WATER SUPPLY SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:
1. Pipe Materials
2. Hydrants
3. Valves
4. Fittings
5. All other appurtenances necessary to complete the water main system as shown on the Contract Plans.

1.02 SUBMITTALS

A. Product Data: Submit published data from manufacturers of products and accessories specified, indicating compliance with requirements to the Engineer and local municipality.

1.03 QUALITY ASSURANCE

A. All materials and the installation procedure shall be in accordance with the Department of Environmental Conservation, Water Supply Division and the applicable construction ordinances of the local municipality.

PART 2 – PRODUCTS

2.01 GENERAL

A. Furnish ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of the same type and class of material as the conduit, or of material having equal or superior physical and chemical properties as acceptable to the Engineer as necessary to complete the water system.

2.02 DUCTILE IRON WATER PIPE

A. Pipe shall be Ductile Iron Class 52 (sizes as shown on the plans) conforming to current ANSI/AWWA C151/A21.51 latest revision. Larger size mains will be required if necessary to allow withdrawal of the required fire flow while maintaining the minimum pressure specified in the VT Water Supply Rule, Chapter 21, 8.1.1. Any proposed departure from minimum requirements shall be justified by hydraulic analysis and future water use assessment, and will be considered only in special circumstances (VT Water Supply Rule, Chapter 21 8.1.4). Push–on joint pipe shall be minimum thickness Class 52. Push–on joint accessories shall conform to applicable requirements of ANSI/AWWA C111/A21.11. All ductile iron pipes shall have polyethylene encasement in accordance with ANSI/AWWA C105/A21.5

B. Pipe shall be cement mortar lined on the inside in accordance with ANSI Specification A21.4 except that the cement lining thickness shall not be less than 1/8 inch. A plus tolerance of 1/8 inch will be permitted.

C. Pipe shall be given an exterior petroleum asphaltic coating in accordance with ANSI AWWA C151/ANSI A21.51.

D. When a pipe material is specifically noted on the contract drawings,the contractor/developer shall not have the option of utilizing any other pipe material. Galvanized pipe or fittings shall not be used in any water system owned or maintained by the Town of Shelburne.

The Town of Shelburne reserves the option to use pvc waterline meeting the requirements of AWWA C–900 (DR–14).

2.03 FITTINGS

A. Ductile iron fittings shall conform to ANSI/AWWA C110/A21.10, 350 PSI working pressure. 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 larger than twelve inches (12"). Ductile iron fittings shall be rated for 250 p.s.i. However, twelve inch (12") and smaller may be rated for 350 p.s.i. with the use of special gaskets. All ductile iron compact fittings shall conforming to AWWA/ANSI C153/A21,53 standards.

B. Anchor tees shall be standard mechanical joint tees except that the branch is plain Class 250 cast iron or Class 350 ductile iron, cement lined, conforming to ANSI/AWWA C110/A21.10, C111/A21,11, and C104/A21.4. Anchor tees shall be Clow F–1217, U.S. Pipe U5–92 or equal.

C. Mechanical Joint restraints shall be incorporated into the design of the follower gland and shall include a restraining mechanism which, when actuated, imports multiple wedging action against the pipe increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron, and have a minimum working pressure of 350 psi. Twist off nuts (i.e. mega–lug) or equal shall be used to ensure proper actuating of the restraining devices. Contractors may also use approved grip ring (or equal) retainer glands.

D. Bolts shall conform to ANSI Specification A21.10.

E. Pipeline couplings shall conform to AWWA Standards C110 and ANSI A21.10. Mechanical joint connecting peices of proper diameter shall be installed in accordance with the manufacturer recommendations and at locations directed by the plans or the Town of Shelburne.

F. All fittings shall be wrapped in plastic and have concrete thrust blocks poured in place.

2.04 TAPPING SLEEVES AND VALVES

A. The Town of Shelburne shall be notified whenever a proposed tap is to be made on any Town of Shelburne water line.

B. Only approved tapping companies shall be allowed to perform wet taps on any Town of Shelburne water mains.

2.05 TAPPING SLEEVES

For use on existing asbestos cement, gray cast iron, ductile iron or PVC C–900 pipe:

A. 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 200 psi, and shall have mechanical joint ends with end and side gasket seals.

