WATER DISTRIBUTION SPECIFICATIONS

1.1 GENERAL:

This item shall consist of the labor, equipment, and material required for the complete construction of the watermains and services which shall include excavation, backfilling, pipe, valves, tees, hydrants, elbows, reducers, and all other appurtenances necessary for a complete watermain system as indicated on the accepted drawings. All materials and installations shall be approved by the local municipal water authority.

1.2 WATER MAIN PIPE MATERIALS:

DUCTILE IRON PIPE

Pipe shall be a minimum diameter of six inches (6") and conform to current AWWA C800 or ANSI Specification A21.51. Push-on joint pipe shall be minimum thickness Class 51.

Pipe shall be cement mortar-lined on the inside in accordance with AWWA C151.51 or ANSI Specification A21.4 except that the cement-lining thickness shall not be less than three-sixteenths inch (3/16"). A plus tolerance of one-eighths inch (1/8") will be permitted.

1.3 FITTINGS:

Ductile iron fittings shall be cement-lined, have 350 pounds working pressure, and be in accordance with AWWA C-104, C-110, C-111, C-153 for compact fittings. Mechanical joint nuts and bolts shall be high strength, low alloy steel per ANSI A- 21.11 . Ductile iron fittings larger than twelve inches (12") shall have a standard body length equal to Class 250 cast iron fittings. Cast iron Class 250 fittings will be allowed in lieu of ductile iron fittings in sizes larger than twelve inches (12").

Megalug retainer glands or an approved equal shall be used on all vertical bends and as shown on the plans.

1.4 GATE VALVE RESILIENT SEAT:

Gate valves shall be AWWA C 509 Standard Gate Valves with mechanical joints of sizes as required on the plans. Valves 12" and smaller shall be bubble tight, zero leakage at 200 psi working pressure. All valves shall be of cast or ductile iron body, parallel brass seats, non-rising stem, inside screw, double disk construction with "O" Ring Stem Seals. All valves to be equipped with a valve box for a minimum of 5.5' of cover material. The gate valves shall open counter clockwise and be provided with a 2" square operating nut with arrow cast in metal to indicate direction of opening.

Each valve shall have maker's name, pressure rating, and year in which manufactured cast on the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure. Buried valves shall be installed with a valve box. All gate valves shall be Mueller or equal.

1.5 VALVE BOXES:

Valve boxes are to be installed on all buried valves. The boxes shall be cast iron with a a minimum five and one quarter inch (5 1/4") diameter and long enough to extend from the valve to the finished grade. The boxes shall enclose the operating nut and the stuffing box of the valve. Valve boxes shall not transfer loads onto the valve. Covers shall be close fitting and dirt-tight with the top of the cover flush with the top of the rim box. Covers shall be marked "water" with an arrow indicating the direction of opening. Valve boxes shall be three piece, screw type manufactured by Kennedy figure 121 or equal.

1.6 FIRE HYDRANTS:

All hydrants are to be 3-way, 5" minimum diameter and limited to the following makes:
Mueller Centurion figure A-423 or Kennedy Guardian K-81KA, and shall conform with AWWA C502.
Main Valve Opening: 5 1/4 inches
Nozzle Arrangement: Two 2 1/2 inch hose nozzles NST threads.
One 4 1/2 inch pumper nozzle NST threads.
Inlet Connection: 6 inch mechanical joint, MEGA-LUG and thrust block
Operating Nut: Standard 1" pentagon
Direction of Opening: Counterclockwise
Color: Enameled hydrant red
Depth of Bury: Hydrant shall be installed to the manufacturer's instructions with nozzles about 18"-21" above finish grade.

1.7 HYDRANT BRANCHES:

Hydrant assemblies shall consist of a six inch (6") mechanical joint gate valve conforming to AWWA C-509; a length of six inch (6") Class 51 ductile iron pipe with a cement-lining; and the fire hydrant. MEGA-LUG retainer glands or approved equal shall be used.

