providing service shall be abandoned in accordance with these Standards. All costs are to be borne by the Developer.

The location of the service line shall be as shown on the approved Engineering Plans, or as directed by the Engineer. There shall be a minimum 3' separation between service taps at the water main, and installed as near perpendicular as possible to the street centerline where applicable. The Engineer, or designee, shall inspect the installation and verify the pressure test prior to approval to backfill. The meter box shall be installed to final grade, and final approval granted prior to the installation of the water meter. See Section 3.12 for meters larger than 2".

3.10.B Meter and Meter Box Location

1. New Service - The meter shall be located so that the meter box is directly behind the sidewalk, or curb if there is no sidewalk, and perpendicular to the street, with the top of the angle stop 8-10" below the finish grade. See Standard Plans 3-10 and 3-11.
2. Exception - If there is no sidewalk between the edge of pavement and the property line, the meter box will be installed behind the shoulder and/or ditch at a location approved by the Engineer. It will be necessary to culvert the ditch at the meter location for meter reading access.
3. It may be necessary to place the meter box in the sidewalk. In such cases, the edge of the meter box shall be no closer than 6" to any edge of the sidewalk. A minimum of 2" (edge to edge) must be maintained between adjacent meter boxes. See Standard Plans 3-10 and 3-11.
4. Meter boxes shall not be installed within driveway approaches unless no other location is feasible. In that case, traffic bearing meter boxes and lids shall be used.
5. It shall be the Developer's, and subsequent Owner's, responsibility to install and maintain the service from the setter connection to the premises or building served by City water, per KCC 7.02.040.

When wireless meter readers are required, they shall be installed by the Developer and become a part of the installation.

3.10.C Meter Box

The type of box shall be as follows, or an approved equal in writing by the Engineer:

Table 3.1

Meter Size	Location	Type
5/8 x 3/4 to 1"	Planters*	Carson 1220-12
5/8 x 3/4 to 3/4 "	Sidewalks, driveways or pavement, or within 5' of a driveway	Olympic Foundry #SM29
1 1/2" to 2"	Planters*	Carson 1730-15
1" to 2"	Sidewalks, driveways or pavement, or within 5' of a driveway	Olympic Foundry #SM30
3" and larger	Planters***	Concrete Vault***

* All plastic boxes are to be black polyethylene

** Installation in sidewalks, driveways or pavement will not be allowed unless there is no other feasible alternative

*** See Standard Plan 3-12

3.10.D Irrigation Box

The type of box will be as follows or approved equal in writing by the Engineer:

Table 3.2

DCVA or PRV Size	Box Type
3/4" to 1" (and all PRV's)	Carson 1324-15G
(Green lid, solid)	Carson 1324-2L
(Extension Boxes, 6")	Carson 1324B-1L
1 1/2" to 2"	Carson 1730C-1B for 15" high Carson 1730D-1B for 18" high
(Green lid, solid)	Carson 1730-P2L

3.10.E Premise Isolation

The type of box will be as follows or approved equal in writing by the Engineer:

Table 3.3

DCVA	Box Type
¾" to 2"	Same as section (D) above
3" and larger	Concrete Vault*

* See Standard Plan 3-12

Table 3.4

RPBA	Box Type
¾" and larger	Insulated Enclosure – above ground

Enclosures shall be large enough to meet the minimum clearances noted on Standard Plan 3-14.

3.10.F Meter Setter

The meter setter shall have dual-purpose end connections for iron pipe thread male adapters on both ends. It will be used with type "K" copper tubing or polyethylene plastic pipe, with a brace pipe eye and pipe to hold the setter vertical. The setter will be equipped with an angle shut-off valve with padlock wings, and on the outgoing side a check valve to prevent backflow. The check valve is to be spring loaded, of brass and stainless steel construction with a removable back for maintenance purposes. This check must be of the same type used at the present time by the Public Works Department. See Standard Plans 3-10 through 3-12.

The following products are standard. Other approved equal products require written approval of the Engineer:

Table 3.5

Meter Setter Size	Type
¾"	Ford VH 72-15W
¾" x 15"	Mueller H1422-2(Double purpose connection)
1"	Ford VH74-15W
1" x 15"	Mueller H1422-2(Double purpose connection)
1½"	Ford VFH66-15 x 13 L/BP
1½" x 15"	Mueller H1422-2L/BP
2"	Ford VFH77-15x17 L/BP

3.11 WATER SERVICE LATERALS

3.11.A Depth

The service lateral shall have a minimum cover of 24" at the meter connection and shall increase in depth to the elevation at the main. The corporation stop shall be installed at a 22 degree upward angle from the center line of the main, and must be tapped on the same side of the watermain as the service lateral. A minimum separation of 3' must be maintained between service taps through the end of the service run.

3.11.B Material

1. Shall be a minimum of 1" diameter (Iron Pipe Size).
2. Copper – Type K, per Section 9-30.6(3)A of the WSDOT Standard Specifications. Copper shall be used for all 2" diameter and smaller service laterals in areas of know contaminated soils.
3. Polyethylene – Conforming to AWWA C901, high molecular weight with a 200 psi rating, per Section 9-30-6(3)B of the WSDOT Standard Specifications. Plastic pipe shall not be used in areas subject to contamination by petroleum distillates or other contamination that potentially could leach into pipe as determined by the Engineer.
4. Service laterals that are 1-½" and 2" diameter shall be polyethylene.
5. In situations where the flow needs exceed the capacity of a 2" diameter pipe, the service lateral shall be increased to a minimum 4" diameter and shall be ductile iron pipe.

3.11.C Locator Wire

A 12-gauge solid copper, single strand continuous locating wire with plastic insulation is to be wound on the outside of all polyethylene laterals. The wire shall be stripped of insulation at the connection and then securely and permanently connected to the corporation stop at the watermain and to the meter setter so as to maintain continuity. See Standard Plans 3-10 through 3-12. No splices will be allowed in the locator wire.

3.11.D Service Saddles

The service saddle shall be an approved equal to Smith Blair, Romac, or Mueller double strap style. A 3' minimum separation will be required between other services, saddles and appurtenances.

3.11.E Corporation Stops

Ford corporation stops, or approved equals, shall be brass and are to be used to isolate the service lateral from the City watermain. They are to have iron pipe thread to connect to the saddle and the adapter. 1-½" and 2" diameter laterals shall have ball corporation stop type.

3.11.F Connections

Ford or Mueller pack joint adapters or approved equals shall be brass and are to be used to connect the service line pipe to the corporation stop and meter setter. All connections and service lines shall be placed, as near as practical, at 90 degrees to the water line.

3.11.G Water Meter Installation

The water meter shall be set by the Water Section following approval of the water permit and approval of the water service installation and final inspection. Contact the Permit Center for a current fee schedule.

3.11.H Water Use

Using water from water services prior to meter installation requires a temporary hydrant meter and check valve assembly, issued by the Water Section. Persons using water illegally will be prosecuted.

3.11.I Service Markings

In new projects or subdivisions where street improvements are to be made, each service lateral shall be marked by a "WS" in the curb where it crosses perpendicular to the curb. The marking shall be done at the time the curb is installed and shall be as-built by stationing. Lettering shall be 3" high and a minimum ¼" deep.

3.12 3" AND LARGER COMPOUND METERS

Compound meters for service connections larger than 2" shall be installed within a pre-cast concrete vault in accordance with Standard Plan 3-12. Compound meters shall be the Sensus OMNI T2 and installed by the Developer. Turbine type compound meters will only be allowed on a case-by-case basis. All services larger than 2", not including the meter, shall be pressure tested, disinfected, flushed, and have acceptable purity sample results prior to being accepted and turned on by the City. All meters are to be tested by an approved meter testing company for accuracy after installation. The test report shall be reviewed and approved by the Engineer prior to acceptance of the meter. An isolation valve in accordance with Section 3.21 shall be installed at the connection to the City watermain.

3.13 WATER USE ONLY OR DEDUCT METERS

The deduct meter is a private meter purchased, installed and maintained by the Developer downstream of the domestic meter. The reading on the deduct meter is deducted from the reading on the domestic meter to determine the monthly sewer charge. The installation of a deduct meter requires an approved Water Permit and the approval of both City and King County Department of Natural Resources Wastewater Treatment Division (KC/DNR-WTD). The City obtains approval from KC/DNR-WTD on behalf of the Developer. Contact the Permit Center for a current fee schedule.

The landscape irrigation deduct meter shall be located on private property adjacent to the City meter. The location shall be as indicated in Standard Plan 3-16. The Engineer may approve other locations prior to installation. Deduct meters located inside buildings or in access restricted areas require remote readouts to be located near the City meter. The type of meter and remote assembly shall be approved by the City and shall be subject to periodic inspections and certifications. Irrigation deduct meters do not require KC/DNR-WTD approval.

When the water use only meter is a direct service connection to the City main, the meter assembly and installation is the same as all domestic meters, however, there is no sanitary sewer charge computed for this type of service. See Standard Plan 3-16 for landscape irrigation deduct meter installation, and Standard Plans 3-10 through 3-12 for water use only service installation. A drawing is required for deduct meters used for processing equipment.

3.14 SEWER RATE METERS

The sewer rate meter is a private meter purchased, installed and maintained by the Developer. The metering system is subject to approval by the City and KC/DNR-WTD. Meter shall read cubic feet. There are several use applications:

3.14.A All Sources Discharged Metering

When the sewer rate meter is used to meter all public and/or private sources of water discharged to the sewer, the domestic meter is changed to water use only. Deduct meters are not used in this system. The sewer rate meter determines the sewer charges. This application is installed in two ways:

1. In a manhole, in line with the side sewer.
2. In the building, in plumbing pipes at location(s) that will read all public and private water that discharges to sewer.

3.14.B Partial Sources Discharged Metering

When the sewer rate meter is used to meter part of public and/or private sources of water discharged to the sewer and deduct meters are used to meter the uses not discharged to the sewer. The domestic meter determines water and sewer charges. The sewer rate meter is added to the sewer charges. The deduct meter(s) are deducted from the sewer charges. The meter for this type of installation is located in three ways:

1. In the building, in plumbing pipes at location(s) that will pick up that portion of the public and/or private sources of water discharged to the sewer but prior to its use.
2. In line with the discharge pipes of processing equipment fed from the public meter prior to discharge to the building plumbing or side sewer. This water must be free of debris that could clog the meter used.

3. In line with the discharge pipes of processing equipment fed from the public meter or private source of water. This water may contain debris.

The sewer rate meter shall be located on private property in a location that is convenient to the Developer with a remote readout located near the City water meter as approved by the Engineer. The type of meter and remote used is subject to the approval of the Engineer and shall read in cubic feet only.

The sewer rate meter requires a sewer permit from the City and waste discharge approval from KC/DNR-WTD. An industrial rate charge is normally added to the sewer bill for sewer permits with waste discharge approval as determined by KC/DNR-WTD.

3.15 CROSS CONNECTIONS

There shall be no cross connection whatsoever between the City water distribution system and any unapproved pipes, wells, pumps, private hydrants, tanks, non-potable fluid or any other contaminating materials that may backflow into the potable water system. The City's potable water distribution system includes all City owned watermain, service pipe up to and including the meter for residential services and appurtenances up to the DCVAs or DCDAs located after the water service meter.

3.16 BACKFLOW PREVENTION

The degree of public health protection required must be commensurate with the degree of hazard presented as defined in WAC 246.290. In situations of high health hazards, whether known or potential physical or toxic health hazards, air gap separation and/or reduced pressure backflow assemblies (RPBAs) shall be required. DCVAs or pressure vacuum breakers are generally utilized where low health hazard, aesthetic or detrimental effects on water quality may occur.

Each water system connection has unique problems arising from location, climatic conditions, service demands, and other factors. Consequently, each cross-connection shall be evaluated on an individual basis and the City shall make the final determination as to the degree of backflow protection required. See testing and annual inspection requirements set forth in KCC 7.02.050 through 7.02.105.

Backflow protection assemblies proposed for use can be found on the current list of approved assemblies by the WSDOH. All backflow assemblies are required to be tested annually by a Washington State certified backflow assembly tester. Copies of these inspection reports shall be sent to the City: Public Works Operations, Attn: Water Manager, 5821 South 240th St., Kent, WA 98032.

A separate water permit will be required for each backflow device installed. An annual inspection and fee will be required for each backflow device.

3.17 PREMISE ISOLATION

Where the City determines protection of the public water distribution system is necessary, a backflow preventer shall be installed at the property line commensurate with the degree of hazard as defined in WAC 246.290.490. A sample use requiring such protection would be a medical/dental office building. Installation of air gaps shall be approved by the City based on submitted drawings in accordance with the latest edition of the City of Kent Cross-Connection Control Program Manual. RPBA's shall be per Standard Plan 3-14.

In situations where a non-residential building has multiple tenants or the potential to have future multiple tenants, an RPBA per Standard Plan 3-14 shall be required at the property line.

3.18 IRRIGATION SYSTEM

Irrigation system cross connection protection is required for all irrigation systems. In areas of flooding, on hillside installations, or where injection systems are used, an RPBA is required. See Standard Plan 3-14.

3.19 WATERMAIN MATERIALS

The installation of watermains and the materials used shall be in accordance with the applicable sections of the WSDOT Standard Specifications, except as herein modified.

3.19.A Watermains and Fittings

The following materials and appurtenances are accepted for City watermains:

1. Pipe – Ductile iron pipe, Class 52, with cement mortar lining.
2. Joints – Mechanical or push-on joints with rubber gaskets.
3. Fittings – Cast iron or ductile iron, with cement mortar lining.
4. Fitting Joints – Mechanical or flanged joints with rubber gaskets.
5. Jointing – Coupling pipes and cut-ins shall be joined by mechanical joint ductile iron long pattern sleeves unless prior approval is given by the Engineer. "Dresser type" couplings will not be allowed, except to join different sizes or dissimilar piping materials, and only upon approval by the Engineer.
6. Installation of watermains and/or appurtenances in known contaminated materials should be avoided whenever possible. If a watermain must be installed in a location with contaminated materials, the rubber gaskets used for all joints shall be Viton gaskets composed of FE, fluoroelastomer, or fluorocarbon rubber.

3.19.B Water Valves

1. Gate Valves – Shall be used for 16" diameter and smaller applications and shall be resilient wedge per AWWA standards.
2. Butterfly Valves – Shall be used for larger than 16" diameter applications and shall be per AWWA standards. Valves larger than 16" shall have a 6" by-pass with a gate valve.
3. Valve Operation – All valves must open by rotating the valve stem in the counter clockwise direction.
4. Valve Joints – Mechanical or flanged fittings.
5. Stem Nuts – Valve stem nuts shall be no shallower than 1-½' and no deeper than 3' below finished grade. In cases where valves are deeper, an extension rod assembly with a rock guard must be installed on the operating nut. See Standard Plan 3-7.
6. Valve Marker Posts – Concrete valve marker posts shall be furnished and installed for each valve located outside of the paved street. Marker posts shall be white with black lettering. See Standard Plan 3-4.

3.19.C Valve Box

1. Valve boxes in all areas, except as described in Section 3.19.C.2 below, shall include the following components:
 - a. Valve Box Bottom Section –VB1C or Rich 24" bottom compatible with the top section.
 - b. Valve Box Top Section with Covers –VB 940 with a 2" "deep skirt" cover and "WATER" cast in the cover.
 - c. Covers shall be installed with the ears in line with the water flow. See Standard Plan 3-7. Alternates must be standard equals.
2. Transmission Main:
 - a. Zone Separation or other applications specified by the Engineer.
 - b. Valve Box Bottom Section –VB1C or Rich 24" bottom compatible with the top section.
 - c. Valve Box Top Section with Covers –VB-045D/T with compatible cover and "WATER" cast in the cover. Covers shall be installed with set screws in line with the water flow. See Standard Plan 3-7. Alternates must be standard equals.

3.19.D Fire Hydrant Assemblies

Fire hydrants shall be compression type, break-away (traffic model) hydrants conforming to AWWA C502, except as herein modified. See Standard Plan 3-1.

1. Valves and Nozzles:

Fire hydrants shall have a bottom valve size of at least 5", one 4-1/2" pumper nozzle and two 2-1/2" nozzles. Nozzles shall have National Standard Threads (NST), with 1-1/4" pentagonal nuts on the nozzle caps and operating nut.

2. Hydrant Leads:

The hydrants leads shall be a minimum of 6" in diameter. An auxiliary valve shall be installed in the hydrant lead located at the connection to the City main.

3. Drainage:

All hydrants shall be equipped with a drain. A gravel pit or dry well shall be provided. Hydrant drains shall not be connected to, or located within, 10' horizontally of sanitary sewers or storm drains.

4. Painting:

Public owned hydrants shall be painted with two (2) coats of Farwest Wonderglow Quickset white gloss enamel #1100 series - V1814-W. Private hydrants shall be painted with two (2) coats of Farwest Wonderglow Quickset yellow gloss #1100 series - V1814-Y, #3472.

5. Fire Hydrant Guard Posts:

Concrete fire hydrant guard posts shall be furnished and installed with fire hydrants as required by the City. After installation, the posts shall be painted with two (2) coats of Farwest Wonderglow Quickset Gloss Alkyd Enamel #1100 series and match the color of the hydrant installed.

6. Standard Fire Hydrant Types:

Standard Fire Hydrant types shall be Clow Medallion, Mueller Centurion or M&H 929. No Corey type hydrants allowed.

7. Fire Hydrant Clearance:

3' clearance with maximum 2 percent slope shall be provided around all fire hydrants, as well as clear access to/from the traveled way.

3.20 WATERMAIN INSTALLATION

3.20.A Pipe Bedding and Foundation Material

Pipe bedding shall be placed under and all around the pipe meeting the requirements of Gravel Backfill for Pipe Zone Bedding per Section 9-03.12(3) of the WSDOT Standard Specifications, latest edition. It shall be compacted in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe to 95 percent compaction ASTM D-1557. See WSDOT Standard Specifications and Standard Plan 3-22 in this chapter.

Where determined necessary by the Engineer, ballast material shall be used below the pipe bedding to stabilize the trench. This ballast shall meet the requirements of shoulder ballast per Section 9.03.9(2) of the WSDOT Standard Specifications.

3.20.B Pipeline Cover (Backfill)

All watermains shall be covered with sufficient earth or other insulation to prevent freezing. The pipe shall be placed at a constant profile grade to provide the minimum cover as shown below and to allow for the release of air within the system. The minimum depth of cover for watermains is:

Table 3.6

Main Size	Minimum Cover
10" and smaller	36" cover
12" and larger	48" cover

Pipe trench backfill shall be crushed surfacing top course (CSTC) under all arterial classifications of roadways and those local streets adjacent to commercial or industrial land uses. Gravel borrow shall be used for pipe trench backfill in all other locations if, in the opinion of the Engineer, existing trench Excavation soils are unsuitable. CSTC or gravel borrow shall be from a pit approved by the Engineer and shall meet the requirements of CSTC per Section 9.03.9(3) or gravel borrow per Section 9.03.14(1) of the WSDOT Standard Specifications. Each layer shall be compacted to 95 percent in paved areas and 90 percent in unpaved areas in accordance with ASTM D 1557, in lifts not to exceed 18". The maximum particle size shall not exceed 6" or 2/3 the depth of the layer being placed, whichever is less.

Pipe trench backfill for lateral runs crossing existing or proposed improved City streets shall be CSTC meeting the requirements of Section 9.03.9(3) of the WSDOT Standard Specifications.

In paved areas, the trench patching shall be in accordance with Standard Plans 3-64 through 3-69.

3.20.C. Blocking

All fittings changing the horizontal or vertical alignment of the pipe shall be installed with Class 3000 cement concrete thrust blocking in conformance with Section 6-02.3 of the WSDOT Standard Specifications. Blocking shall bear against solid undisturbed earth at the sides and bottom of the trench Excavation and shall be securely wrapped with 4-mil polyethylene sheeting. Restrained joint pipe shall be required in areas where soils consist of peat or other low bearing strength materials or other areas as determined by the Engineer. Tie rods can be used in conjunction with thrust blocking for hydrant installations See Standard

Plan 3-1 or fittings as approved by the Engineer. Mega Lugs or Mechanical Restrained Joint Pipe may be used in place of blocking only upon approval by the Engineer.

3.20.D Corrosive Soils

In areas with corrosive soils, and at the sole discretion of the City Engineer, the watermain shall be encased in 4-mil high density polyethylene, in accordance with Method A of the most recent M41 AWWA Manual and all applicable AWWA Standards.

3.21 CONNECTION TO AN EXISTING WATER MAIN

A physical separation between all untested and potentially contaminated watermains (or main extensions) and the City's existing water system shall be maintained at all times unless the connection is protected by an approved City and WSDOH backflow device. See Standard Plan 3-2.

A hydrant meter and an approved backflow prevention device shall be used whenever drawing water from the City's water system. Hydrant meters and backflow prevention devices may be obtained from the Public Works Operations Division, Water Section located at 5821 South 240th Street. The Developer will be required to complete the billing forms for a Water Permit and making the required damage deposit. There will be a charge for all water used in accordance with KCC 7.02.180 - Temporary Water Meters.

Prior to the new watermain being installed, the contractor has the option of cutting in the connection tee on the existing watermain, or providing potable water from an existing hydrant or blowoff to provide a temporary water supply. If the contractor chooses the option of installing a new connection tee, the contractor shall install new resilient wedge valves on all sides of the tee, or otherwise as required by the Engineer. A mechanical joint plug with a 2" minimum tap and proper blocking shall be installed on the new incoming mainline valve at the new tee with piping accessible to accommodate filling the new water main.

3.22 CUBING

Foam cubes (pigs) shall be inserted into and pushed through the new water main to remove any residue, dirt, debris, obstruction or possible foreign material in the new water main.

3.22.A Cube Usage

1. The Water Section will supply the foam cubes to the contractor based on the water system design as shown on the approved Engineering Plan.
2. The Developer shall pickup the cubes at Public Works Operations and shall install two (2) foam cubes at the initial connection and two (2) foam cubes at each lateral connection 6" in diameter and larger

(downstream of each connecting valve), as the new main is installed. This would include all 6" and larger diameter lateral runs to hydrants that are longer than one full pipe length, or have more than a single joint in them.

3. A mechanical joint cap with a 2" minimum tap shall be installed with proper blocking at the initial connection point on the new main with piping accessible to accommodate both flushing and chlorine injection.
4. The Water Section shall retrieve the foam cubes when the contractor performs the cubing process. All cubing and flushing shall be under the supervision of the Water Section or the Inspector.
5. To accommodate the launch and the retrieval of the cubes, the minimum blow-off size shall be 6" for watermain diameters up to 12".
6. It shall be the contractor's responsibility to properly dispose of all flush water per Section 3.23 below as well as locating and retrieving any "lost" or missing cubes or partial cubes from the watermain.
7. In the event that the initial cubing does not adequately clean the new water mains, the contractor shall be required to provide additional point(s) for launching and retrieval of additional cubes, and re-cube those sections of main that have debris in them until clean, as determined by the Water Section.

