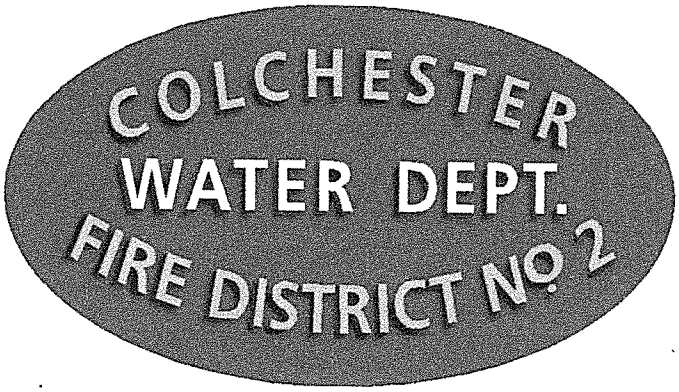


Specifications and Details for the Installation Of Water Lines and Appurtenances

Colchester Fire District No.2

838 Church Road, PO Box 4, Colchester, VT. 05446

August 2018

Forward

I. INTRODUCTION

a. Background

i. Colchester Fire District No.2 is a municipal water supplier for the Town of Colchester. Colchester is divided into three (3) fire districts. Each district is responsible for its own water system. CFD No.2 serves the area known as Malletts Bay.

b. History

i. Colchester Fire District No.2 was formed in 1952. This happened because the community knew there was a need for fire protection. At that time the Town of Colchester could not form a fire department. So, the town was divided into three separate Fire Districts. Each District would be responsible for fire protection in their area. District No2. Formed the Malletts Bay Fire Department for fire protection. For 14 years MBFD would fight fires without the use of fire hydrants because there was no water system. In 1966, District No2. Decided to build its water system. CFD No.2 would purchase water from the City of Burlington and pipe it across the Heineberg Bridge for distribution to the community.

ii. In 1991, the District installed a one million gallon tank on the Diversity Hill off from West Lakeshore Drive. There was a need for water reserves for fire protection in the growing community.

iii. In 2004, a fully programmable automatic telemetry system was installed. This system controls how much water is in the tank by automatically turning on and off valves in Burlington. It also controls 2 booster pumps that were installed to help increase flows when needed.

c. Use of these Specifications

i. These specifications shall apply to any or all CFD No.2 water system components.

ii. These specifications are considered the minimum acceptable standard specifications for the CFD N0.2 water system. The acceptability of any deviations from these standards shall be determined or approved by the CFD No.2 Administrator.

iii. All products incorporated in the work/design shall be subject to review and / or the requirement of a submittal by CFD No.2. The submittal of any item shall include sufficient information for a determination of acceptability by CFD No.2. At a minimum, the information will include a description of the item, detailed materials

information or reference to universally recognized standards (AWWA, ANSI, ASTM, etc.), a description of the methods to be used for construction and any testing necessary to verify the quality of the installation. It is not the intent of this document to prevent alternative solutions; however, the burden of proof for acceptability of alternate solutions lies with the party proposing the substitution.

iv. These specifications shall consist of policies, guidelines, and required procedural steps related to the excavation, installation, backfill, and testing required for water line construction. It shall also include detailed material specifications and typical details that are necessary for a complete water system. Materials and installations shall be inspected and approved by CFD N0.2 or their representative before potable water is supplied to the project infrastructure.

v. All references to AWWA, ANSI, ASTM or the Vermont Water Supply Rule shall be the most recent edition available, at the time of construction.

II. VARIATIONS

a. The Colchester Fire District No2. Specifications and Details for the Installation of Water Lines and Appurtenances (CFD No.2 Specifications) are applicable to all new construction and reconstruction of water infrastructure. Variations from the CFD No.2 Specifications will not be permitted except as provide for herein.