1.8 WATER SERVICE CONNECTION:

A. GENERAL REQUIREMENTS

The Contractor shall install three-fourths inch to two inch (3/4") copper type K services as indicated on the Contract Drawings or as directed by the Engineer. Each service shall consist of a corporation, curbstop, copper tubing, and a curb box with service rod. Corporation shall be attached to the ductile iron pipe by means of a direct tap.

B. CORPORATIONS

Corporations shall be Waterworks Brass and manufactured in accordance with AWWA C800. Corporations shall have Mueller threads, adopted as AWWA Figure # 1, at the inlet and a compression-type fitting at the outlet. Both inlet and outlet shall be of the same size. Corporations shall be used for all taps larger than three-fourths inch (3/4") in diameter.

Corporations shall be directly tapped into ductile iron pipe larger than two inches (2") in diameter. In no other instance, except when a tapping sleeve and valve is used, shall a tap be made and a corporation installed without the use of a tapping saddle. Corporations shall be Mueller H-15009 or equal.

C. CURBSTOPS

Curbstops shall be a quarter-turn, plug-type valve with an "O" ring-type seal and shall be manufactured of Waterworks Brass in accordance with AWWA C800. The curbstop shall open left and have a positive stop. No curbstop shall have the ability to drain the service line. Both inlet and outlet of the curbstop shall have compression-type fittings. The tee head of the curb- stop shall have provision for the connection of a service rod. Curbstops shall be Mueller H-15200 or equal. (Mueller 300 Ball Valves are not acceptable.)

D. SERVICE LINES

Copper tubing shall by type "K", soft-temper, conforming to ASTM B88. The name or trademark of the manufacturer and type shall be stamped at regular intervals along the pipe.

All domestic services and domestic fire sprinkler systems that are connected to the public water system shall be protected according to their degree of hazard, with a backflow prevention assembly, and with an appropriate thermal expansion system.

E. CURB BOXES AND RODS

Curb boxes shall be of the sliding adjustable-type capable of adjusting from five feet to six feet (5' - 6'). The base of the box shall be arch-type so as to prevent the box from resting directly on the curbstop. The adjustable upper section shall be one inch (1") in diameter for use with three-fourths and one inch (3/4" and 1") curbstops. For larger curbstops, the upper section shall be one and one-fourths inches (1 1/4") in diameter.

Stationary rods affixed to the key of the curbstop shall be thirty inches (30") in length for three-fourths and one inch (3/4" and 1") curbstops and twenty-four inches (24") for larger curbstops. The cover of the box shall be by "Mueller" with the two- hole cover. The word "WATER" shall be inscribed on the cover of the box. Both the cover and the upper section of the box shall be able to be located with an aqua-type metal locator.

F. BUILDING SERVICE CONSTRUCTION METHODS

The Contractor shall make all necessary taps into the watermain and will install for each unit an approved brass corporation stop.

The Contractor shall also connect the type "K" copper service pipe to the flanged joint, which shall be connected to the brass type curbstop with inlet and outlet for the appropriate type "K" copper service pipe. Such curbstop shall be located not less than six feet (6') below the ground surface and shall be accessible from the surface through an approved valve box.

Unit Connections: The unit connections shall be made by installing three-fourths inch (3/4") type 'K' copper pipe or approved equal on the end of the approved brass curbstop and proceeding through the cellar wall to an approved three-forths inch (3/4") meter spacer with spuds furnished by the Municipality and installed by the Contractor in accordance with good plumbing practices.

1.9 CONSTRUCTION METHODS

A. INSPECTION AND TESTING

All pipe and fittings shall be inspected and tested in accordance with the manufacturer's specifications and the aforementioned AWWA Specifications. The Contractor shall furnish for approval certification from the pipe manufacturer that all tests have been performed with satisfactory results. Pipe shall not be installed without the Engineer's or Water Authority's approval.