3.23 CHLORINE INJECTION

After the Developer has cleaned the watermain by Cubing and flushing, the Developer shall inject a liquid chlorine solution evenly throughout the new main and all connections and Appurtenances for complete and optimal disinfection. The chlorine dosage shall be a minimum of 50 mg/l and a maximum of 100 mg/l. AWWA C651-99 Standards include detailed procedures for the adequate disinfection, flushing and microbiological testing of all watermains. If the Developer wishes the Water Section to do the injection, the Inspector shall give the Water Section five (5) working days notification to perform the chlorine injection. The Contractor must sign a waiver holding the City harmless for any failure of purity samples due to the work performed by the Water Section, as well as agreeing to reimburse the City for all costs associated with the disinfection process. Work may be scheduled after hours, outside of the 5-day notification period, or refused by the City due to manpower or workload constraints.

The chlorine shall remain in the main for the time specified according to the procedure used from AWWA Standards C651-99. After the 24-hour disinfection period, the remaining residual throughout the watermain and Appurtenances shall not be lower than 25 mg/L, if so it would require reapplication of chlorine. The Contractor shall be responsible for disposing of all chlorinated water. Chlorinated water shall be disposed of in an approved sanitary sewer. If a sanitary sewer is not available, or the capacity of the sanitary sewer will be at risk, the Developer shall be responsible for disposing of the water per all applicable regulations.

Amount of chlorine needed to produce 50mg/L in 18’ of pipe (one pipe length) for 5.25% household bleach (with no additives), 12.5% sodium hypochlorite solutions and 65% available dry calcium hypochlorite is shown in the following table.

Table 3.7

Diameter	5.25% (gal)	12.5% (gal)	65% (lb)
4"	0.009	0.005	0.007
6"	0.022	0.011	0.017
8"	0.039	0.019	0.029
10"	0.061	0.031	0.052
12"	0.087	0.044	0.047
16"	0.156	0.078	0.119
18"	0.197	0.098	0.152
24"	0.352	0.176	0.271
30"	0.548	0.275	0.422

Formula: Gals Required = (Pipe Length/18) x Disinfectant Amount

Example: How many gallons of fresh 5.25% sodium hypochlorite will be required to disinfect 5,000’ of 8” main?

$$5,000' \div 18' = 278 \text{ lengths of } 8'' \text{ pipe}$$

$$278 \times 0.039 = 11 \text{ gallons required}$$

All Costs for re-injecting, including the Inspector’s time to come back due to the Developer “not being ready,” will be the responsibility of the Developer. Costs shall be the actual costs including hourly overtime rate for labor, overhead, equipment and materials and any other associated charges. The costs shall be based on the latest cost schedule prepared and approved annually by the Engineer.

3.24 BACTERIOLOGICAL PURITY SAMPLES

Two (2) consecutive sets of acceptable purity samples, taken at least 24 hours apart, shall be collected from representative points of the new watermain, all appurtenances and all other connections to the new watermain(s).

Water Section personnel will take the first bacteriological purity sample(s) after the chlorine is removed, flushing is completed and the chlorine level is no greater than, or less than, the level present in the adjacent distribution system. Water services installed prior to watermain testing shall also be purity tested with the water main and all other connections to the new watermain. The second set of purity samples shall be taken 24 hours after the first set of samples. A representative background

sample of the City water system may be taken from the distribution source at the same time purity samples are taken from the new main.

In the event that the Water Section or the Inspector determines that trench water, dirt or debris has entered the new main during construction, the first purity samples shall not be taken until the water has stood in the new main for at least 16 hours after final flushing. As above, the second set of purity samples shall not be taken until the water in the new main has stood for an additional 24 hours.

No water shall be flushed during the 16- or 24-hour incubation periods described above, or prior to the purity samples being taken.

It shall be the Developer's responsibility to make arrangements to transport the sample(s) to a state-certified laboratory approved by the Water Section. The Developer shall be responsible for paying all costs for the purity samples.

Two (2) consecutive samples, 24 hours apart, must show no coliform presence before performing final connections to the existing water system.

The Water Section may be available during normal working hours, depending upon workload, (7:30 am to 4:00 pm), excluding holidays and weekends, to take purity samples, assist with cubing and chlorine injections. The Developer shall reimburse the City for all associated costs including labor, overhead, equipment, and material charges. Outside of normal working hours, the Developer shall reimburse the City at the most current hourly overtime rate for labor, overhead, equipment and material and any other associated charges. The costs shall be based on the latest cost schedule prepared and approved annually by the Engineer.

3.25 PRESSURE AND LEAKAGE TESTS

All new water mains, extensions of existing mains, water system appurtenances and water services larger than 2" shall be pressure tested for leakage in accordance with Section 7-17.3(2) of the WSDOT Standard Specifications. Water appurtenances 2" and smaller installed prior to watermain testing shall also be pressure tested with the watermain. At no time will the temporary water system connection or backflow device remain connected or in place during the pressure test procedures.

All costs for re-testing, including the Inspector's time to come back due to the Developer "not being ready," will be the responsibility of the Developer. Costs shall include labor at overtime rates, overhead, equipment, material and any other associated charges. The costs shall be based on the latest cost schedule prepared and approved annually by the Engineer.

3.26 FINAL CONNECTION(S) TO THE EXISTING WATER MAIN

When both sets of purity sample results are satisfactory and received in writing from the state-certified laboratory, and all other City water system standards have been met, the Developer shall be allowed to connect the new mains to the existing distribution system following City and AWWA Standards. It shall be the

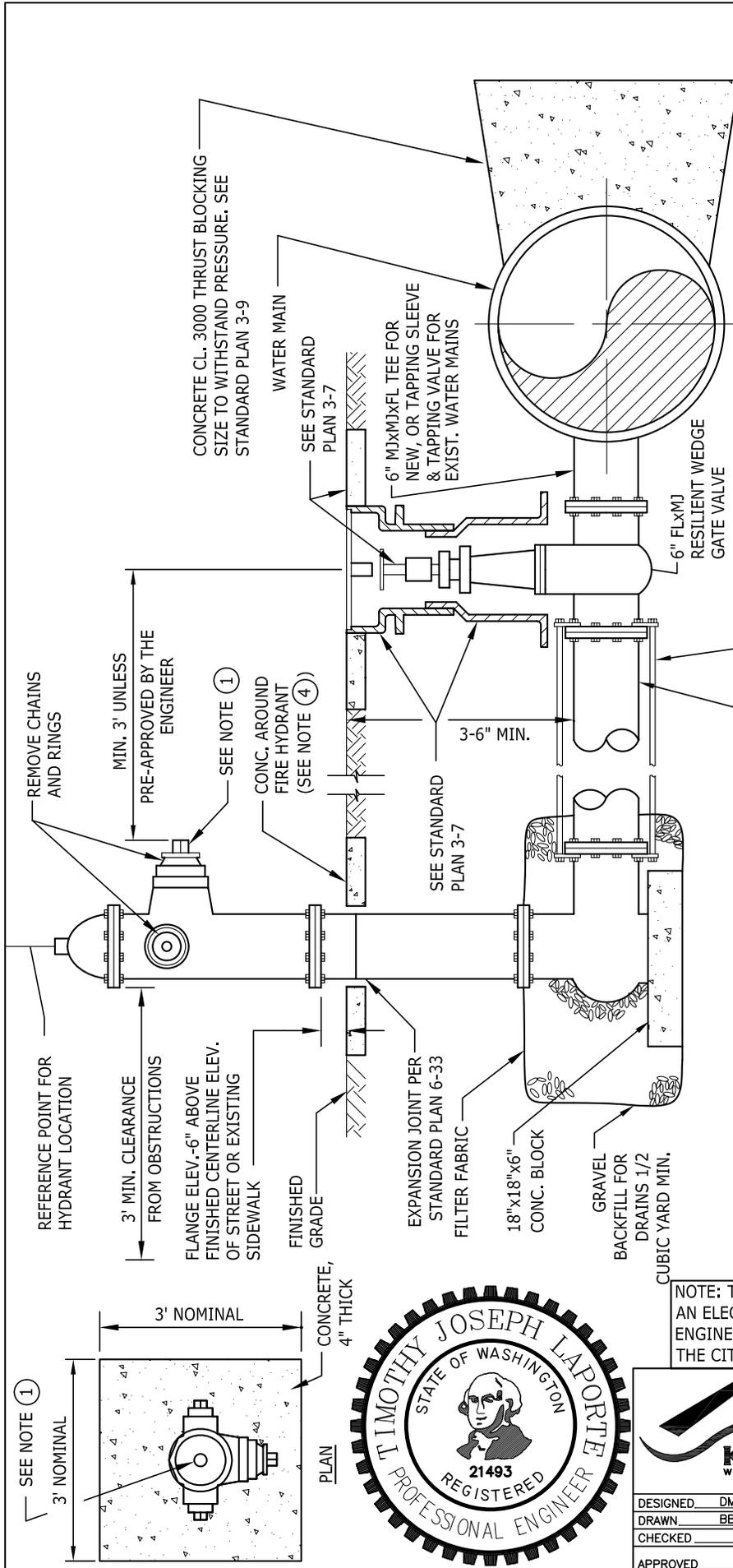
Contractor's responsibility to prevent, at all times, the contamination of the new and existing watermains with trench water, dirt, debris, or other foreign material.

The Inspector and/or Water Section representative must be present to witness the final connection(s) to the existing water system, to turn on and flush the new water system, and to place the new water system and appurtenances into service.



3.27 WATER SYSTEM STANDARD PLANS

- 3-1 Standard Fire Hydrant
- 3-2 Temporary Hydrant Connection
- 3-3 Guard Post
- 3-4 Valve Marker Post
- 3-5 Connection to Concrete Cylinder Main (4" to 12")
- 3-6 2" Connection to Concrete Cylinder Main
- 3-7 Valve Box and Operating Nut Extender
- 3-8 18" or Greater Valve By-Pass
- 3-9 Concrete Blocking
- 3-10 Service Connection 1" Service
- 3-11 Service Connection 1½" and 2" Service
- 3-12 Compound Water Meter with By-Pass
- 3-13 Pressure Reducing Valve with Box for ¾", 1", 1½" or 2" Service Lines
- 3-14 Domestic Service Connection Premise Isolation
- 3-15 Irrigation Service Installation
- 3-16 Single-Family Residential Domestic Waterline / Fireline
- 3-17 Multi-Family Residential Domestic Waterline / Fireline
- 3-18 Double Check Detector Assembly
- 3-19 Standard 6" Blowoff Assembly
- 3-20 Combination Air/Vacuum Valve and Vault
- 3-21 Tapping Sleeve and Valve Assemblies
- 3-22 Typical Pipe Trench



CONCRETE CL. 3000 THRUST BLOCKING SIZE TO WITHSTAND PRESSURE. SEE STANDARD PLAN 3-9

WATER MAIN

SEE STANDARD PLAN 3-7

6" MIX/MFL TEE FOR NEW, OR TAPPING SLEEVE & TAPPING VALVE FOR EXIST. WATER MAINS

6" FLX/MJ RESILIENT WEDGE GATE VALVE

RESTRAINED JOINT PIPE OR 3/4" STEEL SHACKLE ROD (2 PLACES) (18' MAX. LENGTH) TAR COAT OR ZINC PLATED. RESTRAINED MECHANICAL JOINT PIPE TO BE USED FOR ALL RUNS OVER 18 FEET.

REMOVE CHAINS AND RINGS

MIN. 3' UNLESS PRE-APPROVED BY THE ENGINEER

SEE NOTE (1)

CONC. AROUND FIRE HYDRANT (SEE NOTE (4))

3-6" MIN.

SEE STANDARD PLAN 3-7

6" D.I., CL. 52 LENGTH AS REQ'D

EXPANSION JOINT PER STANDARD PLAN 6-33

18"x18"x6" CONC. BLOCK

GRAVEL FOR DRAINS 1/2 CUBIC YARD MIN.

NOTES:

(1) SEE SECTION 3.6.F FOR FIRE HYDRANT TYPE.

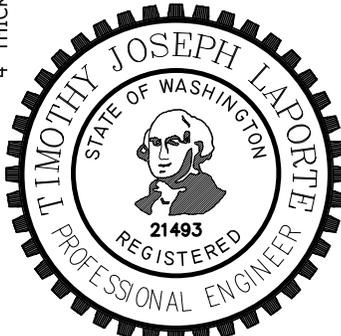
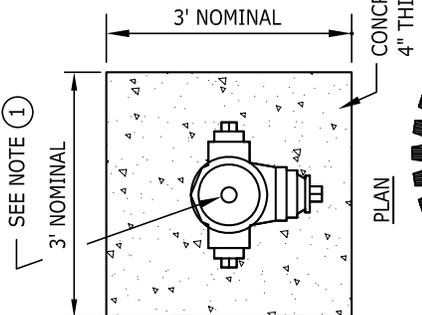
(2) PAINT HYDRANTS WITH TWO (2) COATS OF FARWEST WONDERGLOW QUICKSET HI-PERFORMANCE ENAMEL. PUBLIC HYDRANTS ARE WHITE #1100 SERIES AND PRIVATE HYDRANTS ARE YELLOW #X3472.

(3) ALL FIRE HYDRANTS SHALL BE LOCATED BEHIND SIDEWALK OR AS SHOWN ON PLANS. THE PORT CAP SHALL NOT BE OVER THE SIDEWALK.

(4) PROVIDE EXPANSION JOINT MATERIAL PER STANDARD PLAN 6-35 AROUND HYDRANT WHERE ADJACENT TO CONCRETE. PROVIDE NOMINAL 3 FT. SQUARE CONC. PAD IN ALL AREAS.

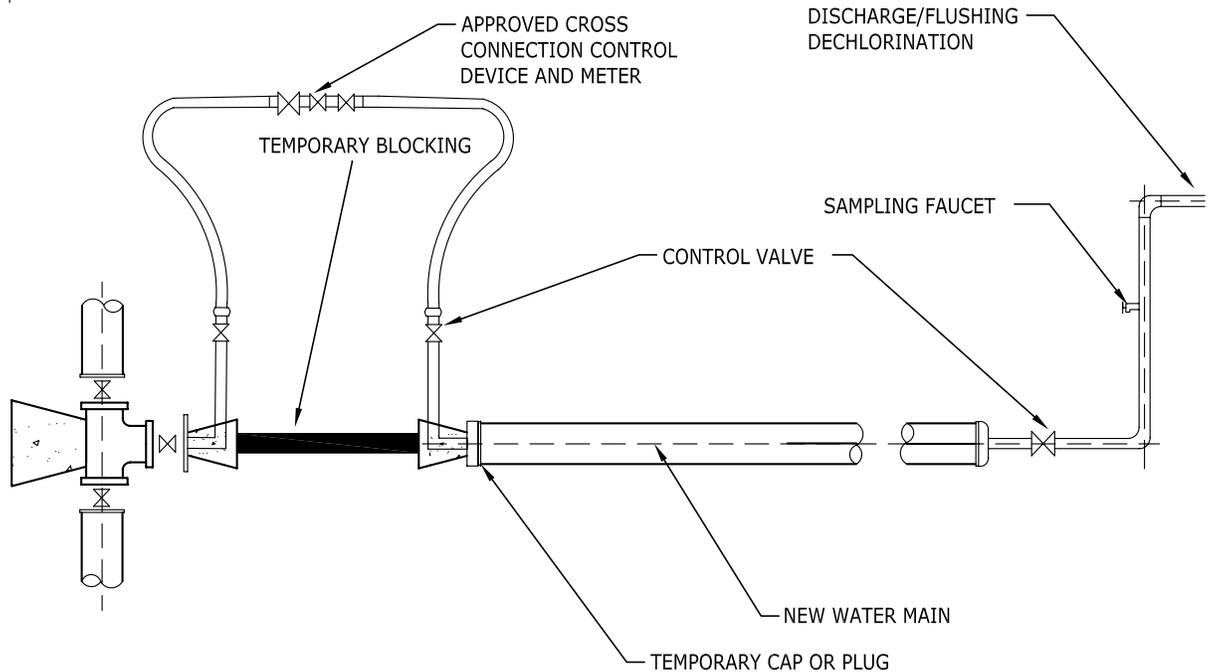
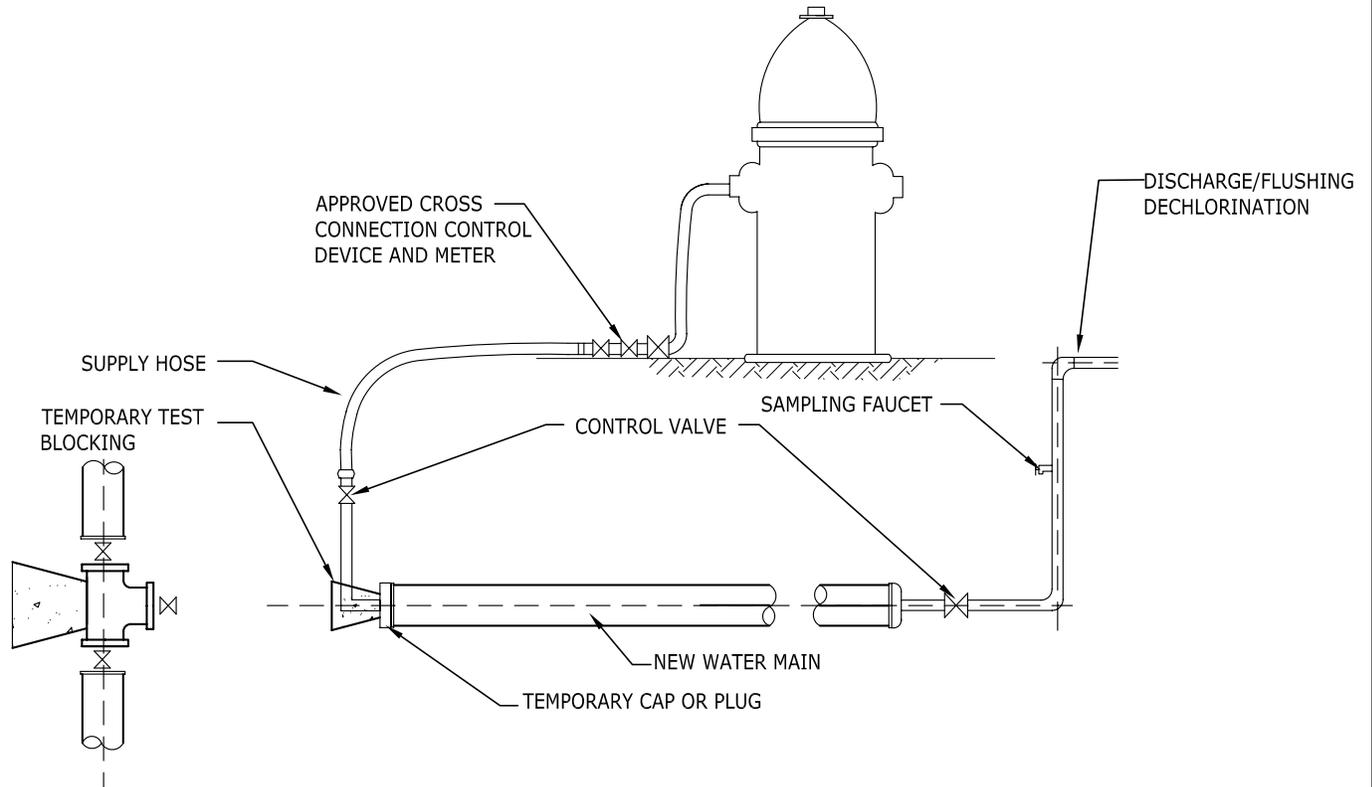
(5) SEE STANDARD PLAN 3-3 FOR GUARD POST DETAILS.

6. WHEN FIRE HYDRANTS FALL BEHIND DITCH LINE, PLACE CULVERT IN DITCH FOR MIN. OF 10' & BACK FILL WITH CRUSHED SURFACING TOP COURSE. RIP RAP ENDS AS NEEDED FOR EROSION CONTROL.
7. NO HYDRANT SHALL BE INSTALLED LESS THAN 10 FEET FROM THE EDGE OF A PRIVATE STREET OR DRIVEWAY APPROACH.
8. FIRE HYDRANT SHALL FACE THE ADJACENT STREET UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
9. A TEMPORARY USE HYDRANT PERMIT, METER AND CHECK VALVE ASSEMBLY ARE REQUIRED FOR DRAWING WATER FROM HYDRANTS. PERSONS DRAWING WATER ILLEGALLY WILL BE PROSECUTED.



NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION IS KEPT ON FILE AT THE CITY OF KENT. A COPY MAY BE OBTAINED UPON REQUEST.