Table of Contents

Table of Contents

GENERAL SPECIFICATIONS

1.00 PLANS AND DESIGN

1.01. One complete set of construction drawings and specifications for the proposed water system expansion or rehabilitation shall be prepared and submitted by a licensed professional engineer registered in the State of Vermont to the Colchester Fire District No.2 Administrator.

1.02. Drawings shall be on a detailed, workable print (24" x 36"), and drawn to scale. Drawings shall contain a location map, plan and profile, type of materials to be used, locations of existing and proposed utilities, and necessary water system components required for a complete installation. Typical details and material and installation specifications shall be provided with all drawings. Construction drawings and specifications shall be submitted for review to the CFD No.2 Administrator during the preliminary design review process. At each stage of a project's development, engineering plans are required to be reviewed to determine compliance with all water specifications and standards. The level of engineering detail required for approval generally increases with each stage of project approval. All construction drawings and specifications shall have a note stating, "All work to be performed in accordance with the Colchester Fire District No.2 Specifications and Details for the Installation of Water Lines and Appurtenances." Upon receipt of acceptable final engineering plans, the CFD No.2 Administrator will approve the plans for construction.

1.03. Any project involving tapping the water main for services one and one-half (1½) inches and larger shall have drawings submitted to the CFD No.2 Administrator for review.

1.04. No water main extensions or alterations will be constructed within the CFD No.2 owned water distribution system without the approval of the CFD No.2 Administrator. All contract documents shall meet these specifications as well as any of the applicable Rules and Regulations of the CFD No.2

1.05. The applicant must state the purposes for which the water shall be required, and shall agree to conform to the CFD No.2 Rules and Regulations and these Specifications. No person supplied with water from the CFD No.2 system's mains will be entitled to use it for any other purpose other than those stated. Requests for any other water use shall require a separate application.

1.06. The project shall be constructed, completed, maintained, and operated in accordance with the approved plans. No changes shall be made in the project without the approval of CFD No.2.

1.07. All water mains, appurtenances and other materials, and construction methods shall conform to the most recent edition of all applicable AWWA, ANSI, ASTM, State and Local codes, standards and regulations, and the VT Water Supply Rule. In the case of conflict between these construction details and specifications, project drawings, and a code or regulation, it shall be resolved to the satisfaction of CFD No.2.

1.08. The applicant, developer or owner of record shall procure all permits, licenses, and easements that may be required to complete planned construction, including payment of all applicable fees, and shall comply with all conditions set forth in each permit in accordance CFD No.2's project review requirements.

1.09. At least fourteen (14) days before the start of actual construction of any utilities or improvements in CFD No.2's water system, the applicant, engineer, owner, or contractor shall notify the CFD No.2 Administrator of their intent to proceed, and shall arrange a pre-construction meeting with the CFD No. 2 Administrator or Operator, applicant, engineer, and the contractor to discuss the project. Pre-construction meetings shall take place a minimum of seven (7) days prior to the start of the actual work.

1.10. The applicant, developer or owner of record, beyond gaining approval of the contract documents by CFD No.2, shall also be responsible for any permit issued or work completed under these specifications. The project applicant, or owner shall keep CFD No.2 advised of the address to which bills, notices, and other communications are to be delivered, and shall provide an emergency contact list effective throughout the construction period.

1.11. All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system should be approximately 60 psi and not less than 35 psi (VT Water Supply Rule, 8.1.1).

1.12. All service connections and water mains shall be buried to a depth no less than five feet six inches (5' 6") to the top of the pipe, and no more than eight feet (8') unless waived by CFD No.2.

1.13. Looping of mains shall be done if at all possible, with the intent of avoiding dead-ends. Dead-ends should only be installed if (1) looping is impractical due to topography, geology, pressure zone boundaries, unavailability of easements or locations of users; or (2) the main will be extended in the near future, and the planned extension will eliminate the dead-end connection. In this condition the water main extension shall be continuous to the furthest property line of the project. A dead-end water main whether

temporary or permanent shall have a fire hydrant or flushing hydrant installed at the end, unless approved otherwise by CFD No.2.