B. INSTALLATION

Pipes, fittings, and accessories shall be carefully handled to avoid damage. Prior to the date of acceptance of the project work by the Owner, the Contractor shall replace any new pipe or accessory found to be defective at any time, including after installation, at no expense to the Owner. All installation and testing shall be done in accordance with AWWA Standard C-600 and ANSI Specification A21.11.

All pipes showing cracks shall be rejected. If cracks occur in the pipe, the Contractor may, at his own expense and with the approval of the Engineer, cut off the cracked portions at a point at least twelve inches (12") from the visible limits of the crack and use the sound portion of the pipe. All pipes and fittings shall be cleared of all foreign matter and debris prior to installation and shall be kept clean until the time of acceptance by the Owner.

At all times, when the pipe laying is not actually in progress, the open ends of the pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed. The pipe shall be installed in trenches and at the line and grade shown on the Contract Drawings.

Any deflection joints shall be within the limits specified by the manufacturer. All piping and appurtenances connected to the equipment shall be supported so that no strain will be imposed on the equipment. If the equipment manufacturer's specifications include that piping loads are not to be transferred, the Contractor shall submit certification of compliance.

Concrete thrust blocks shall be installed on all plugs, tees, and bends deflecting 11 1/4 degrees or more. Care shall be taken to ensure that concrete will not come in contact with flanges, joints, or bolts. The required area of thrust blocks are indicated on the plans or shall be as approved by the Engineer.

Whenever sewers cross under watermains, the watermain shall be laid at such an elevation that the bottom of the watermain is at least 18 inches above the top of the sewer. This vertical separation shall be maintained for that portion of the watermain located within ten feet (10') horizontally of any sewer it crosses.

There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks which are supplied or may be supplied with a water that is, or may be, contaminated. In instances where the use of different types of pipe require joining, the Contractor shall furnish and install all necessary adapters.

All trenching safety standards shall be in conformance with all applicable State and Federal Guidelines.

The Contractor shall, at all times, keep the trenches entirely free of water until all work is finished and ready for backfilling. After the various pipelines have been installed, the trenches and other areas to be filled shall be backfilled to subgrade with, wherever possible, material excavated from the trench. No backfilling will be allowed until any concrete masonry has set sufficiently, as determined by the Engineer.

All material for backfilling shall be free of roots, stumps, and frost. Materials used for backfilling trenches shall be free of stones weighing over 30 pounds. No stones measuring over one and one-half inches (1 1/2") in the longest dimension shall be placed within one foot (1') of the pipeline being backfilled.

Backfill for all pipelines shall be placed in six inch (6") layers, each layer being thoroughly compacted to not less than 95 percent of maximum dry density as determined by the AASHTO-T-99 Standard Proctor. Particular precautions shall be taken in the placement and compaction of the backfill material in order not to damage the pipe or structure. The backfill shall be brought up evenly. All watermains shall be installed with a minimum cover depth of six (6').

Surplus excavated materials not used for backfill shall be disposed of in a manner satisfactory to the Engineer. All surplus material or spoil shall be removed promptly and disposed of so as not to be objectionable to abutters or to the general public.

The contractor shall provide a stable, temporary PVC marker approved by the Engineer at all gate valves, curb stops, and at the end of waterlines to a point six inches (6") above finish grade. The marker shall be seated securely into the ground.

C. FIELD TESTING

Except as otherwise directed, all pipelines shall be tested. Pipelines laid in excavation or bedded in concrete shall be tested prior to backfilling or the placing of concrete, and any exposed piping shall be tested prior to field painting. The Contractor shall furnish all gauges, testing plugs, caps, and all other necessary equipment and labor to perform leakage and pressure test in sections of an approved length. Each valved section or a maximum of one thousand feet (1,000') of the pipe shall be tested. All water required for testing shall be potabe. All testing shall be conducted in the presence of the Engineer.