		CITY OF KENT ENGINEERING DEPARTMENT	
		STANDARD FIRE HYDRANT	
DESIGNED: DMW	SCALE: NONE	STANDARD PLAN 3-1	
DRAWN: BB	DATE: _____		
CHECKED: _____	ENGINEER: _____		
APPROVED: _____			



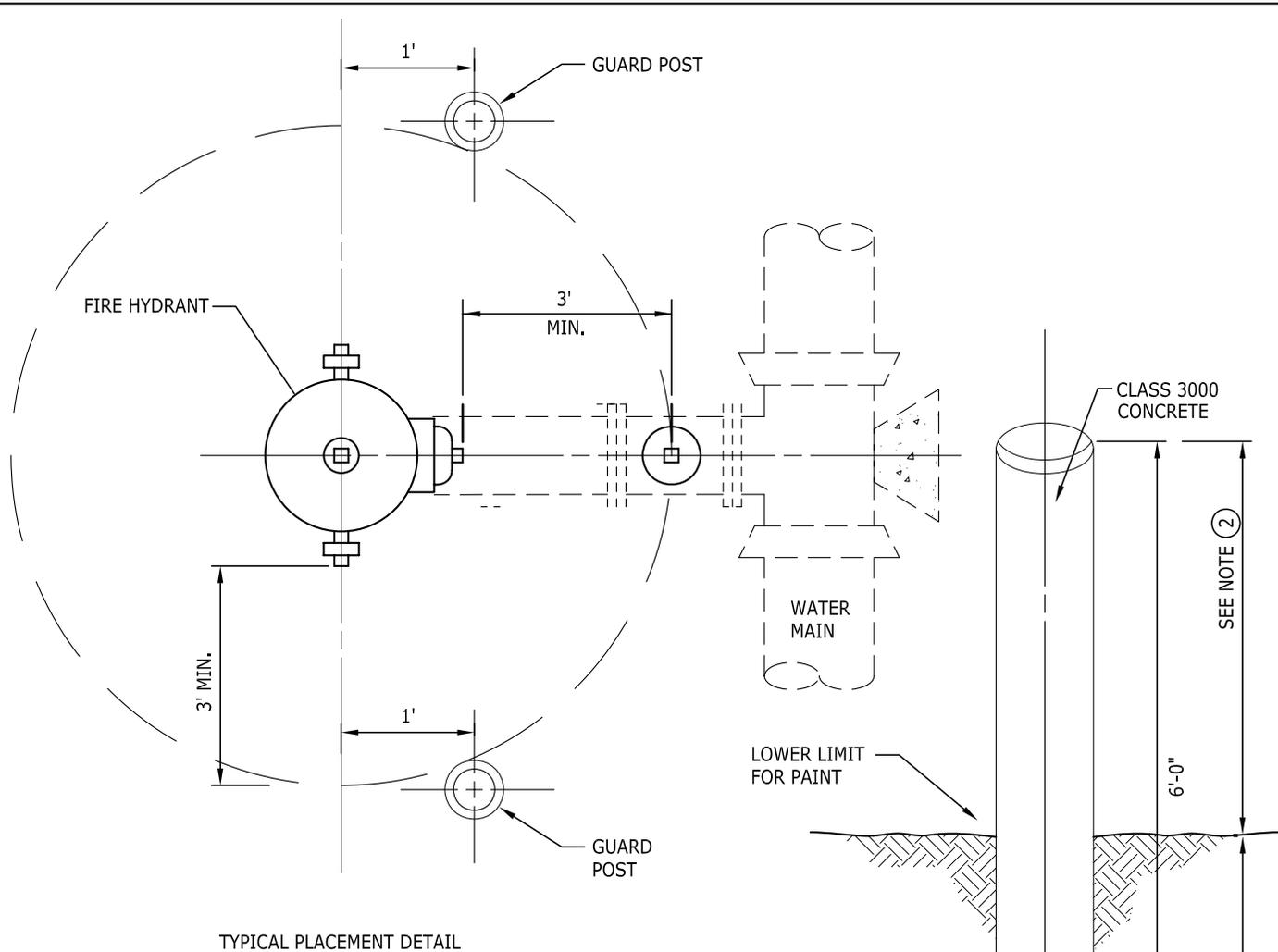
NOTES:

1. THE USER SHALL PROVIDE THEIR OWN GATE VALVE BETWEEN THE METER AND DISCHARGE POINT.
2. CROSS CONNECTION CONTROL DEVICE AND METER SHALL BE SUPPORTED IF NOT RESTING ON THE GROUND.

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		CITY OF KENT ENGINEERING DEPARTMENT	
		TEMPORARY HYDRANT CONNECTION	
DESIGNED _____	SCALE	NONE	STANDARD PLAN
DRAWN _____	DATE	6-11-99	3-2
CHECKED _____	ENGINEER		
APPROVED _____			



TYPICAL PLACEMENT DETAIL

NOTES:

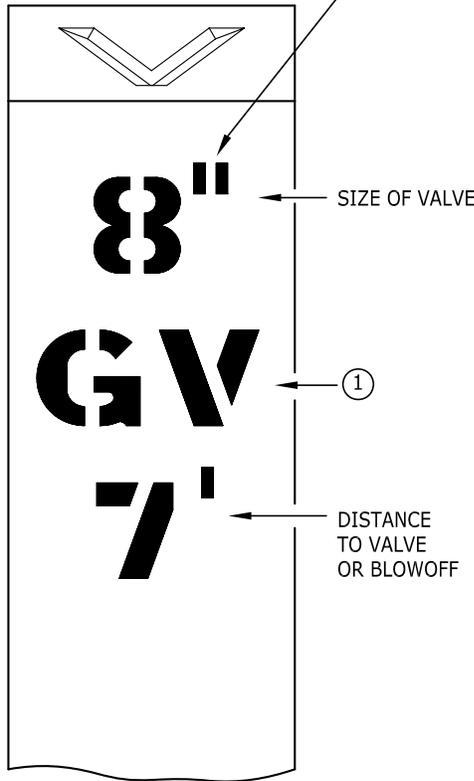
1. THE FOG-TITE HYDRANT GUARD POST IS PRE- APPROVED. ALL OTHERS REQUIRE WRITTEN APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION
- ② GUARD POST ARE INSTALLED WITH TOPS SET AT THE SAME HEIGHT AS THE HYDRANT. IF MORE THAN ONE POST IS SET, THEY SHALL BE SET AT THE SAME HEIGHT.
3. PAINT EXPOSED POST THE SAME COLOR AS THE FIRE HYDRANT. SEE STANDARD PLAN 3-1
4. SEE STANDARD PLAN 3-1 FOR FIRE HYDRANT DETAILS.
5. GUARD POSTS ARE NOT USED WHERE FIRE HYDRANT IS LOCATED BEHIND CURB AND GUTTER OR POSTED SPEED LESS THAN 40 MPH
6. GUARD POST SHALL BE LOCATED OUTSIDE OF THE CLEAR ZONE. SEE STANDARD PLAN 6-50.
7. FOR USE ON PRIVATE PROPERTY.

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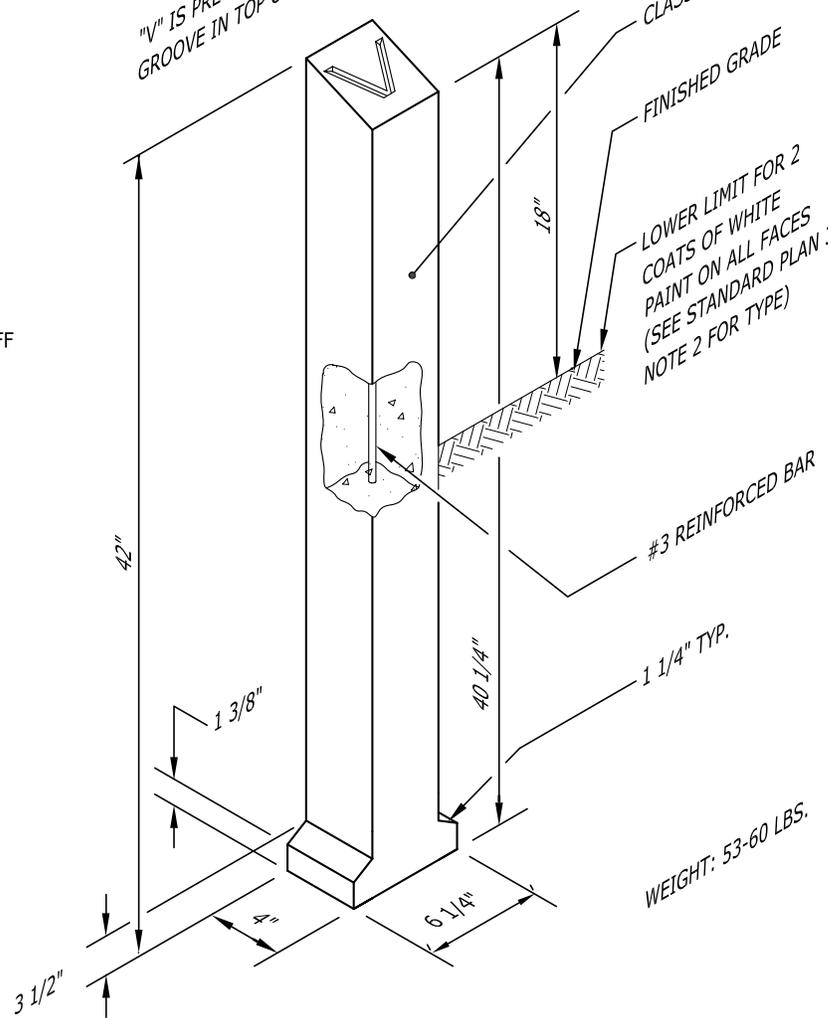
		CITY OF KENT ENGINEERING DEPARTMENT	
		GUARD POST	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN 3-3	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			

TYPICAL 2" HIGH BLACK STENCIL MARKINGS ON THIS FACE ONLY. HOMERIGHT PAINT.



"V" IS PRE-CAST GROOVE IN TOP OF POST.

CLASS 3000 CONCRETE
FINISHED GRADE
LOWER LIMIT FOR 2 COATS OF WHITE PAINT ON ALL FACES (SEE STANDARD PLAN 3-1 NOTE 2 FOR TYPE)



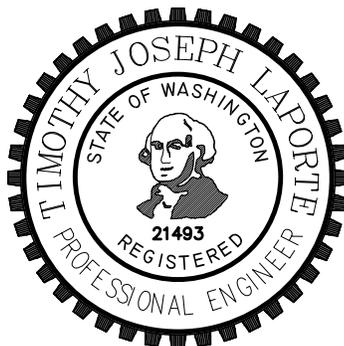
WEIGHT: 53-60 LBS.

- ①. USE
"GV" FOR GATE VALVE
OR
"BV" FOR BUTTERFLY VALVE
OR
"BO" FOR BLOWOFF ASSEMBLY

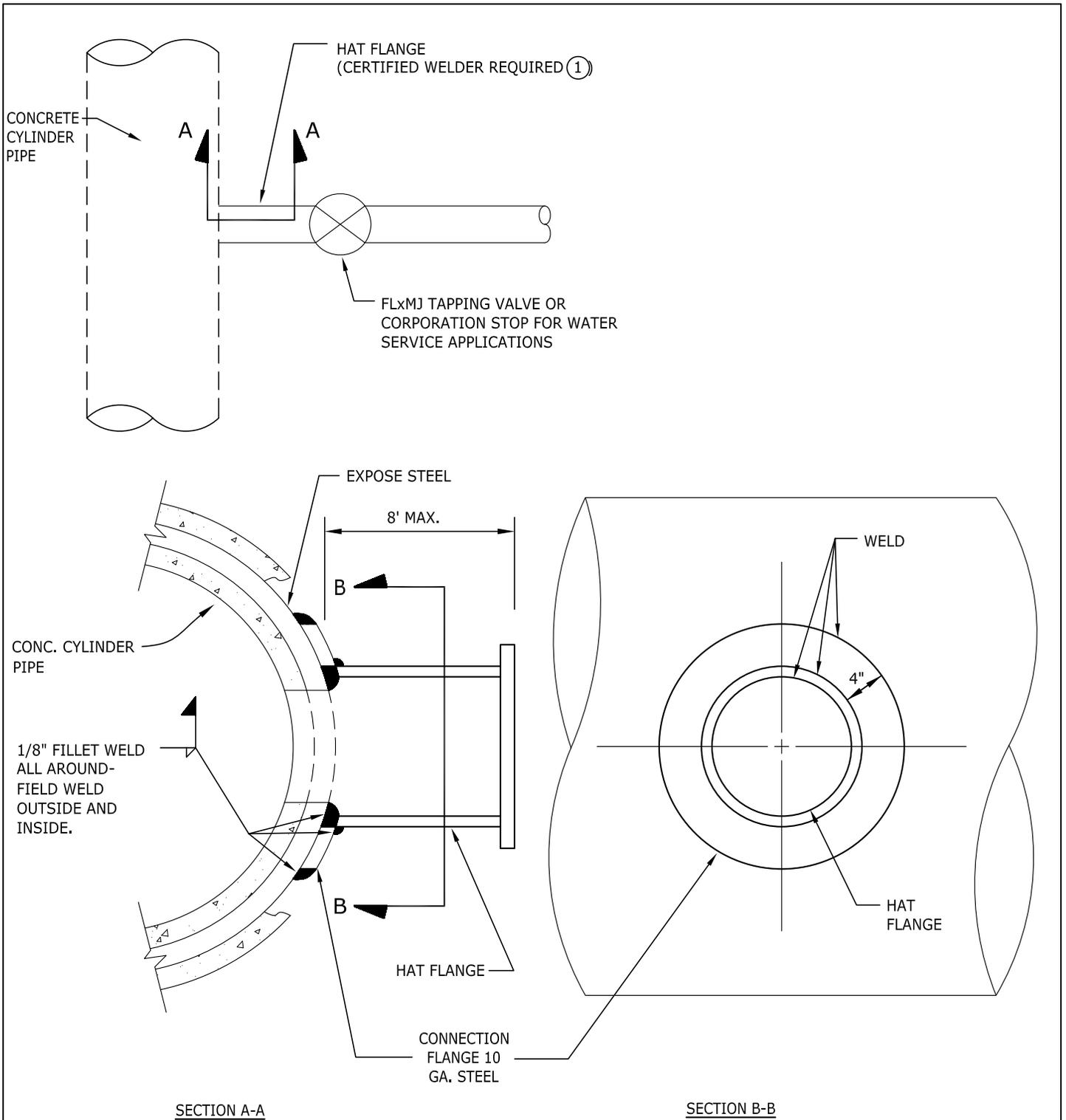
NOTES:

- FOR USE ON PRIVATE PROPERTY.
- THE FOG TITE INC. VALVE MARKER POST WITH THE "WATER" LEGEND IS THE PRE-APPROVED PRODUCT. ALL OTHERS REQUIRE THE WRITTEN APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION.

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION IS KEPT ON FILE AT THE CITY OF KENT. A COPY MAY BE OBTAINED UPON REQUEST.

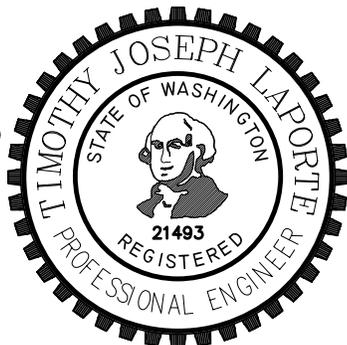


		CITY OF KENT ENGINEERING DEPARTMENT	
		VALVE MARKER POST	
DESIGNED: DMW	SCALE: NONE	STANDARD PLAN 3-4	
DRAWN: BB	DATE: _____		
CHECKED: _____	ENGINEER		
APPROVED: _____			



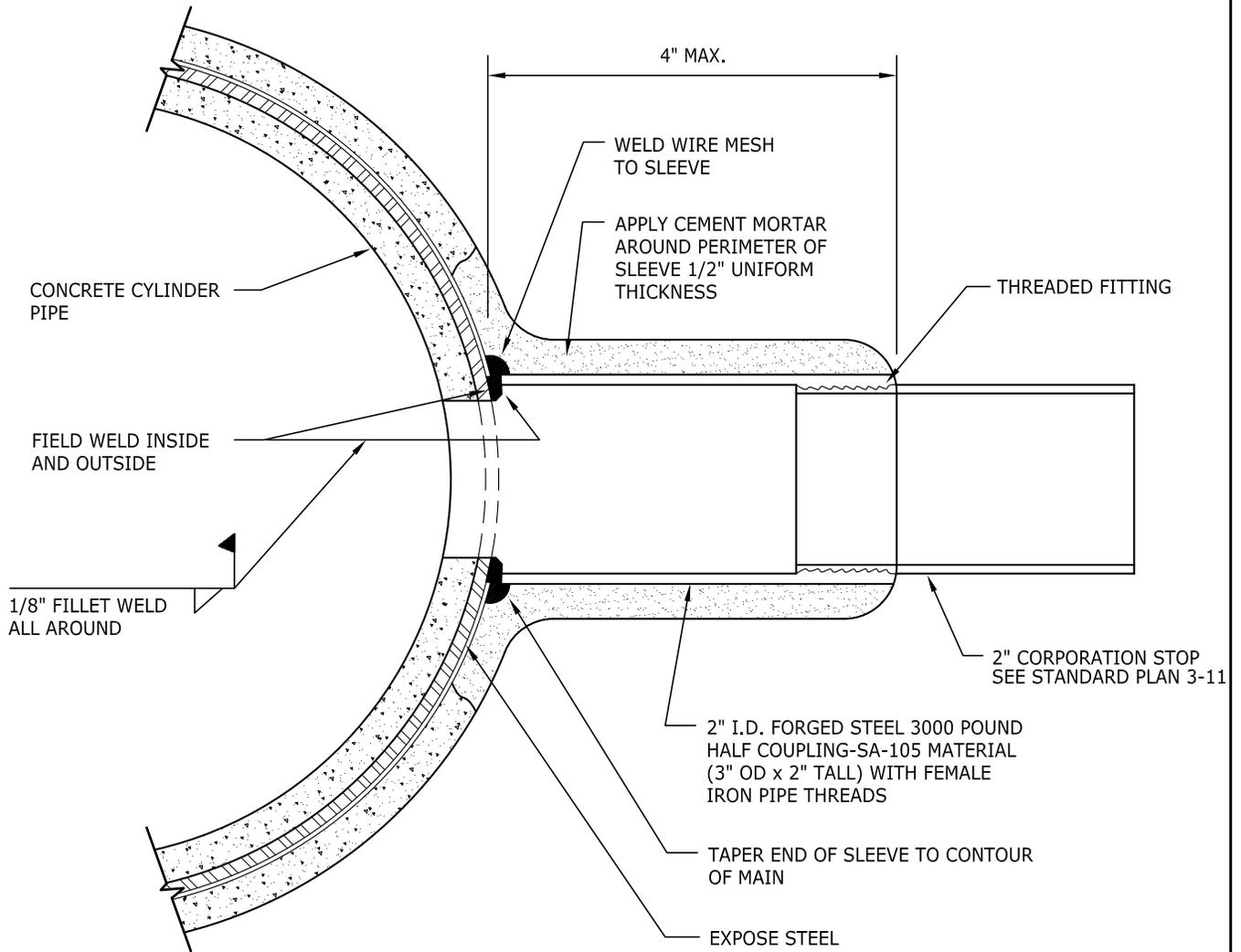
NOTES:

- ① CERTIFIED WELDER SHALL BE PRE-APPROVED BY THE CITY OF KENT WATER DEPARTMENT.
2. FLANGE & VALVE TO BE PRE-APPROVED BY THE CITY OF KENT.
3. APPLY CEMENT MORTAR TO COVER ALL EXPOSED STEEL. (1/2" UNIFORM THICKNESS) EXCEPT THE BOLTED FLANGE AREA.



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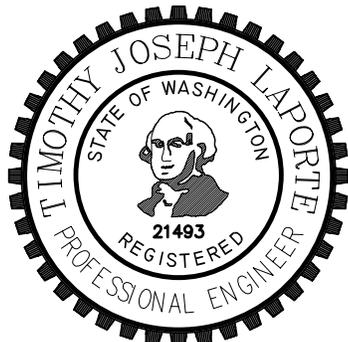
		CITY OF KENT ENGINEERING DEPARTMENT	
		CONNECTION TO CONCRETE CYLINDER MAIN (4" TO 12")	
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED			
APPROVED		ENGINEER	
			3-5



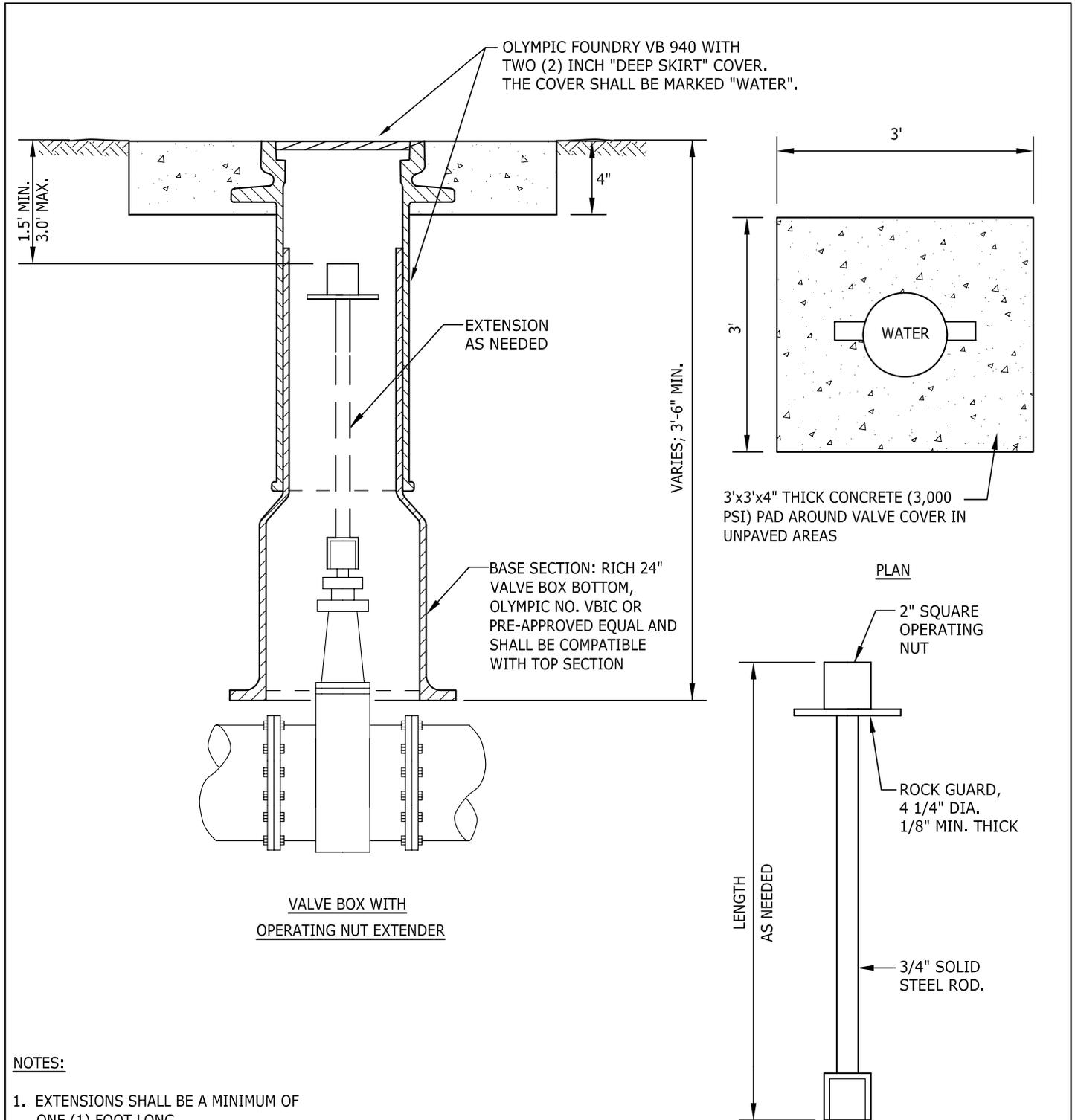
NOTE:

CERTIFIED WELDER SHALL BE PRE-APPROVED BY THE CITY OF KENT WATER DEPARTMENT.