B. 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.

C. All bolts and nuts for mechanical joints of tapping sleeves shall be of high–strength cast iron or high–strength, low–alloy steel conforming to ANSI/AWWA C111/A21.11.

D. All bolts and nuts for flanged joints of tapping sleeves shall be AISC Type 304 stainless steel.

E. 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.

2.06 TAPPING VALVES

A. Tapping valves shall conform to ANSI/AWWA C509 Standard for Resilient–Seated 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 connection shall be Standardized Mechanical Joint unless specified otherwise on the drawings for the type of pipe required for the branch or lateral pipeline.

B. Tapping valves over sixteen inches (16") diameter shall be installed with their stems horizontal, shall be equiped with rollers, tracks and scrapers, and shall be provided with bypass valves unless otherwise specified.

C. Buried tapping valves shall be provided with a two inch (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 operating nut is greater than 6'0", a valve stem riser shall be provided and installed such that the depth from valve stem riser nut to grade is from four feet to six feet (4'–6'), (minimum length of valve stem riser is two feet (2')). Valve stem riser shall be of high strength steel and of welded construction.

D. 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.

2.07 GATE VALVES–RESILIENT SEAT

A. Valves shall be manufactured to meet all requirements of AWWA Specification C509. Valves twelve inches (12") and smaller shall be bubble tight, zero leakage at 200 psi working pressure. Valves shall have non–rising stems, open counter clockwise, and provide a two inch (2") square operating nut with arrow cast in the metal indicating 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. Gate valves shall be Mueller, Dresser, Kennedy, or approved equal.

B. Buried valves shall be installed with a gate valve box.

C. Gate valves shall normally be placed a maximum of five hundred feet (500') apart. Tee intersections shall have a minimum of three (3) gate valves. Cross sections (foru way intersections) shall have a minimum of four (4) valves.

D. The Town of Shelburne may require all bolts, studs and nuts be made from a corrosion resistant–material such as low–zinc, nickel–copper alloy or stainless steel in known or suspected corrosive soil conditions.

2.08 VALVE BOXES

A. Valve boxes shall be of the three–piece Cast iron slide–type with a minimum inside shaft diameter of five and one quarter inches (5 1/4") and a six foot (6') trench depth. Valve boxes shall not transfer loads onto the valve.

B. Valve boxes shall have a cast iron cover, marked "WATER". The boxes shall be dirt tight with the top of the cover flush with the top of the box rim.

2.09 FIRE HYDRANTS AND HYDRANT BRANCHES

A. Fire hydrants shall be Mueller Super Centurion 250, Figure A–423, Kennedy K–81 D, shall conform to AWWA C502 with the following specifications:
1. Main Valve Opening: 5 1/4 inches
2. Nozzle Arrangement: Two 2 1/2 inch Hose Nozzles with National Standard Thread (NST)
3. One 4 1/2 inch Pumper Nozzle with National Standard Thread (NST)
4. Inlet Connection: 6 inch Mechanical Joint, "Mega–Lug" or equivalent retaining gland and concrete thrust block
5. Operating Nut: Standard 1 1/2 inch Pentagon
6. Direction of Opening: Counterclockwise
7. Depth of Bury: Six–foot cover. The hydrant shall have at least 15 inches and no more than 21 inches between the bottom of the steamer cap and the ground.
8. Drain: The hydrant shall be non–draining or have the drains permanently plugged.
9. Color: Red enamel
10. Other: Hydrants shall be compression type closing with the pressure. Hose and pumper nozzles shall be 1/4 turn type secured by stainless steel or corrosion resistant pins or screws. Pressure seals behind the nozzle flanges shall be "O" rings. A breakable coupling retained in place by stainless steel or corrosion resistant pins shall make the union between the upper and lower stems. The two–piece traffic flange shall be held in place by nuts and bolts. The upper barrel shall be able to rotate 360 degrees without removing any bolts. Hydrant flags shall be required and supplied for each hydrant. Wherever a traffic hazard appears to exist, curbing and/or bollards shall protect the hydrant.