1.14. In general, and unless stated otherwise in each Municipality's Rules, Regulations, Specifications, Ordinances, or Planning and Zoning requirements, easements of sufficient width shall be provided at locations acceptable to the Municipality if required. Easements for gas, telephone, electrical, and cable TV and private utilities should be located away from water lines and appurtenances wherever possible. The easement deed shall contain language that specifically indemnifies, and holds the water system owner harmless from any obligations, liabilities or claims arising from the existence of such easement or the construction of any utility within the easement, as well as wording preventing the construction of buildings or structures above the water line or within the water line easement.

1.15. All construction documents shall consider adequate fire protection and domestic service pressure. In the event a new extension cannot meet those requirements, the applicant or developer shall loop the waterlines, add a storage tank, provide booster pumps, or make other approved provisions to meet the requirements. The requirement to install the above appurtenances does not imply that CFD No.2 shall take ownership of the required provisions. Ownership shall be determined within the course of plan reviews, in accordance with CFD No.2's, regulations, specifications, ordinances.

1.16. There shall be no connection between the water distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system (VT Water Supply Rule, Appendix A, Chapter 21.8.8.1.).

1.17. CFD No.2 shall be notified in advance to inspect all mechanical joint fittings, main line taps, appurtenances, thrust blocks, and water line crossings prior to occurrence of back filling.

1.18. The project engineer and /or contractor shall notify CFD No.2 no less than two (2) working days in advance of any proposed testing of any completed mains. Attendance of all testing is at the discretion of CFD No.2; however the absence of CFD No.2 representatives does not relinquish any of the above requirements. No testing shall be performed on weekends or legal holidays.

1.19. When unexpected subsurface conditions or conflicts with underground infrastructure are encountered that could affect the designed water line project, the Contractor must report the changed conditions to the Design/Project Engineer and CFD No.2 before the work is allowed to proceed.

1.20. In the case of the reconstruction of existing facilities or disruption due to the installation of new utilities, the contractor/developer/owner shall be required to upgrade impacted portions of the existing water system to the standards outlined in these CFD No.2 Specifications. These upgrades shall also be required when new construction impacts existing infrastructure. It is the intent of the CFD No.2 to address all conflicts during the design stage of a project, however field changes to this regard may be required at the discretion of CFD No.2.

1.20.01. There is a significant amount of Asbestos Cement (AC) or Transite water pipe within the CFD No.2 water system. There are a number of regulations that affect work involving AC pipe. It is the responsibility of the project engineer and contractor to insure that all work associated with AC pipe is performed by qualified personnel and in accordance with all applicable State and Federal regulations. Costs associated with any and all labor and materials to properly handle and dispose of existing AC pipe is the responsibility of the project owner.

1.21. If at any time during construction the CFD No.2 representative or their designee feels that improper materials, equipment, labor, safety provisions or traffic control is being utilized he/she may direct verbally and/or in writing that the situation be corrected at once. If the situation is not corrected, CFD No.2 may implement a stop work order. This may cause further construction to be terminated pending compliance.

1.22. CFD No.2 reserves the right to direct the contractor to "dig up" any installation not meeting these requirements or that have been installed without prior approval or inspection, at the contractors expense.

1.23. No parallel underground utility (ex. phone, electric, cable, gas) shall be designed or installed within four feet (4') of the water main from either side, or above the water main from the bottom of the main to finish grade. Storm sewer and sanitary sewer separations are only as allowed in Section 31.00 of these specifications and the VT Water Supply Rule. No building or structure shall be built above the water line or within the water line easement. All projects that may cross or impact existing transmission or water distribution lines shall include the requirement to field verify all water associated infrastructure that may be impacted.