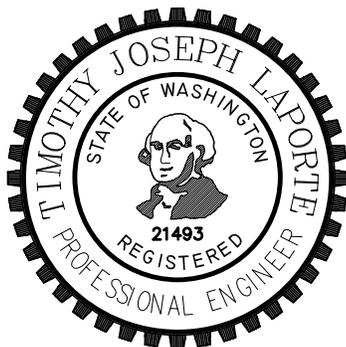
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		CITY OF KENT ENGINEERING DEPARTMENT	
		2" CONNECTION TO CONCRETE CYLINDER MAIN	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN	
DRAWN <u>BB</u>	DATE _____	3-6	
CHECKED _____	ENGINEER _____		
APPROVED _____			

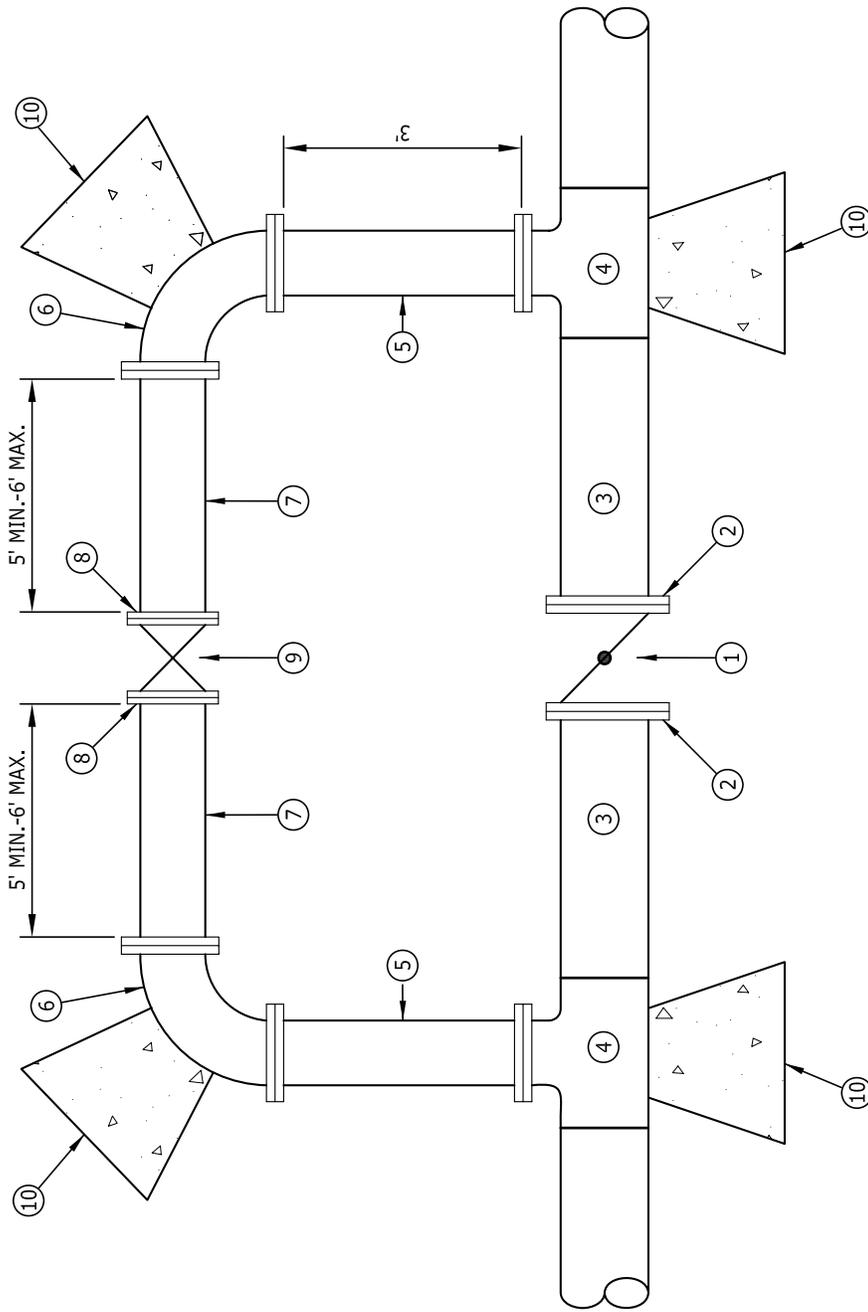


1. EXTENSIONS SHALL BE A MINIMUM OF ONE (1) FOOT LONG.
2. EXTENSIONS SHALL BE SIZED AS NEEDED, AND PAINTED WITH TWO (2) COATS OF METAL PAINT.
3. EARS, LUGS OR STAINLESS CAP SCREWS ON COVER SHALL BE ALIGNED WITH DIRECTION OF WATER FLOW.
4. FOR ADDITIONAL REQUIREMENTS AND USE SEE WSDOT STD. SPECIFICATIONS SECTION 3.19
5. VALVE BOX SHALL BE CENTERED OVER 2" SQUARE OPERATING NUT.

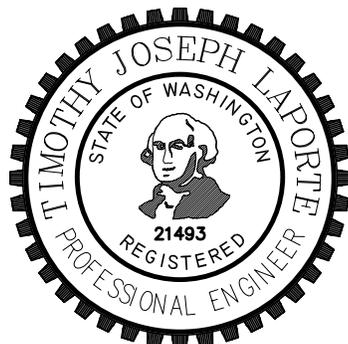


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		CITY OF KENT ENGINEERING DEPARTMENT	
		VALVE BOX AND OPERATING NUT EXTENDER	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN 3-7	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			



- ① 18" OR GREATER BUTTERFLY VALVE FLXFL OPERATOR ON OPPOSITE SIDE OF BY-PASS CENTER BUTTERFLY VALVE BETWEEN TEE'S.
- ② FLXMJ ADAPTER WITH MEGA LUG FOLLOWERS.
- ③ DI PIPE, LENGTH AS NEEDED.
- ④ X"X6" TEE M3XFL WITH MEGA LUG FOLLOWERS.
- ⑤ 3'-6"Ø SPOOL FLXMJ.
- ⑥ 6" 90° BEND FLXFL.
- ⑦ 6" FL X PE SPOOL.
- ⑧ 6" FLXMJ ADAPTER WITH MEGA LUG FOLLOWERS.
- ⑨ 6" GATE VALVE FLXFL.
- ⑩ THRUST BLOCKING.



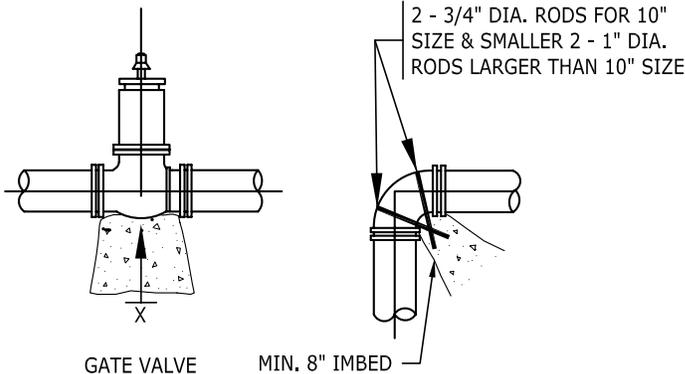
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		CITY OF KENT ENGINEERING DEPARTMENT	
		18" OR GREATER VALVE BY-PASS	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN 3-8	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			

THRUST BLOCK - TABLE

PIPE SIZE	PRESSURE PSI	MINIMUM BEARING AREA AGAINST UNDISTURBED SOIL SQUARE FEET					
		A	B	C	D	E	X (100 PSI)
4"	200	2/(1)	1/(NONE)	1/(NONE)	NONE	NONE	NONE
	300	3/(2)	2/(2)	2/(1)	1/(1)	NONE	NONE
6"	200	4/(3)	3/(2)	3/(1)	1/(1)	1/(NONE)	NONE
	300	6/(4)	4/(3)	3/(2)	2/(1)	1/(NONE)	NONE
8"	200	7/(5)	5/(3)	4/(3)	2/(2)	1/(1)	3/(2)
	300	11/(8)	8/(5)	6/(4)	3/(2)	2/(1)	
10"	200	11/(8)	8/(6)	6/(4)	3/(2)	2/(1)	4/(3)
	275	16/(11)	11/(7)	9/(6)	5/(3)	3/(2)	
12"	200	16/(11)	11/(8)	9/(6)	5/(3)	3/(2)	5/(4)
	250	24/(16)	17/(11)	13/(9)	7/(5)	4/(3)	
14"	200	22/(13)	16/(11)	12/(8)	6/(4)	3/(2)	7/(6)
	250	33/(22)	23/(16)	18/(12)	9/(6)	5/(3)	
16"	200	29/(19)	21/(14)	16/(11)	8/(6)	5/(3)	10/(7)
	225	32/(21)	23/(16)	17/(12)	9/(6)	5/(3)	
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)

NOTE: ADDITIONAL BLOCKING MUST BE PROVIDED IF GATE VALVE IS AT END OF LINE DURING TESTING. ADDITIONAL BLOCKING SHALL ALSO BE PROVIDED UNDER TEES AND CROSSES.

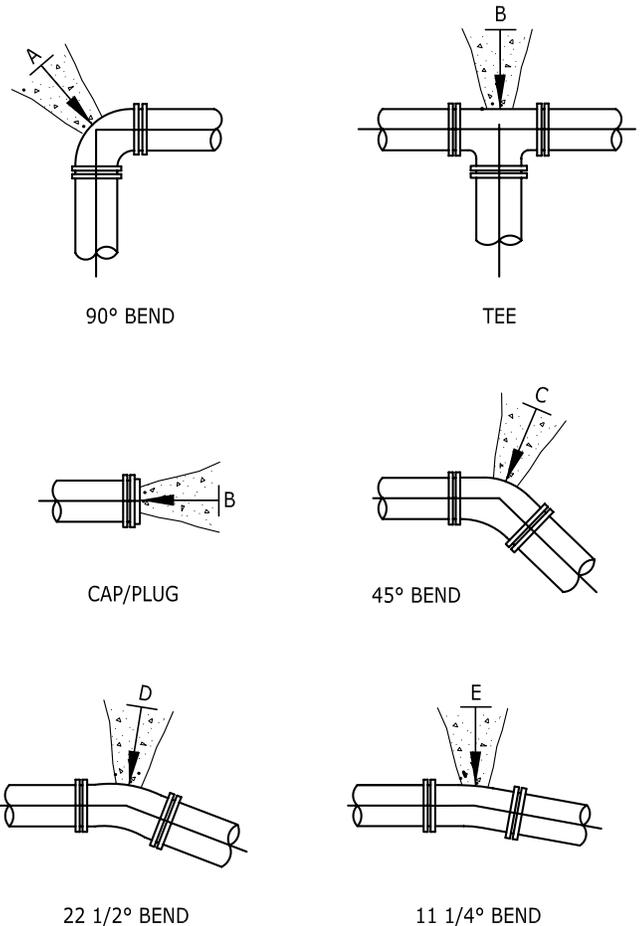


SAFE BEARING LOADS IN LB./SQ. FT.
THE SAFE BEARING LOADS GIVEN IN THE FOLLOWING TABLE ARE FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET.

<u>SOIL</u>	<u>SAFE BEARING LOAD</u> 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.

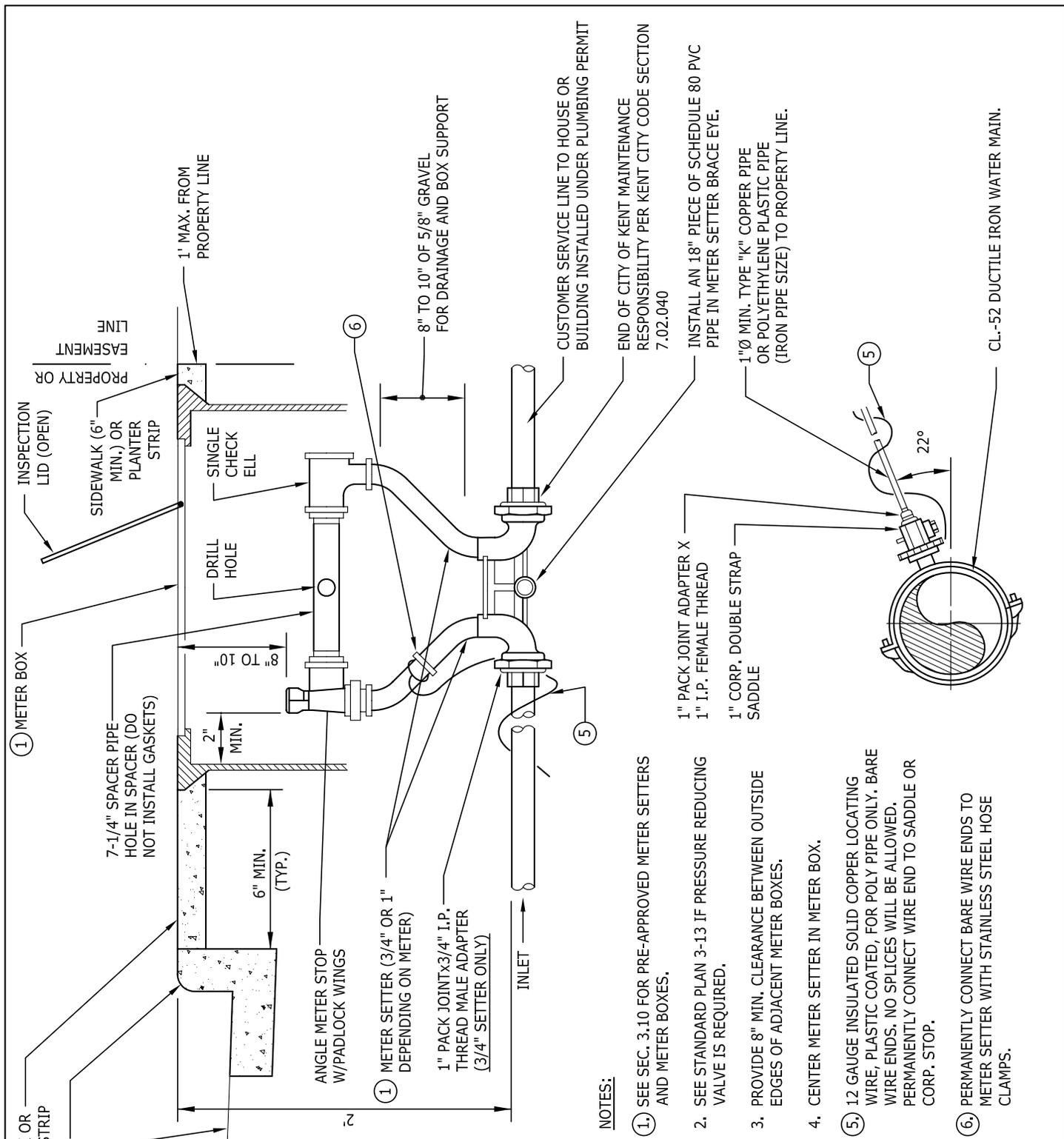


NOTES:

- SQUARE FEET OF CONCRETE THRUSTS - BLOCK AREA BASED ON SAFE BEARING LOAD OF 2000/(3000) POUNDS PER SQUARE FOOT.
- AREAS MUST BE ADJUSTED FOR OTHER SIZE PIPE, PRESSURES & SOIL CONDITIONS.
- CONCRETE BLOCKING SHALL BE CAST IN PLACE, CLASS 3,000 & HAVE MINIMUM OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING. VALVES MAY ALSO BE SUPPORTED WITH 10"x10"x4" CONCRETE CINDER BLOCKS WITH COMPOSITE SHIMS.
- BLOCK SHALL BEAR AGAINST FITTINGS ONLY & SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING JOINT.
- CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.
- WRAP WATER MAIN WITH 4 MIL POLYETHYLENE SHEETING IN AREA OF THRUST BLOCK.

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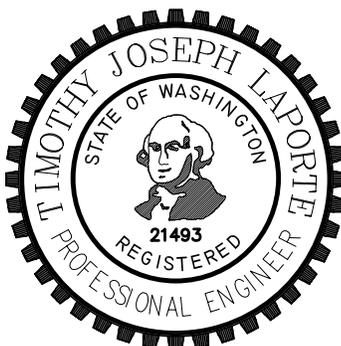
		CITY OF KENT ENGINEERING DEPARTMENT	
		CONCRETE BLOCKING	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN	
DRAWN <u>BB</u>	DATE _____	3-9	
CHECKED _____	ENGINEER _____		
APPROVED _____			



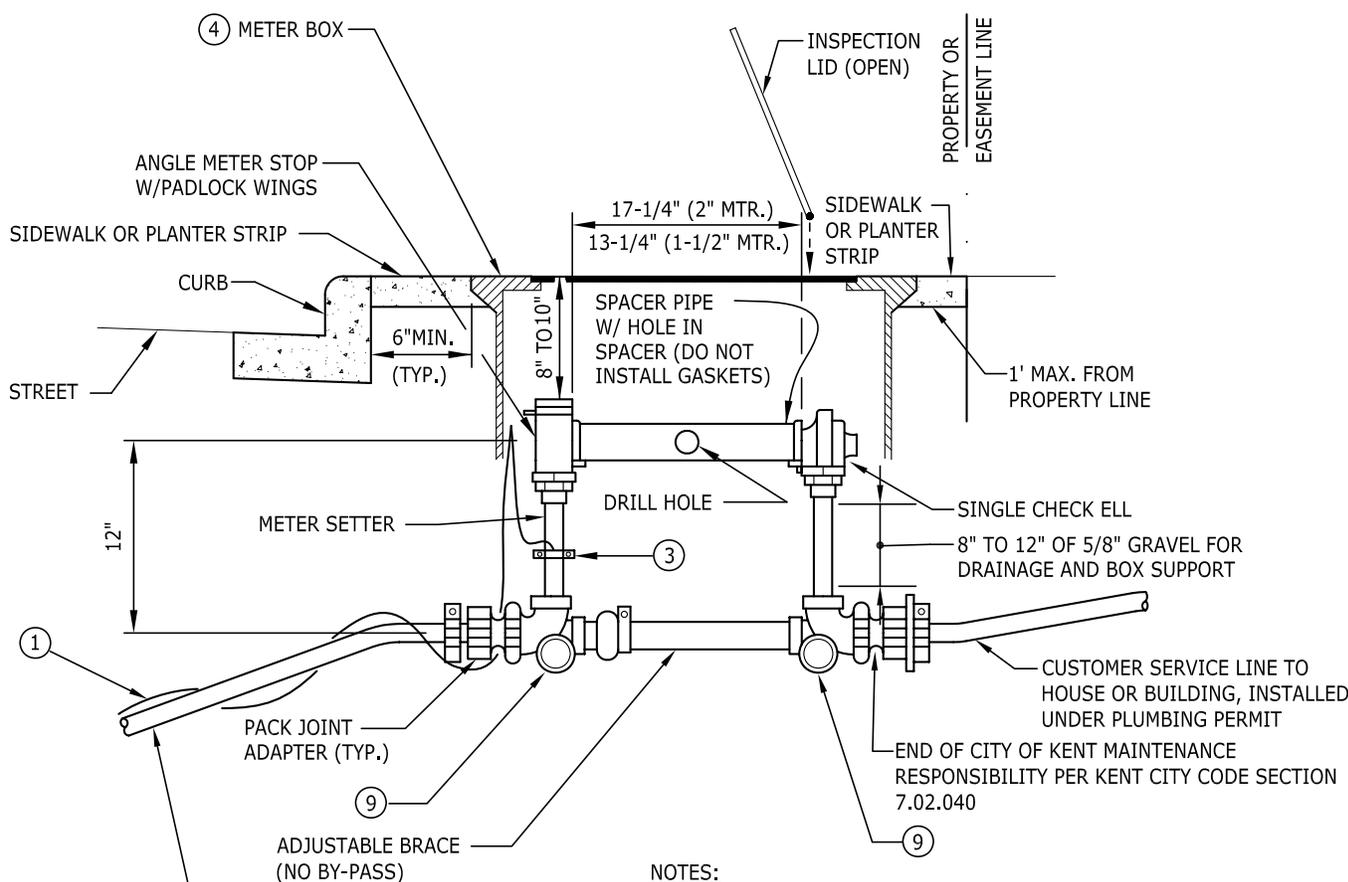
NOTES:

1. SEE SEC. 3.10 FOR PRE-APPROVED METER SETTERS AND METER BOXES.
2. SEE STANDARD PLAN 3-13 IF PRESSURE REDUCING VALVE IS REQUIRED.
3. PROVIDE 8" MIN. CLEARANCE BETWEEN OUTSIDE EDGES OF ADJACENT METER BOXES.
4. CENTER METER SETTER IN METER BOX.
5. 12 GAUGE INSULATED SOLID COPPER LOCATING WIRE, PLASTIC COATED, FOR POLY PIPE ONLY. BARE WIRE ENDS, NO SPLICES WILL BE ALLOWED. PERMANENTLY CONNECT WIRE END TO SADDLE OR CORP. STOP.
6. PERMANENTLY CONNECT BARE WIRE ENDS TO METER SETTER WITH STAINLESS STEEL HOSE CLAMPS.