B. For single–family house subdivisions, there will be at least one hydrant at each intersection and a maximum of five hundred feet (500') between hydrants with a minimum water flow of 500 gallons per minute (gpm) at the flow hydrant with a 20–psi residual pressure at the residual hydrant. Hydrants should be located immediately adjacent to street property lines. A 20' x 20' easement will be required around all hydrants. No structures or plantings are to be placed within a 20' x 20' area of any hydrant.

C. Where dead–end mains occur, they shall be provided with a fire hydrant if flow and pressure meet minimum requirements. If flows and pressure are not sufficient, then an approved flushing hydrant or blow off shall be installed for flushing purposes. Flushing devices should be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. The open end of a blow off must be capped and terminate at least eighteen inches (18") above grade.

D. When set in lawn space between the curb and sidewalk, no portion of the hydrant or nozzle cap will be less than one foot off the gutter face of the curb or edge of the sidewalk. Hydrants shall be a minimum of four feet (4') and a maximum of six feet (6') from the edge of the sidewalk to the closest point on the hydrant when placed behind the sidewalk. In the absence of a curb or sidewalk, no hydrant shall be placed more than six feet (6') from the edge of pavement. Hydrants shall be located so as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.

2.10 HYDRANT ASSEMBLIES

A. Hydrant assemblies shall consist of an anchor tee, a six inch (6") mechanical joint gate valve conforming to the above specifications, the appropriate length of six inch (6") Ductile Iron Cement Lined, Class 52 pipe, all necessary anchor couplings and approved restraining glands, the fire hydrant and appropriate thrust block.

B. Care shall be taken to prevent damage to hydrants and appurtenances during handling and installation. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign material cleaned out of the hydrant bowl; all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. All hydrants shall be carefully incorporated in the water main and supported in their respective positions free from distortion and strain. Hydrants shall be set plumb. All hydrants shall be oriented to most efficiently allow fire truck access and connection for emergency purposes. They shall be installed away from the curb line at sufficient distance to avoid damage from or to vehicles. Traffic model hydrants shall be installed so the breakaway flange is not less than two inches (2"), nor more than six inches (6") above the established grade, according to manufacturer recommendations. Hydrant locations are subject to the approval of the Town of Shelburne and the appropriate municipality's fire department. Installation for fire hydrants can be found in AWWA Standard C600.

2.11 BLOW–OFF ASSEMBLIES

A. Blow–off assemblies will be constructed as detailed in the drawings. They shall consist of an anchor tee, a six inch (6") mechanical joint gate valve conforming to these Specifications, the appropriate length of six inch (6") Ductile Iron Cement Lined, Class 52 pipe, all necessary anchor couplings, approved restraining glands, MJ and flanged fittings, and cap or rodent screen. Smaller blow–off assemblies may be allowed with approval of the Town of Shelburne.

B. Blow–offs shall not be connected to any sewer, submerged in any stream or ditch, or installed in any manner that will permit back siphonage into the distribution system. The open end of the blow–off must be capped and terminate at least eighteen inches (18") above grade (VT Water Supply Rule, A–8.1.7).

2.12 SERVICE CONNECTIONS

A. Service lines shall be installed so as to run perpendicular, in a straight line from the water main to the curb stop.

B. Each service shall consist of a corporation, curb stop, copper tubing and a curb box with a cast iron or stainless steel service rod. Service lines from three–quarter to two inch (3/4" to 2") shall be copper tubing from the corporation stop to the curb stop. Copper tubing shall be 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. Copper service pipe shall be one piece from the corporation to the curb stop. The minimum service for a single–family residence shall be three–quarter inch (3/4"). The minimum service for a duplex shall be one inch (1").