For the pressure test, the Contractor shall develop and maintain 200 pounds per square inch for two hours. Failure to hold the designated pressure for the two-hour period constitutes a failure of the section tested. The leakage test shall be performed concurrently with the pressure test. During the test, the Contractor shall measure the quantity of water required to maintain the test pressure. Leakage shall not exceed the quantity given by:

L = SD (Square root of P) / 148,000

where: L = Leakage in gallons/hour
S = Length of pipeline tested
D = Diameter of pipe in inches
P = Average test pressure in psi

All testing shall be conducted in accordance with AWWA C-600 latest revision. Should any section of the pipe fail either the pressure or leakage tests, the Contractor shall do everything necessary to locate and repair or replace the defective pipe, fittings, or joints at no expense to the Owner.

D. DISINFECTION:

Chlorination of the watermain shall be conducted only after the main has been flushed and a clear stream is obtained as determined by the Engineer.

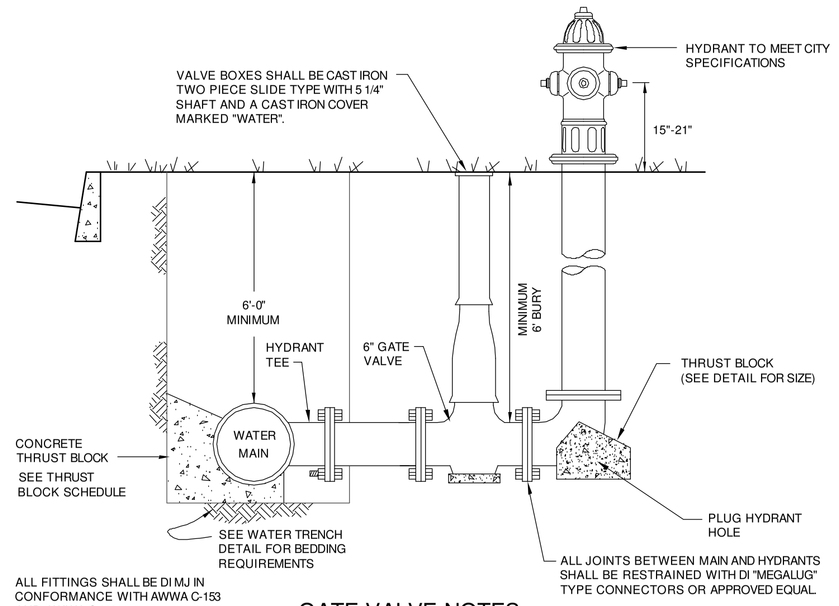
The Contractor shall furnish all labor, equipment, materials, and tools necessary to disinfect the pipe and appurtenances in accordance with the AWWA Standard for Disinfecting Watermains, C-651, with the exception of the tablet method.

The method of disinfection shall be by the continuous feed method unless otherwise approved by the Engineer. After filling, flushing, and the addition of chlorine solution, the free chlorine concentration within the pipe shall be at least 25 mg/l. The chlorinated water shall remain in the main for a period of at least 24 hours. At the end of this period, the treated water in all portions of the main shall not have a residual of less than 10 mg/l of free chlorine. All disinfection shall be performed under the supervision of the Engineer. The disinfection process shall be deemed acceptable only after (2) samples of water from the flushed, disinfected main taken by the Engineer and tested at an approved laboratory show no evidence of bacteriological contamination. Disinfection shall conform to the latest AWWA C-651 revision.

The pipeline and appurtenances shall be maintained in an uncontaminated condition until final acceptance. Disinfection shall be repeated when and where required at no expense to the Owner until final acceptance by the Owner.

E. FROST PROTECTION OF SHALLOW WATERLINES

Waterlines with less than six feet (6') of cover over the crown, or where indicated on the plans, shall be protected against freezing by installation of two inch (2") thick Styrofoam SM insulating sheets with a total width of four feet (4') or twice the pipe diameter, whichever is greater. The sheets shall be placed six inches (6") above the crown of the main after compaction of the six inch (6") lift immediately above the crown. Care shall be exercised by the Contractor during backfill and compaction over the styrofoam sheets to prevent damage to the sheets. Styrofoam SM sheets shall meet the compressive strength requirements of ASTM D1621-73 and shall be as manufactured by Dow Chemical Company, Midland, Michigan, or equivalent. In no case shall the waterlines have less than four feet (4') of cover over the top of the pipe.