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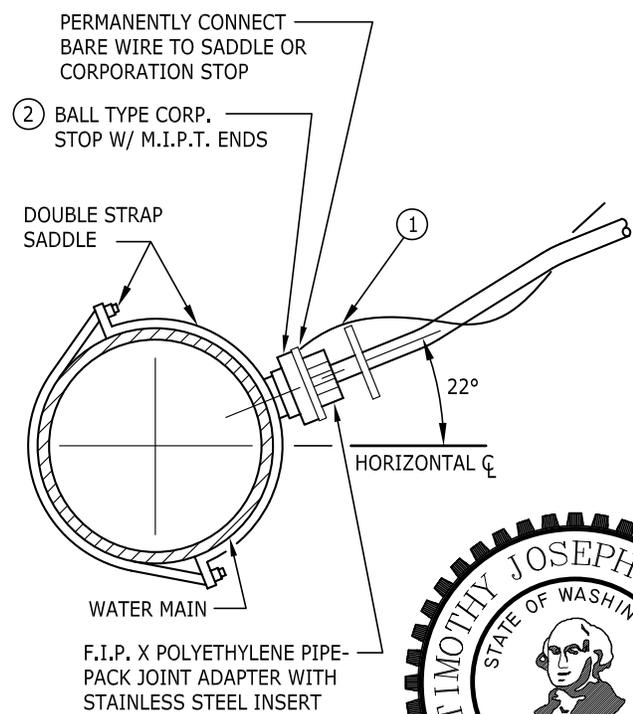


		CITY OF KENT ENGINEERING DEPARTMENT	
		SERVICE CONNECTION 1" SERVICE	
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED		ENGINEER	
APPROVED		3-10	
		STANDARD PLAN	



NOTES:

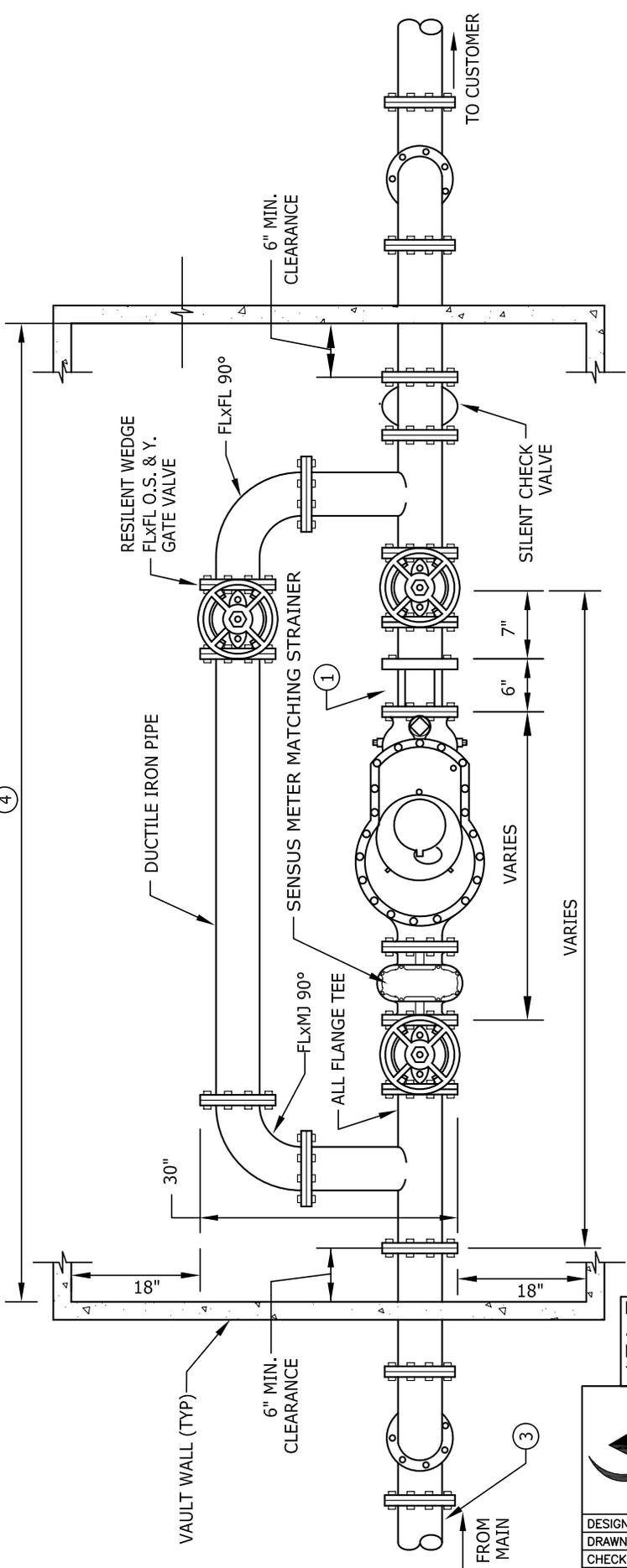
- ① 12 GAUGE INSULATED SOLID COPPER LOCATING WIRE, PLASTIC COATED BARE WIRE ENDS, FOR POLYETHYLENE PLASTIC PIPE ONLY. NO SPLICES WILL BE ALLOWED.
- ② FORD NO. FB-500 CORPORATION STOP OR APPROVED EQUAL.
- ③ PERMANENTLY CONNECT BARE WIRE ENDS TO METER SETTER WITH STAINLESS STEEL HOSE CLAMPS.
- ④ SEE SEC. 3.10 FOR PRE-APPROVED METER SETTERS AND METER BOXES.
- 5. SEE STANDARD PLAN 3-13 IF PRESSURE REDUCING VALVE IS REQUIRED.
- 6. PROVIDE 8" CLEARANCE BETWEEN OUTSIDE EDGES OF ADJACENT METER BOXES.
- 7. CENTER METER SETTER IN METER BOX.
- 8. REDUCERS INSIDE SETTERS ARE NOT ALLOWED.
- ⑨ INSTALL AN 18" PIECE OF SCHEDULE 40 PVC PIPE IN EACH OF THE METER SETTER BRACE EYES.



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		CITY OF KENT ENGINEERING DEPARTMENT	
		SERVICE CONNECTION 1-1/2" & 2" SERVICE	
DESIGNED: DMW	DRAWN: BB	SCALE: NONE	STANDARD PLAN
CHECKED:	APPROVED:	DATE:	
		ENGINEER	3-11

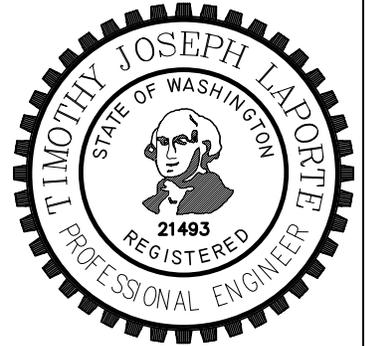


PLAN VIEW
SENSUS/SRH WATER METER W/ BY-PASS

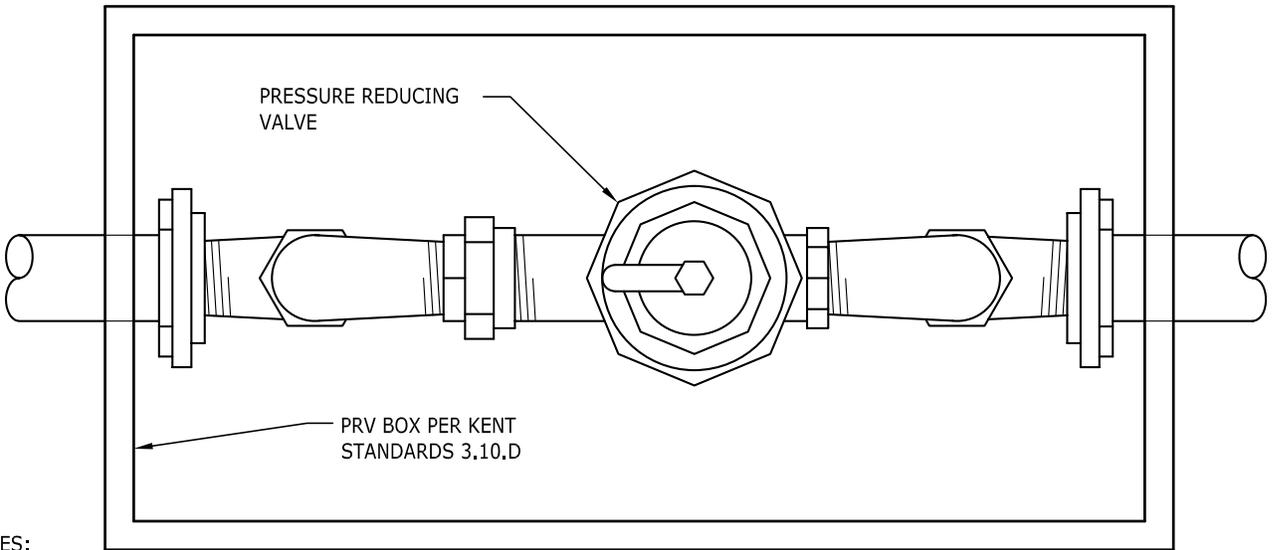
NOTES:

- ① FLANGE COUPLING ADAPTER
- ② 3"-6" COMPOUND WATER METERS TO BE TESTED BY APPROVED TESTING COMPANY FOR ACCURACY AFTER INSTALLATION
- ③ AN ISOLATION VALVE SHALL BE INSTALLED AT THE CONNECTION TO THE CITY MAIN.
- ④ USE UTILITY VAULT 4484 LA OR EQUIVALENT WITH AN OVERALL DEPTH OF 5'-7" AND HAVE A DOUBLE HATCH LID WITH RECESSED LOCKING HASP.
- ⑤ SEE SHEET 2 FOR ELEVATION VIEW

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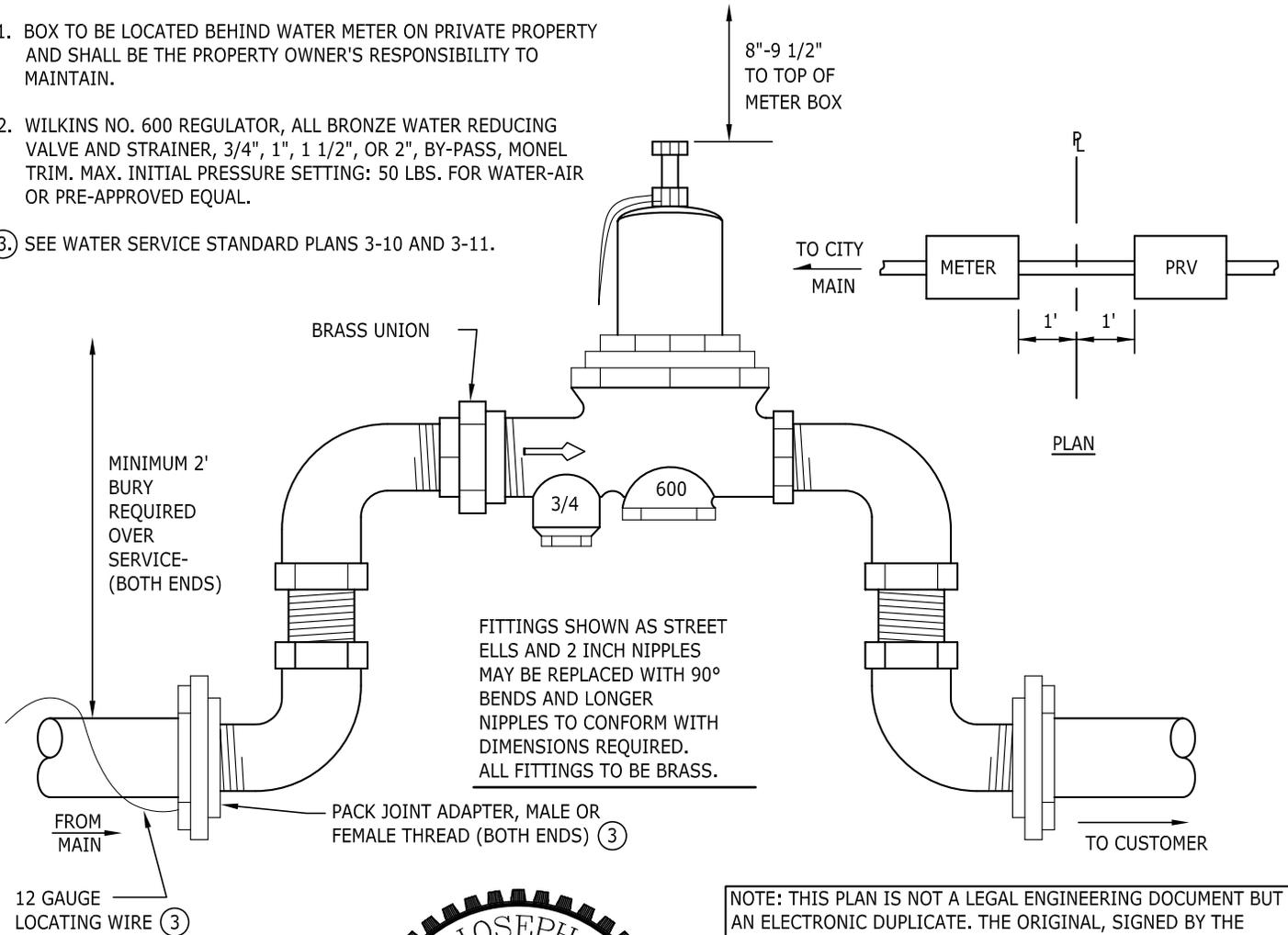


	CITY OF KENT ENGINEERING DEPARTMENT	
	COMPOUND WATER METER WITH BY-PASS SHEET 1 OF 2	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN
DRAWN <u>BB</u>	DATE _____	
CHECKED _____	ENGINEER _____	3-12
APPROVED _____		

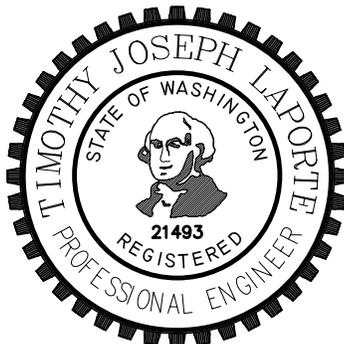


NOTES:

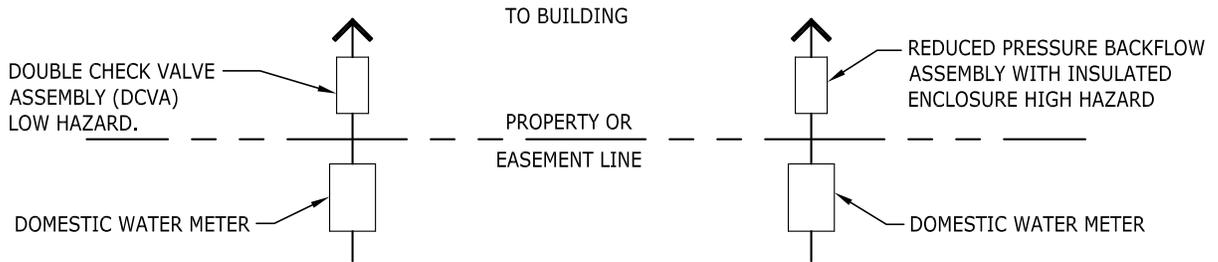
1. BOX TO BE LOCATED BEHIND WATER METER ON PRIVATE PROPERTY AND SHALL BE THE PROPERTY OWNER'S RESPONSIBILITY TO MAINTAIN.
2. WILKINS NO. 600 REGULATOR, ALL BRONZE WATER REDUCING VALVE AND STRAINER, 3/4", 1", 1 1/2", OR 2", BY-PASS, MONEL TRIM. MAX. INITIAL PRESSURE SETTING: 50 LBS. FOR WATER-AIR OR PRE-APPROVED EQUAL.
3. SEE WATER SERVICE STANDARD PLANS 3-10 AND 3-11.



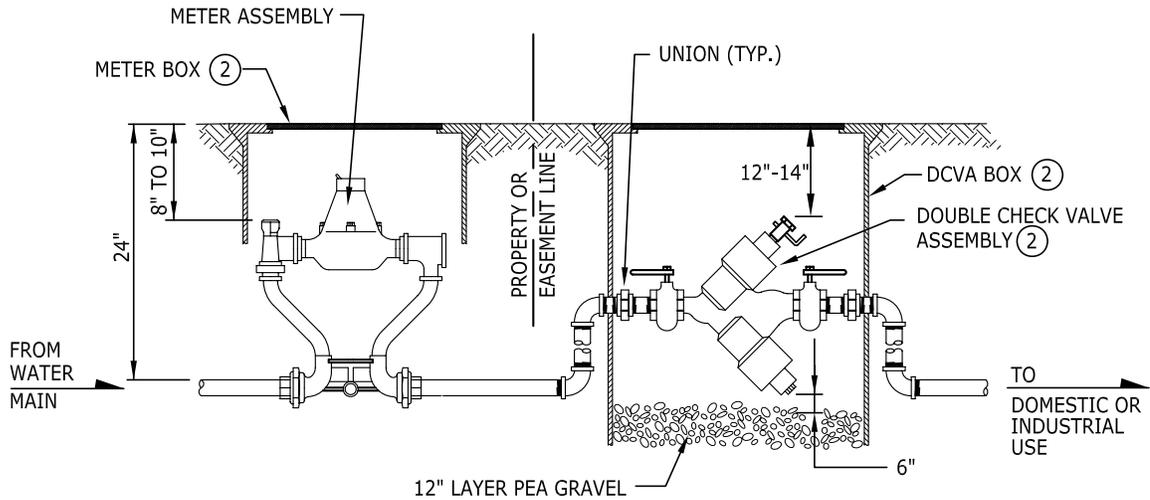
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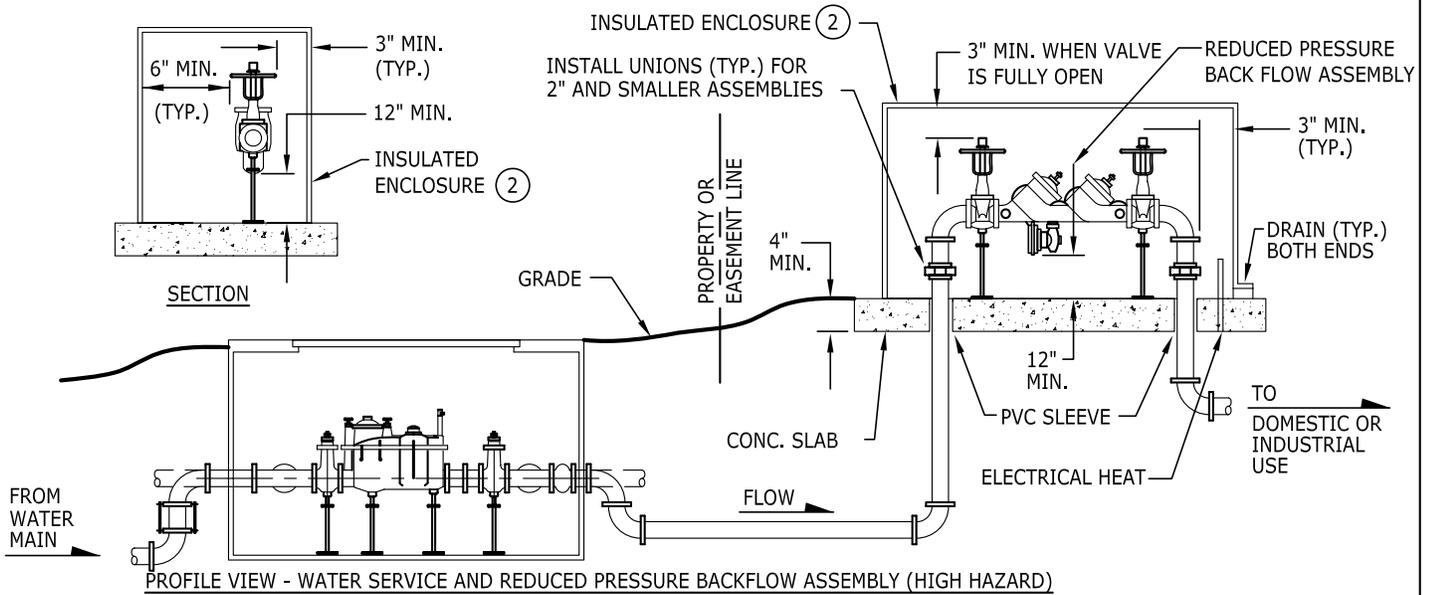
		CITY OF KENT	
		ENGINEERING DEPARTMENT	
PRESSURE REDUCING VALVE WITH BOX FOR 3/4", 1", 1-1/2", OR 2" SERVICE LINES			
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED			
APPROVED		ENGINEER	
			STANDARD PLAN
			3-13



PLAN VIEW - TYPICAL INSTALLATION



PROFILE VIEW - WATER SERVICE AND DOUBLE CHECK VALVE ASSEMBLY (LOW HAZARD)



PROFILE VIEW - WATER SERVICE AND REDUCED PRESSURE BACKFLOW ASSEMBLY (HIGH HAZARD)

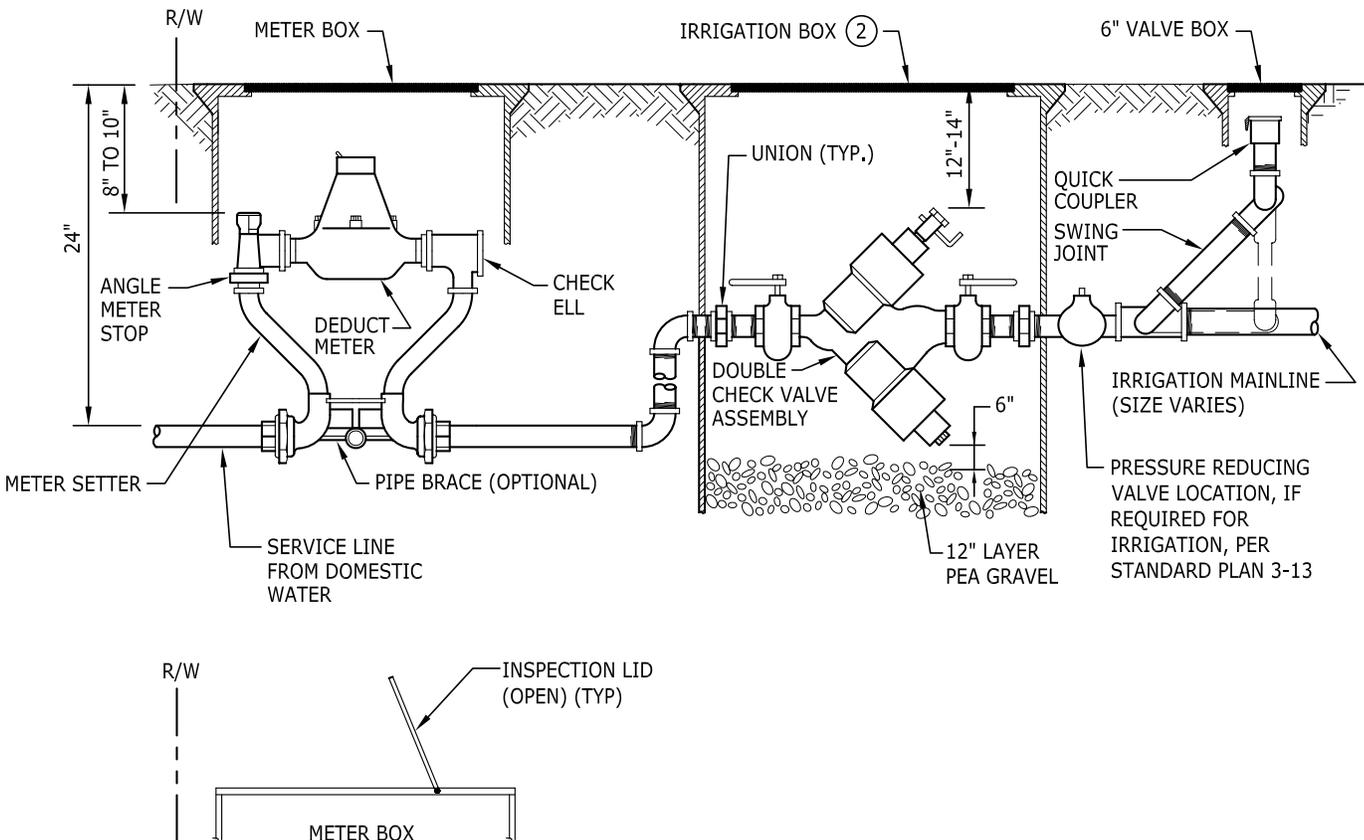
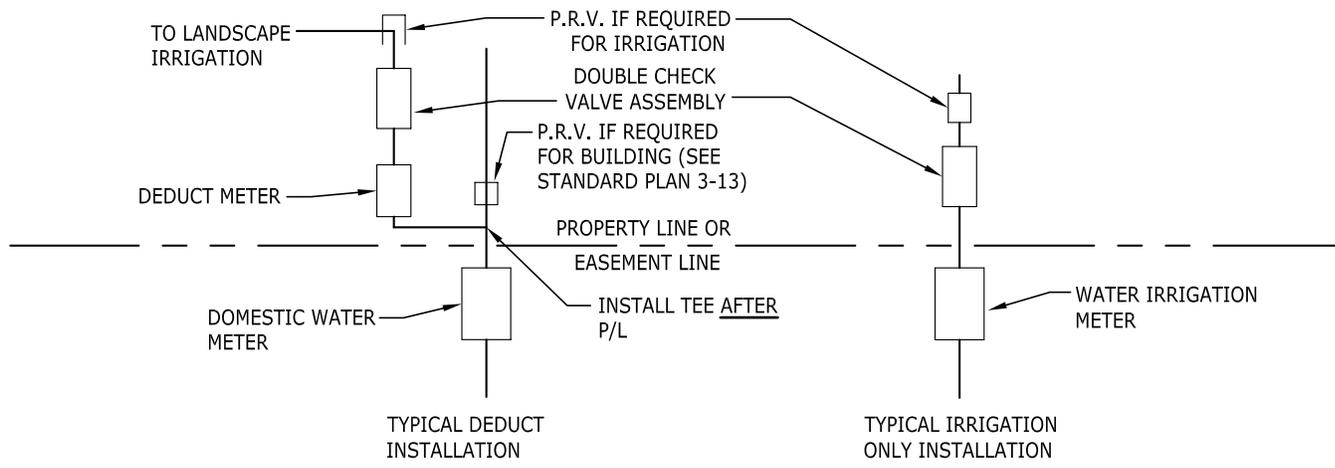
NOTES:

1. DRAWINGS ARE ILLUSTRATIONS ONLY. SIZE OF METER AND BACKFLOW PREVENTER SHALL BE PER THE APPROVED PLANS.
2. BOXES OR VAULTS SHALL PER SECTION 3.10.
3. INSULATED ENCLOSURES SHALL ALLOW MINIMUM CLEARANCES.
4. BACKFLOW PREVENTION SHALL BE PER SECTION 3.16.