C. Corporations shall be Mueller 110 (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 the same size. Three–quarter inch and one–inch corporations shall be directly tapped into ductile iron pipe six inches (6") and larger in diameter. Larger size corporations up to two inches (2") shall use a tapping saddle. Pipe less than six inches (6") shall require the use of a tapping saddle and corporation. Corporations shall be used for all taps up to two inches (2"). In no instance, except when a tapping sleeve and valve are used, shall a tap be made without a corporation. Corporations shall be Mueller H–15008 (3/4" – 1"), or Mueller H 15013 (1 1/2" – 2"). A connection made to a pipe that requires a tapping saddle or is not ductile iron will have a body with a suitable outlet, seal, and suitable means for attachment to the main. The body shall be made to conform to the outside configuration of the main. The service saddle shall be designed to provide a drip tight connection. The body shall be Teflon or Epoxy coated with stainless steel strap(s), bolts, nuts, and mechanism for attaching to the pipe barrel.

D. Curb stops shall be a quarter turn plug type valve with an o–ring type seal and manufactured in accordance with AWWA C800. The curb stop shall open left, have a positive stop, and be of the tee design or flat design. No curb stop shall have the ability to drain the service line. Both the inlet and outlet of the curb stop shall have compression type fittings. The tee head of the curb stop shall have the provision for the connection of a service rod. Curb stops shall be Mueller Oriseal III. The curb stop shall rest on a four inch by eight inch by sixteen–inch (4" x 8" x 16") concrete block for support. Curb stops shall be installed just inside the municipality or AOT R.O.W.

E. Curb boxes shall be of sliding adjustable type Erie style with 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 on the curb stop. The adjustable upper section shall be one inch (1") diameter for use with 3/4" and 1" curb stops. For larger curb stops, the upper section shall be 1 1/4" in diameter. Stationary rods affixed to the key of the curb stop with a brass pin shall be thirty inches (30") in length for 3/4" and 1" curb stops and twenty–four inches (24") for large curb stops. Curb box rods may be stainless steel.
The word "WATER" shall be inscribed on the cover of the box. The cover of the box shall have countersunk brass pentagon plug for paved or concrete areas, and standard two holes for grass areas. Curb box couplings and extensions will be the same material as the curb box. Both cover and upper section of the box shall be able to be located with an aqua type metal locator.

F. All service connections shall be installed to the curb stop for all building lots before the street is paved.

2.13 BACKFLOW PREVENTION DEVICES

A. No water service connection shall be approved or maintained by Town of Shelburne unless the water supply is protected as required by State laws, regulations and ordinances. The type of protective device shall depend on the degree of hazard that exists. In general, backflow devices designed to protect potable water supplies in accordance with national plumbing codes for non–health hazard cross connections and continuous pressure applications shall be used, i.e. Watts Series 007 or approved equal. Watts Series 709 Double Check Valve Assembly or approved equal shall be installed on all sprinkler systems. A shop drawing detail assembly showing backflow devices and meter placements shall be required by the Town of Shelburne.

2.14 ROCK EXCAVATION

A. Areas of known or suspected ledge may require subsurface investigation to determine its extent prior to job commencement, at the contractor's expense. A pre–blast survey shall be required prior to blasting.

B. Rock shall be excavated, when encountered, to the lines and grades indicated on the drawings or as directed by the Town of Shelburne. Excavated material shall be disposed of and acceptable material shall be furnished for backfill in the space voided by the excavated rock.

C. Rock in pipe trenches shall be excavated to a depth not less than six inches (6") lower than the bottom of the installed pipe. When so specified or indicated, or when laying the pipe in an excavated rock area, the trench shall be backfilled with satisfactory material listed and approved under Pipe Bedding.

D. Blasting shall be in full compliance with all State and Federal laws and local ordinances. Take all possible care to avoid injury to persons and damage to property. The rock is to be well covered with blasting mats and sufficient warning given to all persons in the vicinity of the work before blasting. Care shall be taken to avoid damages to utilities or other structures above and below ground.

E. No blasting will be permitted under or adjacent to any street, road, or highway unless permission has been received in writing by the authority having jurisdiction.

F. Conform to all municipal, State, Federal and other ordinances and codes relating to the storage and handling of explosives. Particular attention is called to adherence of requirements of the electric, gas and other utilities that may be located in the project area.