HYDRANT DETAIL

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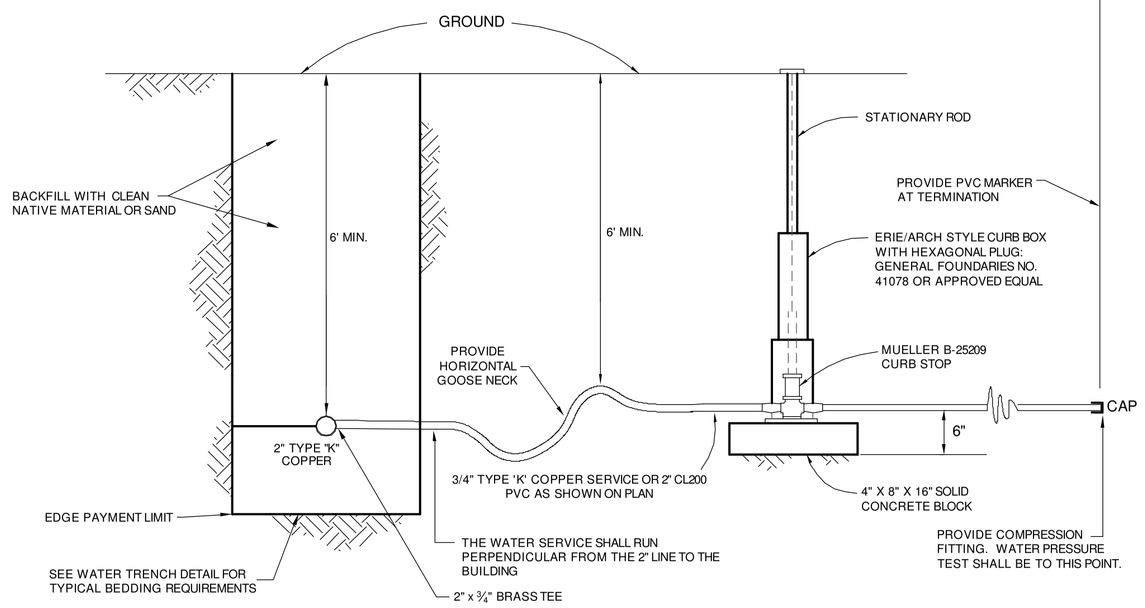
GATE VALVE NOTES

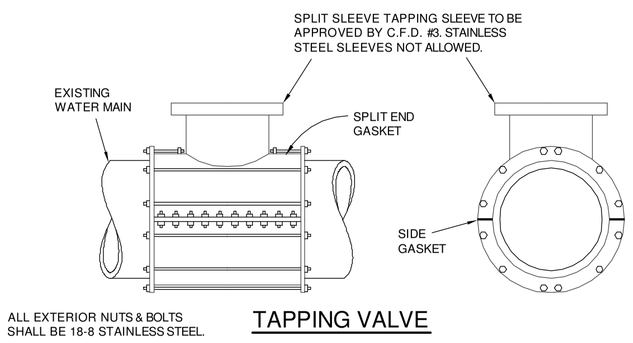
1. GATE VALVES SHALL CONFORM TO AWWA C500.
2. THE GATE VALVES SHALL OPEN LEFT AND BE DESIGNED FOR A WORKING PRESSURE OF 200 PSI
3. ALL GATE VALVES SHALL BE OF CAST OR DUCTILE IRON BODY, PARALLEL BRASS SEATS, NON-RISING STEM, INSIDE SCREW, RESILIENT WEDGE CONSTRUCTION WITH "O" RING STEM SEALS.
4. ALL VALVES SHALL BE EQUIPPED WITH A VALVE BOX FOR A MINIMUM OF 5' OF COVER MATERIAL.