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		CITY OF KENT ENGINEERING DEPARTMENT	
		DOMESTIC SERVICE CONNECTION PREMISE ISOLATION	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	3-14	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			



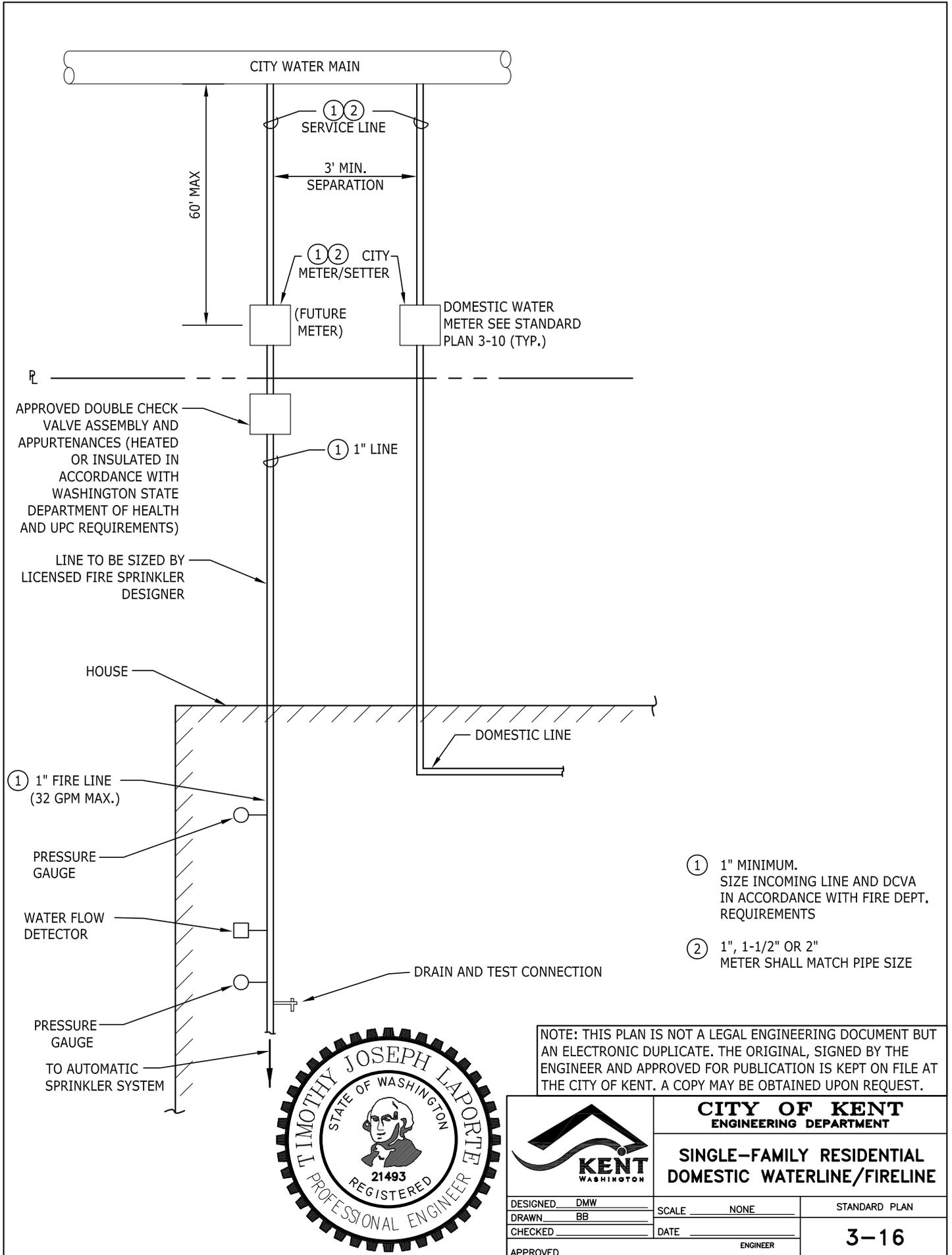
NOTES:

1. DRAWINGS ARE ILLUSTRATIONS ONLY. SIZE OF METER AND BACKFLOW PREVENTER SHALL BE PER THE APPROVED PLANS
2. BOXES OR VAULTS SHALL BE PER SECTION 3.10.
3. BACKFLOW PREVENTION SHALL BE PER SECTION 3.16.
4. FOR IRRIGATION USE ONLY INSTALLATION. THE DCVA AND IRRIGATION BOX SHALL BE INSTALLED PRIOR TO THE METER BEING SET. THE DCVA CAN BE CERTIFIED AFTER INSTALLATION OF THE METER.



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		CITY OF KENT ENGINEERING DEPARTMENT	
		IRRIGATION SERVICE INSTALLATION	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	3-15	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	DATE _____	ENGINEER	
APPROVED _____			

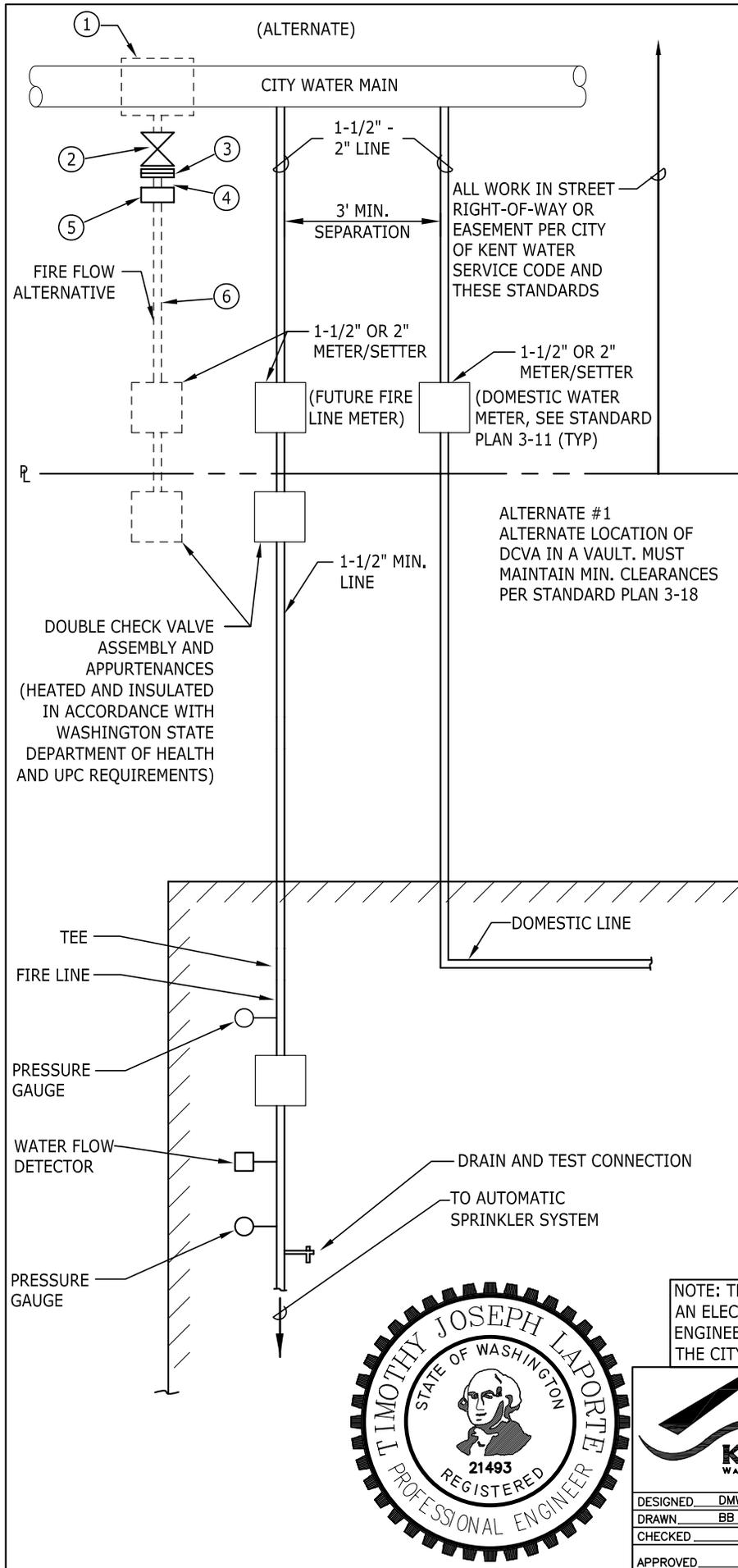


- ① 1" MINIMUM. SIZE INCOMING LINE AND DCVA IN ACCORDANCE WITH FIRE DEPT. REQUIREMENTS
- ② 1", 1-1/2" OR 2" METER SHALL MATCH PIPE SIZE

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		CITY OF KENT ENGINEERING DEPARTMENT	
		SINGLE-FAMILY RESIDENTIAL DOMESTIC WATERLINE/FIRELINE	
DESIGNED: <u>DMW</u>	SCALE: <u>NONE</u>	3-16	
DRAWN: <u>BB</u>	DATE: _____		
CHECKED: _____	APPROVED: _____ ENGINEER		

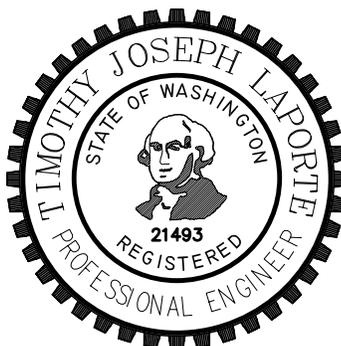


NOTE:
 ALL MATERIALS, CONSTRUCTION, APPARATUS, CONNECTIONS AND APPURTENANCES SHALL BE IN ACCORDANCE WITH KENT CITY CODES, STANDARDS AND DETAILS

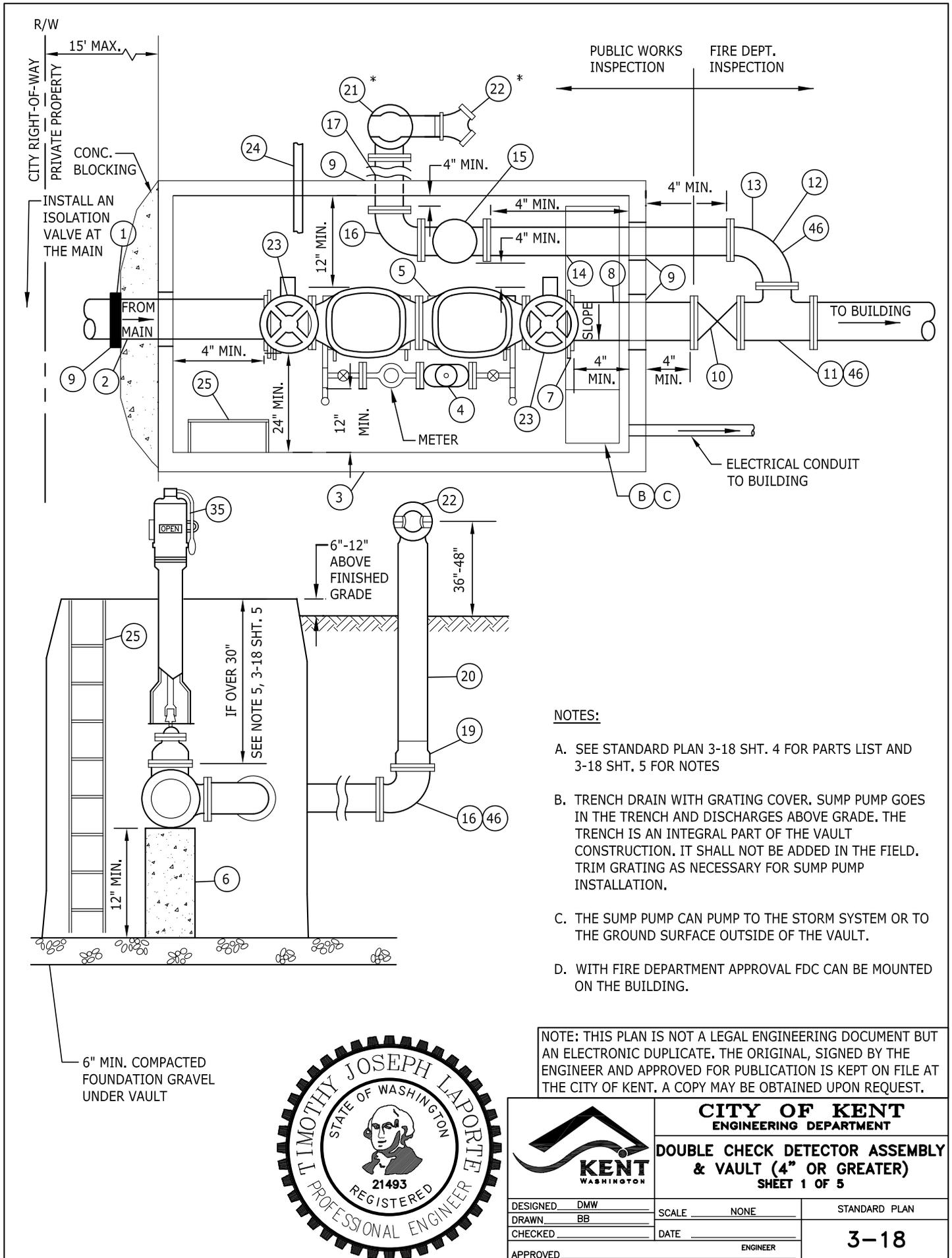
FIRE LINE SYSTEMS EXCEEDING FLOW RATES OF 2 INCH DOMESTIC WATER METER, SHALL BE REQUIRED TO USE DOUBLE DETECTOR CHECK VALVE ASSEMBLIES PER STANDARD PLAN 3-18.

- FOR SERVICES LARGER THAN 2"
1. WET TAPPING SLEEVE (FL) ON EXISTING MAIN, OR 4" TEE (FL) ON NEW MAIN
 2. 4" RESILIENT WEDGE GATE VALVE (FLxFL)
 3. 4" REDUCER COMPANION (FL W/ 2" TAP)
 4. 2" NIPPLE, BRASS M.I.P.T.xM.I.P.T.
 5. 2" FEMALE IP THREAD x 2" PACK JOINT ADAPTER
 6. 2" HDPE
 7. 1-1/2" MINIMUM, OR SIZE INCOMING LINE AND DCVA IN ACCORDANCE WITH FIRE DEPT. REQUIREMENTS. ACCESS TO DOUBLE CHECK HAS TO BE APPROVED
 8. SPRINKLER SYSTEMS WITH 20 HEADS OR MORE REQUIRE A FIRE DEPT. CONNECTION CHECK VALVE ASSEMBLY
 9. OUTSIDE LOCATION REQUIRES APPROVAL OF UNDERGROUND FIRELINE PLAN

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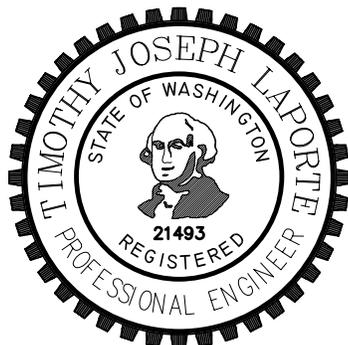
		CITY OF KENT ENGINEERING DEPARTMENT	
		MULT-FAMILY RESIDENTIAL DOMESTIC WATERLINE/FIRELINE	
DESIGNED: DMW	SCALE: NONE	STANDARD PLAN 3-17	
DRAWN: BB	DATE: _____		
CHECKED: _____	ENGINEER: _____		
APPROVED: _____			



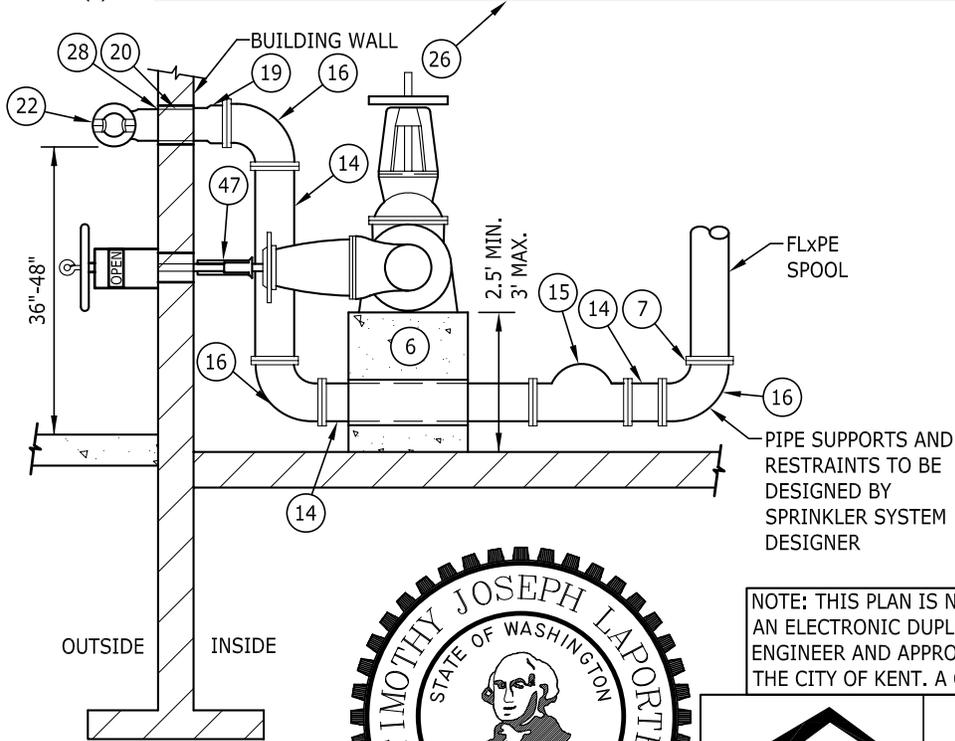
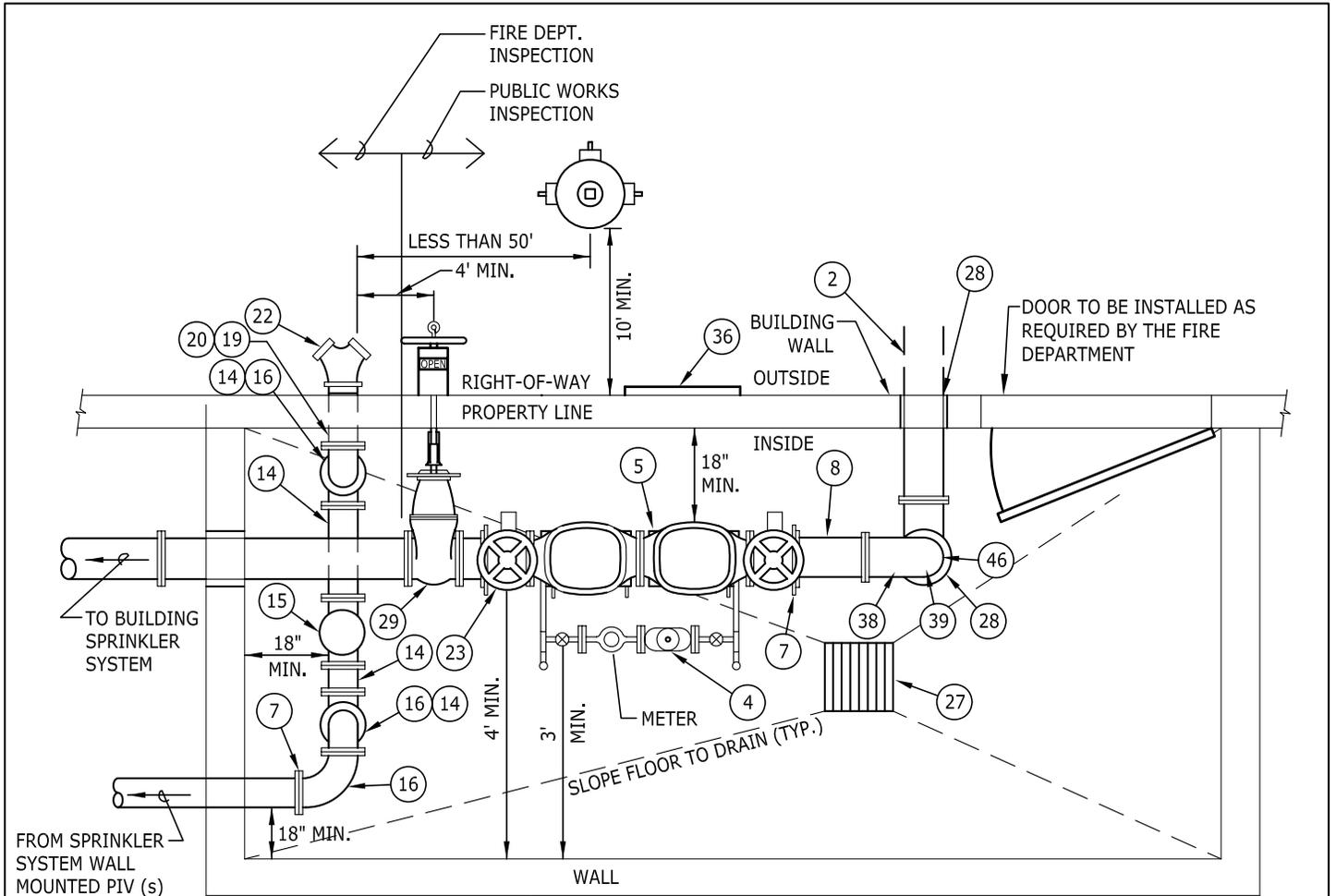
NOTES:

- A. SEE STANDARD PLAN 3-18 SHT. 4 FOR PARTS LIST AND 3-18 SHT. 5 FOR NOTES
- B. TRENCH DRAIN WITH GRATING COVER. SUMP PUMP GOES IN THE TRENCH AND DISCHARGES ABOVE GRADE. THE TRENCH IS AN INTEGRAL PART OF THE VAULT CONSTRUCTION. IT SHALL NOT BE ADDED IN THE FIELD. TRIM GRATING AS NECESSARY FOR SUMP PUMP INSTALLATION.
- C. THE SUMP PUMP CAN PUMP TO THE STORM SYSTEM OR TO THE GROUND SURFACE OUTSIDE OF THE VAULT.
- D. WITH FIRE DEPARTMENT APPROVAL FDC CAN BE MOUNTED ON THE BUILDING.