G. Damages and cost of whatever nature resulting from blasting operations shall be borne solely by the contractor.

H. If rock below grade is shattered by blasting, caused by holes drilled too deep, or too heavy charges of explosives, or any other circumstance due to blasting, and if such shattered rock does not provide suitable foundation, the rock shall be removed and the excavation refilled with acceptable material by and at the expense of the contractor.

2.15 PIPE BEDDING

A. Water lines shall be laid and maintained on lines and grades established by the plans for the project. Pipeline trenches shall be excavated to the width and depths shown on the plan typicals. Pipeline trenches in which pipe is to be laid directly on the trench bottom shall not be excavated entirely by machinery, but shall be finally excavated by hand tools such that the trench shall have a bottom shaped to support the pipe throughout its entire length by firm and undisturbed material. Pipeline trenches, for which bedding is required, may be excavated to the required depths using machinery. No pipe shall be laid directly on ledge, hard shale or a very compact glacial till. When an unstable trench bottom is encountered and the Town of Shelburne determines that it cannot support the pipe adequately, an additional depth shall be excavated and refilled to the pipe invert with approved material at the contractor's expense. Pipeline trenches shall be dry during the laying of pipe. Wood supports under pipe shall be removed prior to backfilling. Pipeline installation procedures can be found in AWWA Standard C600.

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D. Curb stops shall be a quarter turn plug type valve with an o–ring type seal and manufactured in accordance with AWWA C800. The curb stop shall open left, have a positive stop, and be of the tee design or flat design. No curb stop shall have the ability to drain the service line. Both the inlet and outlet of the curb stop shall have compression type fittings. The tee head of the curb stop shall have the provision for the connection of a service rod. Curb stops shall be Mueller Oriseal III. The curb stop shall rest on a four inch by eight inch by sixteen–inch (4" x 8" x 16") concrete block for support. Curb stops shall be installed just inside the municipality or AOT R.O.W.

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F. All service connections shall be installed to the curb stop for all building lots before the street is paved.

2.13 BACKFLOW PREVENTION DEVICES

A. No water service connection shall be approved or maintained by Town of Shelburne unless the water supply is protected as required by State laws, regulations and ordinances. The type of protective device shall depend on the degree of hazard that exists. In general, backflow devices designed to protect potable water supplies in accordance with national plumbing codes for non–health hazard cross connections and continuous pressure applications shall be used, i.e. Watts Series 007 or approved equal. Watts Series 709 Double Check Valve Assembly or approved equal shall be installed on all sprinkler systems. A shop drawing detail assembly showing backflow devices and meter placements shall be required by the Town of Shelburne.

2.14 ROCK EXCAVATION

A. Areas of known or suspected ledge may require subsurface investigation to determine its extent prior to job commencement, at the contractor's expense. A pre–blast survey shall be required prior to blasting.

B. Rock shall be excavated, when encountered, to the lines and grades indicated on the drawings or as directed by the Town of Shelburne. Excavated material shall be disposed of and acceptable material shall be furnished for backfill in the space voided by the excavated rock.

C. Rock in pipe trenches shall be excavated to a depth not less than six inches (6") lower than the bottom of the installed pipe. When so specified or indicated, or when laying the pipe in an excavated rock area, the trench shall be backfilled with satisfactory material listed and approved under Pipe Bedding.

D. Blasting shall be in full compliance with all State and Federal laws and local ordinances. Take all possible care to avoid injury to persons and damage to property. The rock is to be well covered with blasting mats and sufficient warning given to all persons in the vicinity of the work before blasting. Care shall be taken to avoid damages to utilities or other structures above and below ground.

E. No blasting will be permitted under or adjacent to any street, road, or highway unless permission has been received in writing by the authority having jurisdiction.

F. Conform to all municipal, State, Federal and other ordinances and codes relating to the storage and handling of explosives. Particular attention is called to adherence of requirements of the electric, gas and other utilities that may be located in the project area.

G. Damages and cost of whatever nature resulting from blasting operations shall be borne solely by the contractor.

H. If rock below grade is shattered by blasting, caused by holes drilled too deep, or too heavy charges of explosives, or any other circumstance due to blasting, and if such shattered rock does not provide suitable foundation, the rock shall be removed and the excavation refilled with acceptable material by and at the expense of the contractor.