NOTE:
ALL DOMESTIC SERVICES AND DOMESTIC FIRE SPRINKLER SYSTEMS THAT ARE CONNECTED TO THE PUBLIC WATER SYSTEM SHALL BE PROTECTED ACCORDING TO THEIR DEGREE OF HAZARD, WITH A BACKFLOW PREVENTION ASSEMBLY, WITH AN APPROPRIATE THERMAL EXPANSION SYSTEM.



WATER SERVICE DETAIL

NTS



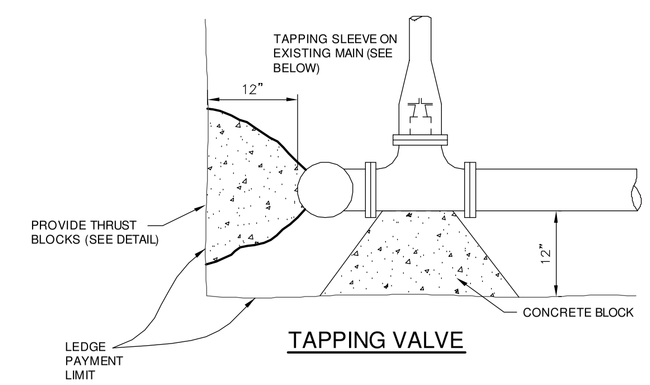
TAPPING VALVE

NOTES:

1. TAPPING SLEEVES SHALL BE OF THE SPLIT SLEEVE DESIGN CONSTRUCTED WITH TWO SOLID HALF-SLEEVES BOLTED TOGETHER SLEEVES SHALL BE CONSTRUCTED OF DUCTILE IRON, SHALL HAVE A WORKING PRESSURE OF AT LEAST 150 PSI, AND SHALL HAVE MECHANICAL JOINT ENDS AND SIDE GASKET SEALS.
2. ALL IRON BODY TAPPING SLEEVES SHALL BE PROVIDED WITH A 3/4" NPT TEST PLUG, OR OTHER PROVISIONS MUST BE MADE FOR AIR TESTING THE VALVE AND SLEEVE AT MAXIMUM WORKING PRESSURE, PRIOR TO TAPPING.
3. ALL BOLTS AND NUTS FOR FLANGED JOINTS OF TAPPING SLEEVES SHALL BE OF AISC TYPE 304 STAINLESS STEEL.
4. ALL EXTERIOR BOLTS AND NUTS FOR TAPPING SLEEVES OR VALVES SHALL BE STAINLESS STEEL.
5. ALL BOLTS AND NUTS SHALL BE SOUND, CLEAN, AND COATED WITH A RUST RESISTANT-LUBRICANT; THEIR SURFACES SHALL BE FREE OF OBJECTIONABLE PROTRUSIONS THAT WOULD INTERFERE WITH THEIR FIT IN THE MADE-UP MECHANICAL OR FLANGED JOINT.
6. ALL EXTERIOR EXPOSED SURFACES SHALL BE FUSION BOND, EPOXY COATED TO A MINIMUM OF 10 MIL THICKNESS.
7. ALL BOLTS AND NUTS USED WITH ALL PIPE SLEEVES SHALL, UPON FINAL TIGHTENING AND TESTING, BE BRUSH COATED HEAVILY WITH BITUMASTIC COLD-APPLIED MATERIAL TO THOROUGHLY COVER ALL EXPOSED SURFACES OF THE BOLTS AND NUTS.