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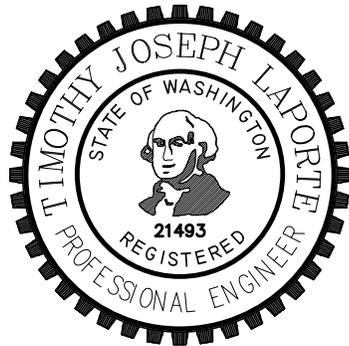


CITY OF KENT ENGINEERING DEPARTMENT		
DOUBLE CHECK DETECTOR ASSEMBLY & VAULT (4" OR GREATER) SHEET 1 OF 5		
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	STANDARD PLAN
DRAWN <u>BB</u>	DATE _____	3-18
CHECKED _____	ENGINEER _____	
APPROVED _____		

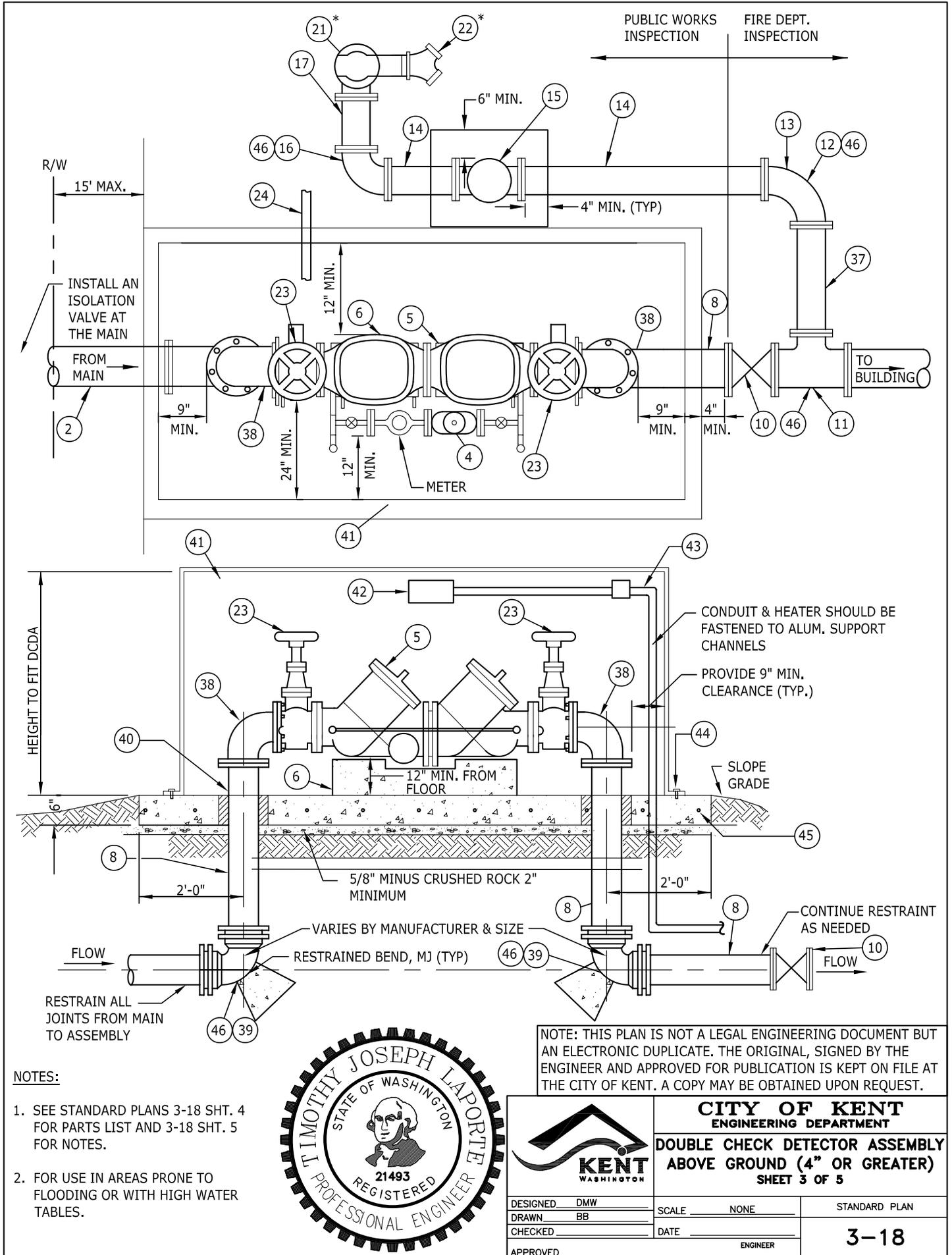


- NOTES:**
- SEE STANDARD PLANS 3-18 SHT. 4 FOR PARTS LIST AND 3-18 SHT. 5 FOR NOTES.
 - INTERIOR DCDA SHALL ONLY BE ALLOWED IN ZONING AREAS THAT HAVE ZERO SETBACK REQUIREMENTS BETWEEN THE BUILDING AND THE PROPERTY LINE.

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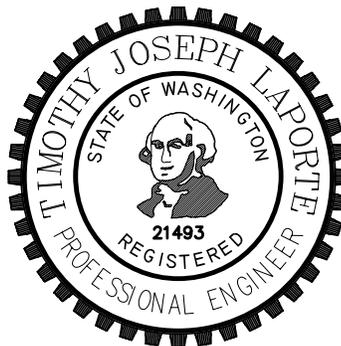


		CITY OF KENT ENGINEERING DEPARTMENT		
		DOUBLE CHECK DETECTOR ASSEMBLY INSIDE BUILDING (4" OR GREATER) SHEET 2 OF 5		
DESIGNED	DMW	SCALE	NONE	STANDARD PLAN
DRAWN	BB	DATE		
CHECKED				3-18
APPROVED			ENGINEER	



NOTES:

1. SEE STANDARD PLANS 3-18 SHT. 4 FOR PARTS LIST AND 3-18 SHT. 5 FOR NOTES.
2. FOR USE IN AREAS PRONE TO FLOODING OR WITH HIGH WATER TABLES.



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		CITY OF KENT ENGINEERING DEPARTMENT	
		DOUBLE CHECK DETECTOR ASSEMBLY ABOVE GROUND (4" OR GREATER) SHEET 3 OF 5	
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED		ENGINEER	
APPROVED			3-18

DOUBLE CHECK DETECTOR ASSEMBLY PARTS LIST

SEE KCC CHAPTER 13
AND STANDARD PLAN 3-18 SHEET 5 FOR NOTES.
SEE STANDARD PLAN 3-18 SHEETS 1, 2 AND 3 FOR PLAN, ELEVATION & SECTION.

- | | |
|---|---|
| <p>① LOCKING FOLLOWER RING.</p> <p>② 4" MIN. RESTRAINED JOINT D.I. CLASS 52.</p> <p>③ PRECAST CONC. VAULT. SEE KCC TITLE 13 FIRE PREVENTION AND PROTECTION</p> <p>④ APPROVED DCVA IN BYPASS LINE (LATEST HEALTH DEPARTMENT AND CITY OF KENT APPROVED LIST) SHALL BE ON OPPOSITE SIDE OF PUMPER LINE. (PART OF DCDA).</p> <p>⑤ DCDA IN MAIN LINE (LATEST DEPARTMENT OF HEALTH APPROVED LIST).</p> <p>⑥ CONC. SUPPORT PADS UNDER CHECK VALVES.</p> <p>⑦ 10", 8", 6" OR 4" FL COUPLING ADAPTER.</p> <p>⑧ 10", 8", 6" OR 4" PEXFL PIPE.</p> <p>⑨ GROUT INTERIOR & EXTERIOR ALL AROUND PIPE TO MAKE WATER TIGHT SEAL.</p> <p>⑩ 10", 8", 6" OR 4" RESILIENT WEDGE GATE VALVE, FLxFL W/ POST INDICATOR W/ TAMPER SWITCH.</p> <p>⑪ 10", 8", 6" OR 4" TEE, FLxFL</p> <p>⑫ 10", 8", 6" OR 4" REDUCING 90° BEND, FLxFL AS REQ'D.</p> <p>⑬ 6" OR 4" LONG RADIUS 90° BEND, FLxFL</p> <p>⑭ 6" OR 4" SPOOL, FLxFL</p> <p>⑮ 6" SWING TYPE GRAVITY OPERATED CHECK VALVE, FL W/ BALL DRIP IN VAULT OR INSIDE BUILDING DEPENDING ON DCDA APPLICATION.</p> <p>⑯ 6" OR 4" 90° BEND, FLxFL</p> <p>⑰ 6" OR 4" SPOOL, FLxFL.</p> <p>⑱ NOT USED</p> <p>⑲ FLxIP ADAPTER.</p> <p>⑳ 6" OR 4" GALV. PIPE, THREADED, LENGTH AS REQ'D (SEE STD. PLAN 3-18 SHT. 5).</p> <p>㉑* 4"x4"x6" BULL HEAD THREADED TEE.</p> <p>㉒* UL LISTED FD CONNECTION & UL LISTED LOCKING CAPS, LOCATE WITHIN 50' MAX. OF A PUBLIC FIRE HYDRANT. WITH FIRE DEPARTMENT APPROVAL, FDC CAN BE MOUNTED ON THE BUILDING.</p> <p>㉓ O.S & Y VALVES TO BE RESILIENT WEDGE WITH TAMPER SWITCHES. ADD WIRING IN ACCORDANCE WITH L & I (SEE NOTE 18 ON STD. PLAN 3-18 SHT. 5).</p> <p>㉔ GALV. CONDUIT SLEEVE, SEALED BOTH ENDS, FOR ELECTRONIC MONITORING WIRES.</p> <p>㉕ LADDER AS REQ'D PER OSHA.</p> <p>㉖ WALL AS REQUIRED BY THE FIRE MARSHALL</p> <p>㉗ FLOOR DRAIN TO BUILDING PLUMBING STORM SYSTEM.</p> <p>㉘ 2" CLEARANCE INTERIOR AND EXTERIOR ALL AROUND PIPE.</p> | <p>⑳ 10", 8", 6" OR 4" NON-RISING STEM RESILIENT WEDGE GATE VALVE WITH 2" OPERATING NUT.</p> <p>㉑ APPROVED DCVA IN BYPASS LINE (LATEST HEALTH DEPARTMENT AND CITY OF KENT APPROVED LIST) SHALL BE ON OPPOSITE SIDE OF EXTERIOR WALL. (PART OF DCDA)</p> <p>㉒ 6" OR 4" RESTRAINED JOINT DIP, CL 52.</p> <p>㉓ DRAIN ROCK, 1/2 C.Y.</p> <p>㉔ 4"x4"x6" BULL, ELBOW, THREADED.</p> <p>㉕ 10", 8", 6", OR 4" RESILIENT WEDGE GATE VALVE, FL W/POST INDICATOR W/TAMPER SWITCH.</p> <p>㉖ SIGN ON OUTSIDE OF BUILDING..... FIRELINE
DCDA
INSIDE BLDG.</p> <p>㉗ 10", 8", 6" OR 4" SPOOL, FLxFL.</p> <p>㉘ 10", 8", 6" OR 4" 90° BEND, FLxFL.</p> <p>㉙ 10", 8", 6" OR 4" 90° BEND, MJ.</p> <p>㉚ WRAP PIPE WITH 1/2" EXPANSION JOINT MATERIAL.</p> <p>㉛ FIBERGLASS OR ALUMINUM ENCLOSURE</p> <p>㉜ HOT BOX HEATER.</p> <p>㉝ 120 VOLT PULL BOX FOR HEATER CONDUIT AND WIRES FROM SEPARATE ELECTRICAL CIRCUIT FROM SERVED FACILITY. ALSO INCLUDE ELECTRICITY FOR ELECTRONIC SUPERVISION OF CONTROL VALVES.</p> <p>㉞ 3/8" SS EXP BOLTS 24" O.C.</p> <p>㉟ REINFORCED CONCRETE SLAB WITH #4 AT 15" O.C. EACH WAY.</p> <p>㊱ CONCRETE BLOCKING AS REQUIRED.</p> <p>㊲ DISTANCE FROM THE OPERATING NUT TO THE INSIDE WALL SHALL BE 18" MIN. OR PER THE MANUFACTURER'S RECOMMENDATION.</p> |
|---|---|

* ㉑ & ㉒ ARE GENERALLY 6" WITH THE BULLHEAD, ELBOW AS INDICATED. IN CASES WHERE A 4" DCVA IS APPROVED THE BULL, ELBOW IS ELIMINATED AND THE FD CONNECTION IS ATTACHED DIRECTLY TO THE GALV. PIPE.

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		CITY OF KENT ENGINEERING DEPARTMENT	
DOUBLE CHECK DETECTOR ASSEMBLY & VAULT PARTS LIST SHEET 4 OF 5			
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED		ENGINEER	
APPROVED		STANDARD PLAN	
		3-18	

DOUBLE CHECK DETECTOR ASSEMBLY

MINIMUM CLEARANCES IN VAULT ARE DEPENDENT UPON LOCATION OF PUMPER CONNECTION.

GENERAL NOTES:

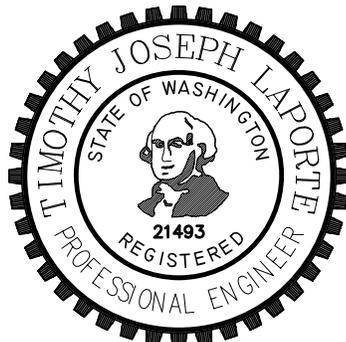
1. VAULT DIMENSIONS BASED ON SIZE OF APPARATUS AND MEETING MINIMUM CLEARANCES.
2. ALL VAULT LIDS SHALL BE GALVANIZED STEEL AND HAVE DOUBLE DOORS WITH LID UNDER DRAINS WHICH DRAIN TO EXTERIOR OF VAULT.
3. MINIMUM APPARATUS SIZE SHALL BE 4 INCHES.
4. VAULT SHALL BE SEALED TO PREVENT WATER LEAKAGE.
5. LADDERS WITHIN VAULTS SHALL BE REQUIRED WHEN DEPTH FROM TOP OF LID TO TOP OF APPARATUS EXCEEDS 30", AND/OR THE APPARATUS IS MORE THAN 12" ABOVE THE FLOOR. INSTALLATION OF ALL LADDERS SHALL BE IN COMPLIANCE TO OSHA.
6. ALL BACKFLOW PREVENTERS SHALL BE ON THE LATEST LIST APPROVED BY THE DEPARTMENT OF HEALTH AND THE CITY OF KENT.
7. MAKE ALL ATTEMPTS TO LOCATE DCDA VAULT OR INSULATED ENCLOSURE AND SWING CHECK VAULT IN PLANTING AREA & NOT IN PAVING AREA.
8. ALL BENDS AND ELBOWS TO BE CAST IRON, CLASS 250, CEMENT LINED. (SEE APWA AND AWWA).
9. BYPASS LINE TO BE ON OPPOSITE SIDE OF PUMPER LINE.
10. INSTALL THREADED PLUGS IN ALL 8 TEST COCKS.
11. TEMPORARY SUPPORT SHALL BE PROVIDED UNDER VALVES AT THE TIME OF INSTALLATION. AFTER COMPLETE INSTALLATION REMOVE THE TEMPORARY SUPPORT AND INSTALL CONCRETE SUPPORT PAD WITH 6" BRICK SHIMS AS REQUIRED.
12. FOR FIRE PIPING SYSTEM INSTALLATIONS ON PRIVATE SIDE OF VAULT, THE CONTRACTOR MUST HAVE SPECIAL FIRE CERTIFICATION.
13. GROUT INTERIOR AND EXTERIOR ALL AROUND PIPE MAKING A WATER TIGHT SEAL.
14. ALL PIPE TO BE DUCTILE IRON CEMENT LINED CLASS 52 PIPE EXCEPT WHERE INDICATED. INSTALLATION MUST ALLOW CLEARANCE FOR PROPER OPERATION OF ALL O.S AND Y's.
15. GALVANIZED STEEL PIPE SHALL BE WRAPPED WITH POLYETHYLENE WRAPPING 10mm THICKNESS.
16. COMPLETE ALL WORK IN ACCORDANCE WITH STATE, CITY AND MANUFACTURER STANDARDS.
17. SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL DCDA IS APPROVED BY THE CITY AND TESTED/CERTIFIED BY A WASHINGTON STATE LICENSED TESTER.
18. DCDA IS PRIVATE AND SHALL BE MAINTAINED BY THE PROPERTY OWNER WITH ANNUAL CERTIFICATIONS REQUIRED.
19. ELECTRONIC SUPERVISION OF CONTROL VALVES IS REQUIRED.
20. THE INSTALLATION OF THE FIRE DEPARTMENT CONNECTION SHALL BE PER THE FIRE CODE OFFICIAL.
21. AN ISOLATION VALVE SHALL BE PROVIDED AT THE CITY WATER MAIN.
22. BY-PASS AND FIRE DEPARTMENT CONNECTION AS SHOWN IN 3-18 SHEETS 1, 2 AND 3 ARE REQUIRED.
23. SEE STANDARD PLAN 3-18 SHEETS 1, 2 AND 3 FOR PLAN, ELEV. & SECTION.
24. SEE STANDARD PLAN 3-18 SHEET 4 FOR PARTS LIST.

INSIDE BUILDING NOTES:

1. ROOM IN WHICH DCDA IS PROPOSED TO BE LOCATED SHALL:
 - A. HAVE FLOOR DRAINS CONNECTED TO STORM OR SANITARY SEWER.
 - B. HAVE A HEATING SYSTEM (40° F MIN. TEMP.) NO HEAT TAPE.
 - C. NOT BE USED FOR STORAGE AROUND THE DCDA.
 - D. HAVE CLEARLY DELINEATED ACCESS WAYS TO DCDA AND WALL MOUNTED PIVS.
2. GROUT ALL AROUND PIPE WHERE IT ENTERS THE BUILDING.
3. IF PRIVATE HYDRANTS ARE REQUIRED FOR THE PROJECT, ENTIRE SYSTEM (HYDRANTS & FIRELINE) SHALL BE ISOLATED FROM CITY SYSTEM BY A DCDA LOCATED AT THE PROPERTY LINE PER STANDARD PLAN 3-18 SHTS 1 & 3.
4. INSTALLATION OF DCDA IS APPROVED BY HORIZONTAL ALIGNMENT ONLY.
5. A HEATED, R-19 INSULATED WOOD FRAMED ENCLOSURE IS AN ACCEPTABLE ALTERNATIVE TO A ROOM IF DCDA IS TO BE LOCATED IN AN UNHEATED BUILDING. THE ENCLOSURE MUST MEET ALL REQUIREMENTS OF THE DEVELOPMENT SERVICES DIVISION.
6. INTERIOR DCDA SHALL ONLY BE ALLOWED IN ZONING AREAS THAT HAVE ZERO SETBACK REQUIREMENTS BETWEEN THE BUILDING AND THE PROPERTY LINE.
7. FOR INSIDE BUILDING DCDA, THE CITY'S RESPONSIBILITY SHALL CEASE TEN FEET (10') OUT SIDE OF THE BUILDING.

ABOVE GROUND NOTES:

1. "HOT BOX" TO BE LOCATED OUTDOORS AND ACCESSIBLE TO THE CITY. ALTERNATE LOCATION REQUIRES THE CITY APPROVAL.
2. HEATERS AND WIRING SHALL BE RATED AT 2,000 WATT FOR 8" AND UNDER: 3,000 WATT FOR 10".
3. CONCRETE TO BE 2500 PSI (MINIMUM) MIX WITH AIR ENTRAINMENT.
4. DRAIN TO DAYLIGHT WITH BIRD SCREEN LOCATED AT SLAB LEVEL (SIZED PER MANUFACTURERS RECOMMENDATION).
5. NO BRANCH CONNECTIONS ALLOWED BETWEEN METER AND DCDA.



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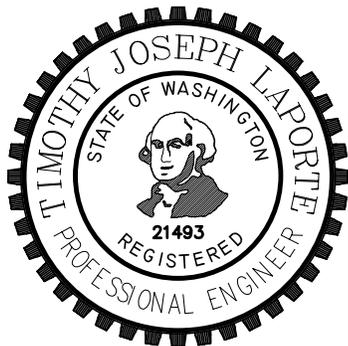
		CITY OF KENT ENGINEERING DEPARTMENT	
DOUBLE CHECK DETECTOR ASSEMBLY & VAULT NOTES SHEET 5 OF 5			
DESIGNED: <u>DMW</u>	SCALE: <u>NONE</u>	STANDARD PLAN 3-18	
DRAWN: <u>BB</u>	DATE: _____		
CHECKED: _____	APPROVED: _____	ENGINEER	

NOTES:
 1. TEE, VALVE AND PIPING SHALL BE PER SECTION 3.19.