2.15 PIPE BEDDING

A. Water lines shall be laid and maintained on lines and grades established by the plans for the project. Pipeline trenches shall be excavated to the width and depths shown on the plan typicals. Pipeline trenches in which pipe is to be laid directly on the trench bottom shall not be excavated entirely by machinery, but shall be finally excavated by hand tools such that the trench shall have a bottom shaped to support the pipe throughout its entire length by firm and undisturbed material. Pipeline trenches, for which bedding is required, may be excavated to the required depths using machinery. No pipe shall be laid directly on ledge, hard shale or a very compact glacial till. When an unstable trench bottom is encountered and the Town of Shelburne determines that it cannot support the pipe adequately, an additional depth shall be excavated and refilled to the pipe invert with approved material at the contractor's expense. Pipeline trenches shall be dry during the laying of pipe. Wood supports under pipe shall be removed prior to backfilling. Pipeline installation procedures can be found in AWWA Standard C600.

B. Bedding material shall consist of crushed or natural stone conforming to ASTM D2321.

Sieve	Percent Passing
1" Screen	100%
3/4" Screen	100%
1/2"	90 – 100%
3/8" Screen	40 – 70%
No. 4 Sieve	0 – 15%

C. Bedding and blanket material shall be Class II material (ASTM D2321) consisting of clean, granular material (sand), particle size limits described as follows:

Sieve	Percent Passing
No. 4	100%
No. 100	30%
No. 200	12%

2.16 PIPELINE INSULATION

A. Approved waterlines with less than five feet (5') of cover over the crown, that cross a storm sewer, or where indicated on the plans, shall be protected against freezing by the installation of four inch (4") thick highest available density extruded polystyrene insulating sheets or equivalent. Sheets shall be the total width of the trench, for a typical four foot (4') trench. The sheets shall be placed six inches (6") above the crown after placement of four to six inches (4" – 6") of clean medium or coarse sand below the pipe bottom and four to six inches (4" – 6") above the crown. Joints shall be overlapped so there is no gap that will allow frost to penetrate. Care shall be exercised during backfill and compaction over the polystyrene sheets to prevent damage to the sheets. The polystyrene sheets shall meet the comprehensive strength requirements of ASTM D1621–73. In no cases shall the waterline have less than four feet (4') of cover over the top of the pipe.

2.17 POLYETHYLENE PIPE ENCASEMENT

A. Polyethylene pipe encasement may be required in areas of corrosive soils and shall conform to current ANSI/AWWA C105/A21.5 Specifications. Minimum material requirements for the polyethylene film shall be high density, cross laminated virgin polyethylene 4 mil film. The Town of Shelburne reserves the right to specify Polyethylene pipe, C–900, in areas of corrosive soils.

B. The polyethylene encasement shall prevent contact between the pipe or fittings and the surrounding backfill and bedding material and shall be installed as outlined in Section 4.1 of the above ANSI/AWWA standard.

2.18 CONCRETE FOR THRUST BLOCKS

A. Concrete shall be Portland Cement concrete of 2,500 psi minimum 28 day compressive strength. ASTM C–94 specification for transit mixed concrete shall control the concrete quality. A maximum water cement ratio of 6 gallons per sack and a maximum slump of four inches (4") will be allowed.

2.19 INSTALLATION

A. Contractors shall notify the Town of Shelburne and Dig Safe at least seven days prior to any work on the water system.

B. Skilled workers experienced in such work shall install all items. Tools shall be adequate for the work and in good condition so as to produce good, clean cut threads of the correct size, pitch, and taper.