TAPPING VALVE and SLEEVE DETAIL

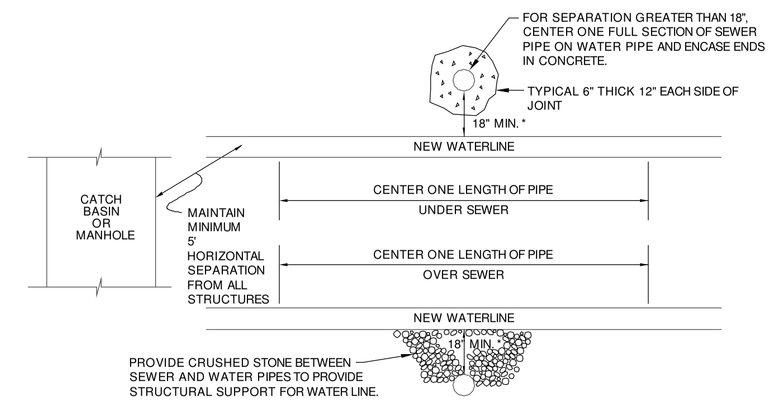
NTS



TAPPING VALVE

TAPPING VALVE SHALL CONFORM TO ANSI/AWWA 0509-87 STANDARD FOR RESILIENT-SEALED GATE VALVES FOR WATER AND SEWAGE SYSTEMS, EXCEPT AS MODIFIED HEREIN. VALVES SHALL OPEN COUNTERCLOCKWISE AND SHALL HAVE A MINIMUM WORKING PRESSURE OF 200 PSI. INLET FLANGES SHALL BE CLASS 125 CONFORMING TO ANSI SPECIFICATION B16.1 OR ANSI/ AWWA C110/A21.10, AND OUTLET CONNECTIONS SHALL BE STANDARDIZED MECHANICAL JOINTS.

BURIED TAPPING VALVES SHALL BE PROVIDED WITH A 2" SQUARE WRENCH NUT AND SHALL BE INSTALLED WITH A CAST IRON VALVE BOX AS REQUIRED TO ALLOW POSITIVE ACCESS TO THE VALVE OPERATING NUT AT ALL TIMES. IN INSTALLATIONS WHERE THE DEPTH FROM GRADE TO TOP OF VALVE IS GREATER THEN 6' 0", A VALVE STEM RISER SHALL BE PROVIDED AND INSTALLED SUCH THAT THE DEPTH FROM VALVE STEM RISER NUT TO GRADE IS FROM 4' 0" TO 6' 0" (MINIMUM LENGTH OF VALVE STEM RISER IS 2' 0"). VALVE STEM RISER SHALL BE OF HIGH STRENGTH STEEL AND OF WELDED CONSTRUCTION.



VERTICAL SEPARATION AT CROSSINGS:

SEWERS CROSSING WATER MAINS SHALL BE LAID BENEATH THE WATER MAIN WITH AT LEAST 18" VERTICAL CLEARANCE BETWEEN THE OUTSIDE OF THE SEWER AND THE OUTSIDE OF THE WATER MAIN. WHEN IT IS IMPOSSIBLE OR IMPRACTICAL TO MAINTAIN THE 18" VERTICAL SEPARATION OR WHERE THE SEWER MUST BE LAID ABOVE THE WATER MAIN, THE FOLLOWING CRITERIA APPLY:

(A) THE CROSSINGS SHALL BE ARRANGED SO THAT ONE FULL LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATER LINE WITH SEWER JOINTS AS FAR AS POSSIBLE FROM WATER JOINTS;