2. CONCRETE BLOCKING SHALL BE CLASS 3000 (SEE SECTION 3.20.C.)

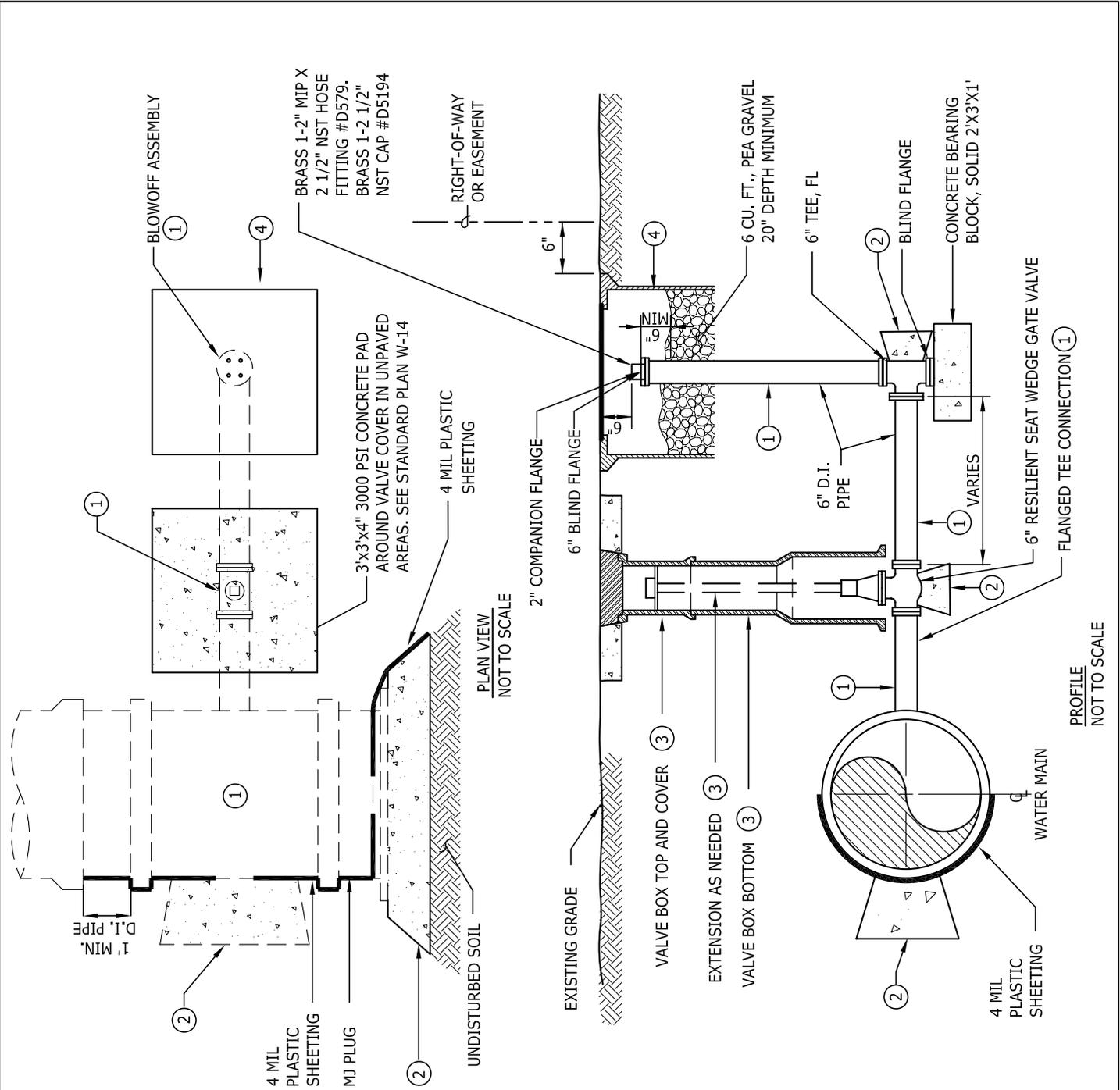
3. VALVE BOX SHALL BE OLYMPIC FOUNDRY VB940 WITH TWO (2) INCH "DEEP SKIRT" COVER. THE COVER SHALL BE MARKED "WATER" THE EARS SHALL ALIGN IN THE DIRECTION OF FLOW. (SEE STANDARD PLAN 3-7).

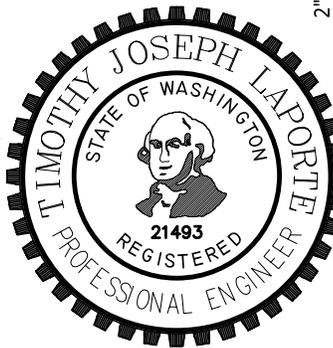
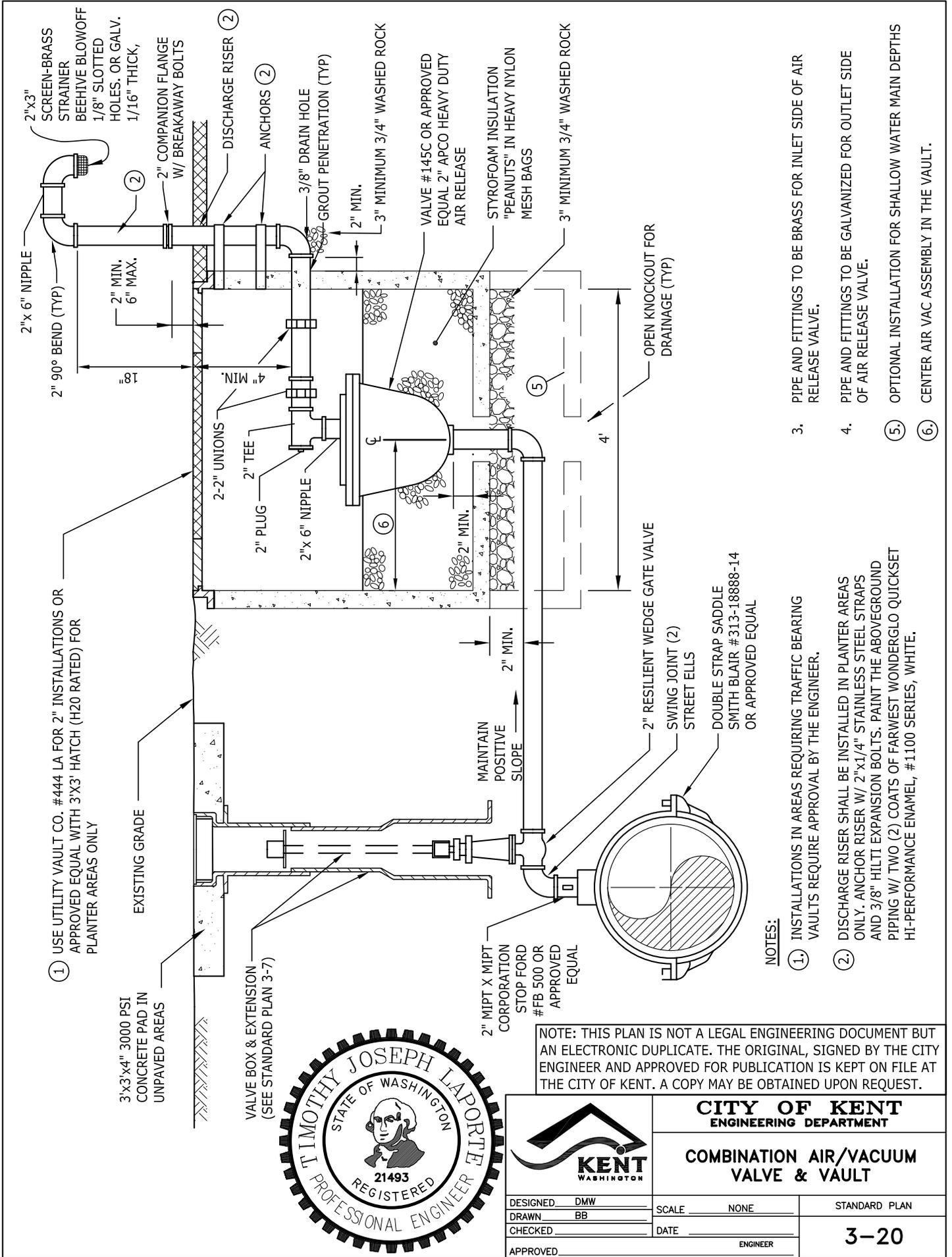
4. OLYMPIC FOUNDRY #SM30 METER BOX.



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		CITY OF KENT ENGINEERING DEPARTMENT	
		STANDARD 6" BLOWOFF ASSEMBLY	
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED		ENGINEER	
APPROVED			
			STANDARD PLAN 3-19





CITY OF KENT
ENGINEERING DEPARTMENT

COMBINATION AIR/VACUUM VALVE & VAULT

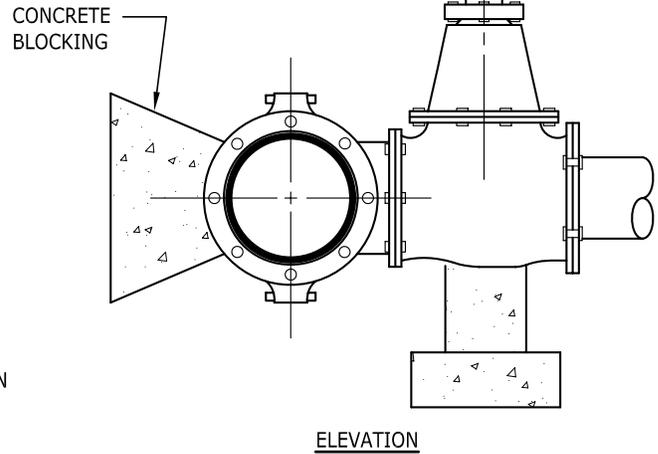
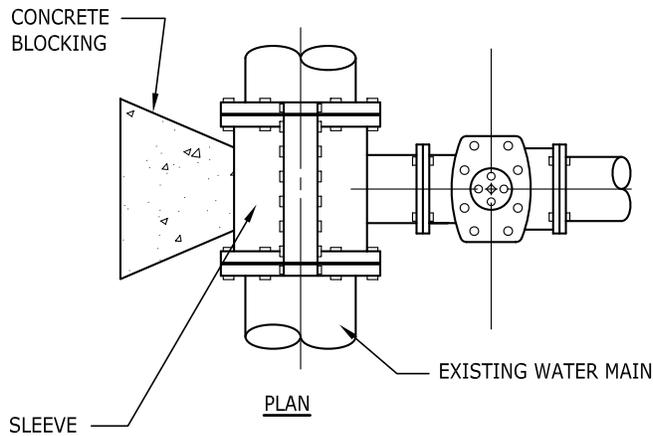
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CHECKED	
APPROVED	

SCALE	NONE
DATE	
ENGINEER	

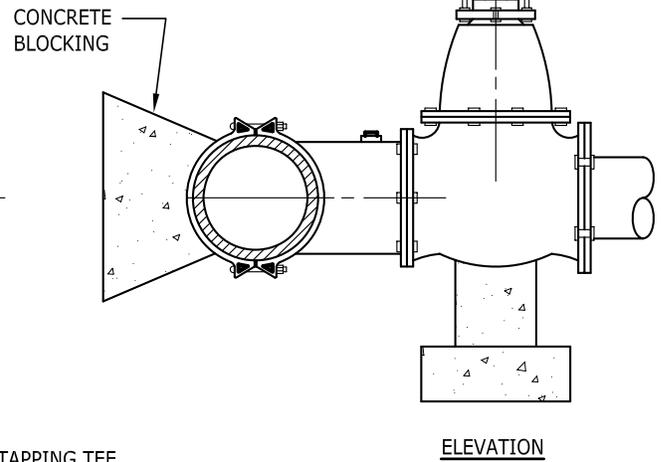
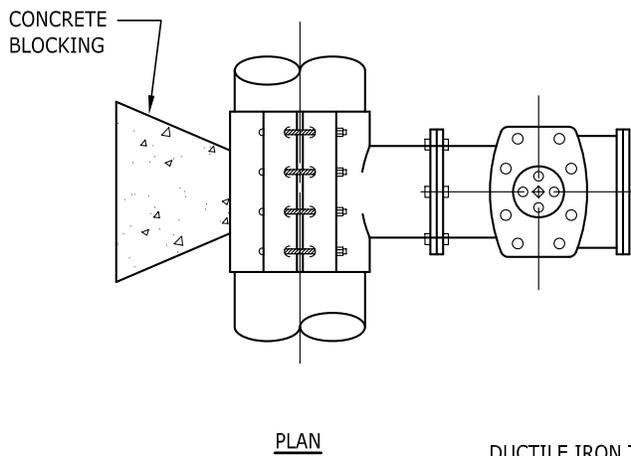
STANDARD PLAN
3-20

NOTES:

1. MECHANICAL JOINT LONG SLEEVES SHALL BE HEAVY DUTY CAST DUCTILE IRON, HAVE END AND SIDE GASKETS.
2. LONG TAPPING SLEEVE & VALVE ASSEMBLY TO BE PRE-APPROVED BY THE ENGINEER. PRESSURE TESTING SHALL BE APPROVED BY CONSTRUCTION INSPECTOR PRIOR TO TAPPING. FOLLOW AWWA REQUIREMENTS FOR DISINFECTION OF TAPPING SLEEVES (AWWA STD. C651)
3. WET TAPS SHALL NOT BE ALLOWED ON SAME SIZE OR SMALLER MAINS.

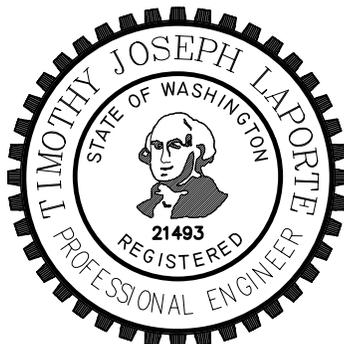


**HEAVY DUTY CAST DUCTILE
IRON TAPPING TEE**

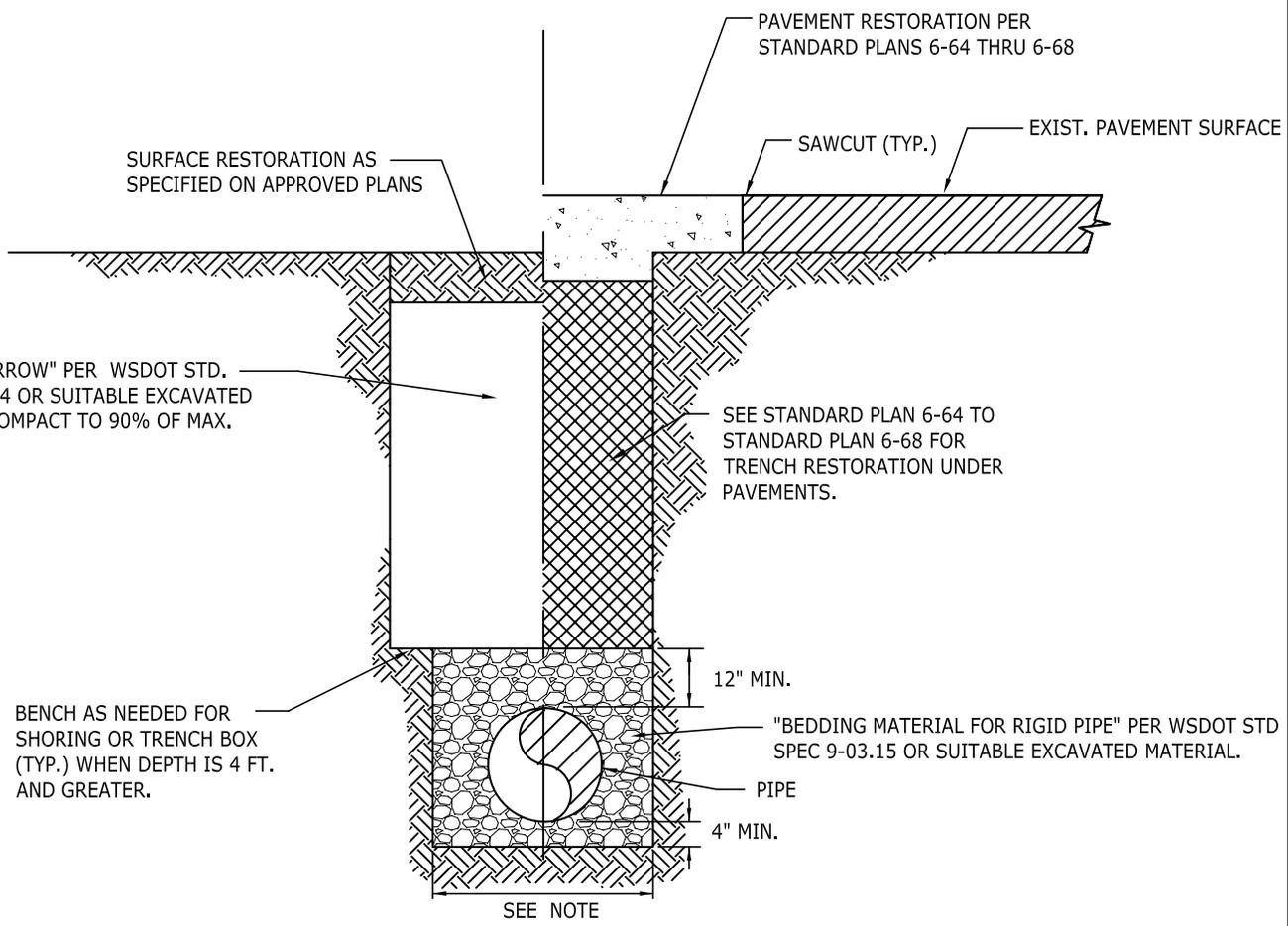


DUCTILE IRON TAPPING TEE

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		CITY OF KENT ENGINEERING DEPARTMENT	
		TAPPING SLEEVE AND VALVE ASSEMBLIES	
DESIGNED	DMW	SCALE	NONE
DRAWN	BB	DATE	
CHECKED			
APPROVED		ENGINEER	
			3-21



UNPAVED AREAS

PAVED AREAS

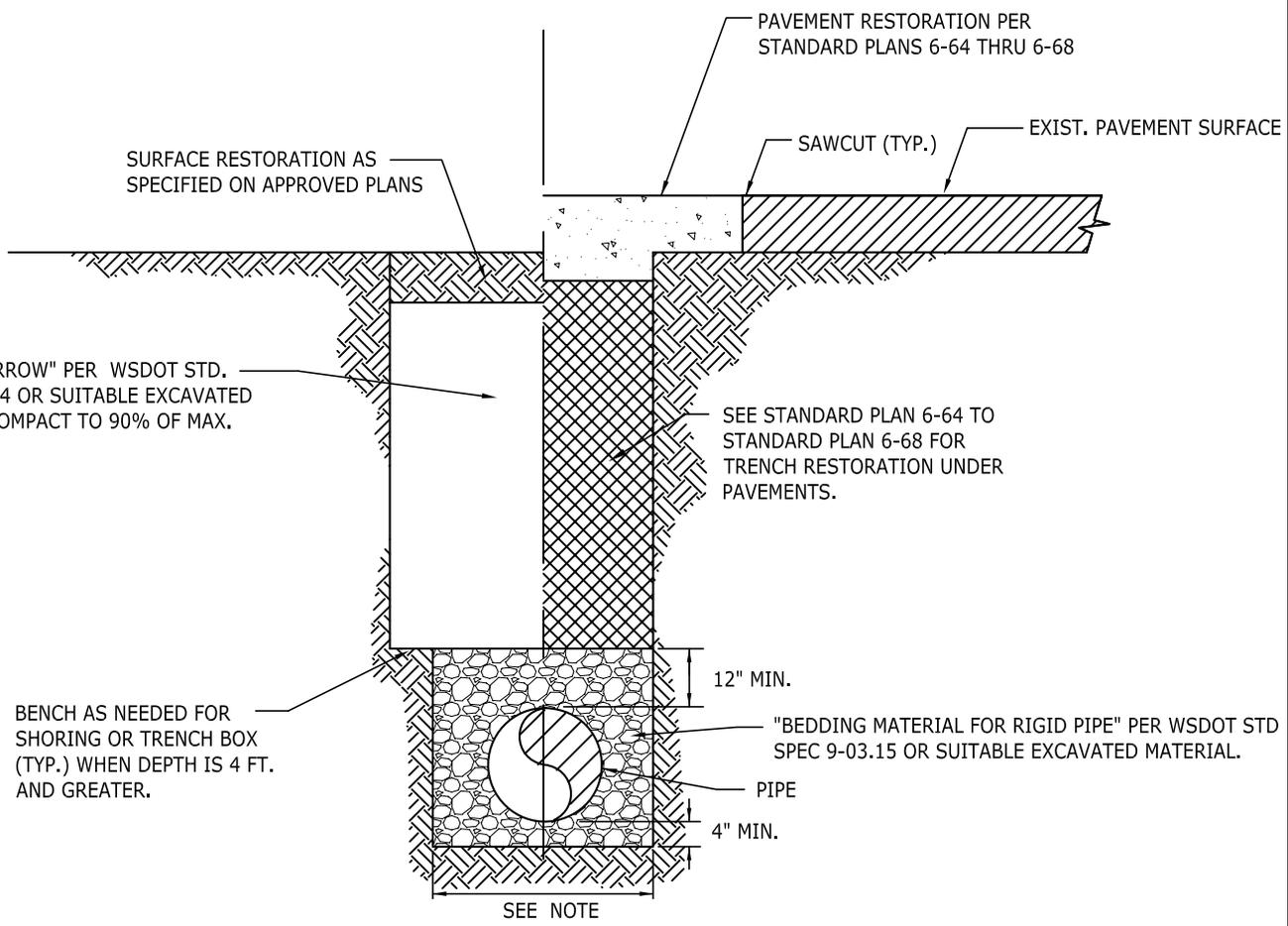
NOTE:

MAXIMUM WIDTH OF TRENCH AT TOP OF PIPE
 * 30" FOR PIPE UP TO AND INCLUDING 12" NOMINAL DIAMETER.
 * O.D. PLUS 16" FOR PIPE LARGER THAN 12" NOMINAL DIAMETER.

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		CITY OF KENT ENGINEERING DEPARTMENT	
		TYPICAL PIPE TRENCH	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	3-22	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			



UNPAVED AREAS

PAVED AREAS

NOTE:

MAXIMUM WIDTH OF TRENCH AT TOP OF PIPE
 * 30" FOR PIPE UP TO AND INCLUDING 12" NOMINAL DIAMETER.
 * O.D. PLUS 16" FOR PIPE LARGER THAN 12" NOMINAL DIAMETER.

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		CITY OF KENT ENGINEERING DEPARTMENT	
		TYPICAL PIPE TRENCH	
DESIGNED <u>DMW</u>	SCALE <u>NONE</u>	3-22	
DRAWN <u>BB</u>	DATE _____		
CHECKED _____	ENGINEER _____		
APPROVED _____			