C. Installation of all water lines shall be in accordance with the latest version of AWWA C600.

D. Connection to an existing water main shall be done under the supervision of and with the approval of the Town of Shelburne. It is the applicant's, developer's, or owner of record's responsibility to secure ALL necessary connection permits and pay ALL applicable fees to make the connection, and to coordinate all parties involved in the process. The engineer and the Town of Shelburne shall be notified at least two working days in advance of the intended connection time. No existing valves, hydrants, curb stops, etc. shall be operated without prior approval of the Town of Shelburne. The Town of Shelburne shall operate all valves initially to ensure the integrity of the valve. The Town of Shelburne may then allow the contractor to operate those valves. Any damage occurring after the use of any valve operated by the contractor shall be the contractor's responsibility.

E. Care shall be taken to prevent damage to valves and other appurtenances during handling and installation. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign matter cleaned out of valve openings, etc.; all operating mechanisms operated to check their proper functioning, and all other nuts and bolts checked for tightness. Valves and other equipment, which do not operate easily, or are otherwise defective, shall be replaced. All valves shall be carefully incorporated into the water main and supported in their respective positions free from all distortion and strain. Valves and valve boxes shall be set plumb. Valve boxes, besides being plumb, shall be centered directly over the valves.

F. All pipes showing cracks shall be rejected. If cracks occur in the pipe, the contractor may, at his own expense and after approval of the Town of Shelburne, cut off 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.

G. All water mains shall have no less than six feet (6') of cover unless waived by the Town of Shelburne. The pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be laid so as to form a close joint with the next adjoining pipe and to bring the inverts continuously to the required grade. In no cases shall the waterline have less than four feet (4') of cover over the top of the pipe.

H. Temporary support, adequate protection, and maintenance of all underground structures, drains, sewers and other obstructions encountered in the progress of the work shall be provided at all times. If utility service is interrupted as a result of work for the project, the contractor shall immediately restore service by repairing the damaged utility at the contractor's expense.

I. At all times, when 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. During construction, the contractor shall conduct operations so as to prevent the accumulation of water, ice, and snow in the vicinity of excavations or in the vicinity of excavated areas, and to prevent water from interfering with the progress and quality of the work.

J. Under no conditions shall water be allowed to rise in open trenches after pipe has been laid.

K. Accumulated water, ice, and snow shall be promptly removed and disposed of by pumping or other approved means. Disposal shall be carried out in a manner that will not create a hazard to public health, nor cause injury to public or private property, work completed or in progress, or public streets. Disposal shall not cause any interference in the use of streets and roads by the public. Pipes under construction shall not be used for drainage of excavations.

L. Any deflection of joints in pipe up to twelve–inch (12") diameter shall be within the limits specified by the manufacturer, but not to exceed five degrees or nineteen inches (19") per eighteen feet (18') of pipe length.

M. Concrete thrust blocks shall be installed on all hydrants, plugs, tees, and bends deflecting 11 1/4 degrees or more. Concrete thrust blocks shall be used in conjunction with "Mega–Lug" restraining glands or equivalent. Care shall be taken to ensure that concrete will not come into contact with flanges, joints, or bolts. The required area of thrust blocks shall be indicated on plan typicals and approved by the Town of Shelburne. Concrete shall be placed against undisturbed soil. Wooden side forms or equal shall be provided for thrust blocks. No backfilling shall be allowed until concrete masonry has set sufficiently. Where directed by the Town of Shelburne or engineer, concrete encasement of the waterline may be made for stream crossings and similar purposes. Where required on the plans or as directed by the Town of Shelburne or engineer, a concrete cradle shall be used to bolster and strengthen the pipe. The Town of Shelburne or his designee shall inspect all thrust blocks prior to backfilling.

N. All trenching safety standards shall be in conformance with all applicable State and Federal guidelines. The contractor shall be solely responsible for any safety citations by State or Federal inspectors.

O. There shall be no physical connection b
system and any pipes, pumps, hydrant
supplied with water that is, or may be,

P. As necessary, temporary PVC markers
gate valves, curb boxes, and at the en
minimum of twelve inches (12") above
accepted by the Town of Shelburne.

Q. All surplus material and debris shall be
progresses, leaving all areas clean and

R. Unless otherwise required, all paving an
damaged during construction shall be r
kind of material that previously existed

S. The contractor shall be responsible for
persons and property on the project.
barricade open holes and depressions
work, and post warning lights on adjac
public access.