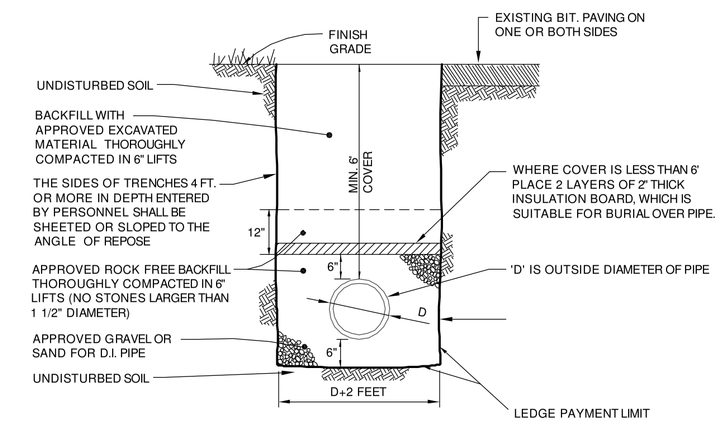
(B) THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN STANDARDS FOR A MINIMUM DISTANCE OF 20 FEET EITHER SIDE OF THE CROSSING OR A TOTAL OF THREE PIPE LENGTHS, WHICHEVER IS GREATER;

(C) THE SECTION CONSTRUCTED TO WATER MAIN STANDARDS MUST BE PRESSURE TESTED TO MAINTAIN 50 PSI FOR 15 MINUTES WITHOUT LEAKAGE PRIOR TO BACKFILLING BEYOND ONE FOOT ABOVE THE PIPE, TO ASSURE WATER TIGHTNESS;

(D) WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.

SEWER / WATER SEPARATION DETAIL FOR CROSSINGS

NTS



TYPICAL WATER TRENCH DETAIL

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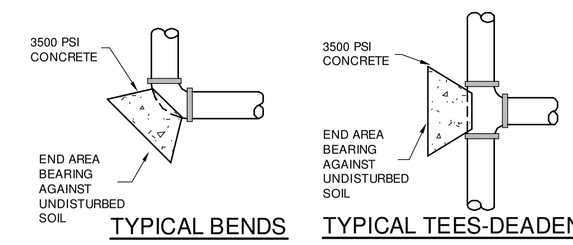

TYPICAL BENDS

TYPICAL TEES-DEADENDS-CAPS

NOTE: PLACE 4 mil POLYETHYLENE BETWEEN FITTING AND THRUST BLOCK

THRUST BLOCK END AREA
SOIL TYPE - SAND

SIZE / FITTING	6"	8"	12"
11 1/4 & 22 1/2	2	2	5
45°	2	4	9
90°	4	8	17
TEES OR END CAPS	3	6	12
VALVES	2	2	2

SQ FT BEARING AREA

BASED ON 100 PSI WORKING PRESSURE PLUS 100 PSI SURGE ALLOWANCE AND BEARING CAPACITY OF 2000 LBS/SQ FT

THRUST BLOCK DETAIL

NTS

Date	Revision	By
4-1-15	REVISED FOR PRELIMINARY RE-FILING TO CITY	DLH
5-24-11	ADD EASEMENT AND CONVEYANCE TO CITY	DLH
4-4-11	REVISE LAYOUT	DLH
10-29-10	REVISE LAYOUT	DLH
8-26-10	GENERAL REVISIONS PER COURT APPEAL	DLH
9-11-09	REVISED PERVIOUS CONCRETE DETAILS	DLH
7-13-09	REVISED LIGHTING AND LANDSCAPING	DLH
1-9-08	REVISED DRIVEWAY LAYOUT	DLH
10-5-07	REVISED LAYOUT	DLH
8-7-07	REVISED LAYOUT	DLH

These plans shall only be used for the purpose shown below:

- ☐ Sketch/Concept
- ■ Preliminary
- ☐ Final Local Review
- ☐ Act 250 Review
- ☐ Construction
- ☐ Record Drawing

NOT FOR CONSTRUCTION

Lands of
Tim Alles & Bill Ellis
Ethan Allen Parkway, Burlington, Vermont

A PLANNED RESIDENTIAL DEVELOPMENT
WATER
DETAILS AND SPECIFICATIONS

LAMOUREUX & DICKINSON
Consulting Engineers, Inc.
14 Morse Drive
Essex Junction, VT 05452
Tel: 802-878-4450

proj. no. 07028
survey Others
design DLH
drawn SEA
checked DJG
date 04/09/07
scale N.T.S.
sht. no. 10 of 11

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