T. Warning lights shall be operated during
and as otherwise requested.

U. The contractor shall protect structures,
pavements, and other facilities from d
settlement, lateral movement, washout,
created by construction operations.

V. No water lines shall be installed after
April 1 without prior approval of the T
The Town of Shelburne may restrict
work before November 15 and after Ap
weather conditions. The Town of Shelb
may not allow excavating for water ma
the winter months except by special p

2.20 BACKFILLING

A. Trenches shall be backfilled to subgrade
material excavated from the trench, a
the approval of the Town of Shelburne.
backfilling shall be free of roots, stum
not be placed on frozen material. Ma
trenches shall be free of stones weigh
pounds. No stones measuring over th
longest dimension shall be placed with
pipeline being backfilled. Stones found
removed for a depth of at least six in
of the pipe. In general, use of blaste
not be permitted.

B. Backfill material shall be tamped in lay
sufficient height above the pipe to ade
protect the pipe. Backfill for pipelines
inch (12") lifts, each lift being compac
maximum dry density as determined b
Standard Proctor. If conditions warran
trenches may be done with mechanical
precautions shall be taken in the place
the backfill material in order not to d
coating or structure. The backfill shal
Around valve boxes, the backfill shall b
four feet (4') on all sides of the box,
face, if less than four feet (4'). Back
shall be so compacted as to leave no
Additional backfill requirements may ap
Right–of–Ways. All public road surfac
condition at least equal to that which
construction. Precautions shall be tak
to existing surface materials.

C. No compacting shall be done when the
compacted properly. At such times th
until the previously placed and new m
sufficiently to permit proper compactio
precautions are taken as may be nece
compaction.

D. Surplus excavated materials shall be di
manner. Surplus material or spoil sha
and disposed of so as not to be obje
general public.

E. Trenches that have been improperly ba
covered before inspection of fittings a
and re–backfilled at the contractor's e

2.21 WATER/SEWER SEPARATION

A. Water mains crossing sewers shall be l
vertical distance of eighteen inches (1
the water main and the outside of the
the case where the water main is eith
sewer. At crossings, one full length o
both joints will be as far from the sew
vertical separation shall be maintained
water main located within ten feet (10
it crosses. Water mains must be laid
horizontally from any existing or propo
feet (10') from any existing or propose

B. When it is impossible to obtain horizon
on new installations, both the water m
be constructed of waterworks material
shall be pressure tested before backfil
required for one or both mains in addi
material. Lines may also be encased
the Retail Superintendent. No water m
come in contact with any part of a se

C. Distribution lines shall not be placed cl
horizontal distance from any septic ta
approved by the VT Water Supply Rule
Chapter 21.8.6.4 or the Town of Shelb

D. Force main crossing shall be arranged
length of sewer pipe is centered above
with the sewer joints as far as possib
The new force main line shall be cons
standards for a minimum of twenty fe
crossing. The section constructed to
be pressure tested to maintain 50 psi
without leakage prior to backfilling. In
cover cannot be provided, proper insul

E. Sewer and waterline separation shall co
Supply Rule requirements, and installed
latest edition of the "Ten States Stan
Standards for Water."

2.22 TESTING AND DISENFECTION

A. All water mains shall be constructed, t
accordance with AWWA Standards C–6
The Vermont Water Supply Rule. Mini
shall be 1.5 times the working pressur
200 psi, whichever is greater, and will
lowest elevation in the length of the p
Maximum allowable leakage will be:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$ as outlined in

Where: L = allowable leakage, in gallon
S = length of pipe tested, in f
D = nominal diameter of the p
P = average test pressure duri
per squa

1. Testing: All tests shall be conducte
of the Contractor. The Engineer w
pertaining to the test methods an
2. Hydrostatic Test of Pipeline: The pi
laterals, shall be tested in accorda
C–600–87 Section 4.
3. Disinfection: Disinfection of the pi
by the Engineer and at the Contra

STEPHEN A. VOCK
#5226

Date	Ch'k'd	
		Shelbu Sheet

Drawn by ACL
Checked by SAV
Approved by

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