1.24. Prior to final acceptance and at the conclusion of the warranty period the following shall occur:

1.24.01. The CFD No. 2 representative or his designee will conduct a preliminary walk-through inspection of the construction project and prepare a "punch-list" of identified deficiencies which the Contractor will promptly address.

1.24.02. Upon completion of the construction project or any phase of the project, "Record Drawings" shall be supplied to CFD No.2 in the form of one (1) hard copy and one (1) electronic copy in PDF Format. All Record Drawings are to include valve and curb stop ties and valve and curb stop coordinates to sub-meter accuracy.

1.24.03. The contractor shall repair, replace or retest promptly as directed by CFD No.2 and without further charges to the water system owner, all work, equipment, materials or parts, which may fail during the warranty period.

1.24.04. Final acceptance shall not take place until CFD No.2 has determined that complete record information has been received and all required improvements have been satisfactorily completed.

TECHNICAL SPECIFICATIONS

2.00 DUCTILE IRON PIPE

2.01. Ductile Iron Pipe is required on CFD No.2 system projects.

2.02. Pipe shall be ductile iron with a minimum diameter of eight inches (8") unless waived by CFD No.2, and conform to current AWWA C151 or ANSI Specification A21.51 for all distribution mains. 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, 8.1.2. 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).

2.03. Push-on joint pipe shall be minimum thickness class 52. Pipe shall be cement mortar lined on the inside in accordance with ANSI A21.4 and AWWA C104 except that the cement lining thickness shall not be less than one-eighth inch (1/8"). A plus tolerance of one-eighth inch (1/8") will be permitted.

2.04. Ductile iron pipe shall be given an exterior petroleum asphaltic coating in accordance with ANSI AWWA C151/ANSI A21.51

2.05. Four-inch (4") and six-inch (6") DI pipe shall have no less than two (2) brass wedges installed at each joint. Eight-inch (8") and larger DI pipe shall have no less than three (3) brass wedges installed at each pipe joint. Conductivity bonds may be installed in place of wedges.

2.06. When a pipe material is specifically noted on the approved project drawings, the contractor/developer shall not have the option of utilizing any other pipe material.

2.07. Galvanized pipe or fittings shall not be used in the CFD No.2 water system.

3.00 POLYVINYL CHLORIDE (PVC) PIPE

3.01. Where approved by the CFD No.2 Administrator, PVC pipe may be used for limited main line installations, such as but not limited to:

3.01.01. Areas with corrosive soils.

3.02. When approved for use, PVC pipe and fittings will meet and be installed in accordance with ANSI AWWA specification C900 current edition.

3.03. Where PVC is used within the CFD No.2 water system, all service connections shall require a tapping saddle. Only tapping saddles manufactured specifically for PVC pipe shall be used. The service saddle shall be designed to provide a drip tight connection. The body shall be Teflon or Epoxy coated Ductile Iron with double stainless steel straps, bolts, nuts, and mechanism for attaching to the pipe barrel (see Section 8.10). The maximum outlet size with a service saddle shall be two-inch (2"). Narrow U-bolt-type straps and saddles having lugs that dig into the pipe wall shall be prohibited.

3.04. PVC pipe must be AWWA C900 Class DR14. Pressure rating of 305 (psi).

3.05. A continuous tracer wire must be connected to the top of all pipes.

3.06. Tracer wire boxes shall be installed whenever PVC pipes are used.

4.00 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

4.01. Where approved by the CFD No.2 Administrator, HDPE pipe may be used for limited main line and service line installations, such as but not limited to:

4.01.01. Remote undevelopable areas with corrosive soils.

4.01.02. Unstable soil conditions.

4.01.03. Directional bores.

4.02. When approved for use, HDPE pipe and fittings will meet and be installed in accordance with ANSI AWWA specification C901, C906 current edition.

4.03. A continuous tracer wire must be connected to the top of all HDPE pipes.

4.04. Tracer wire boxes shall be installed whenever HDPE pipes are used.

5.00 DUCTILE IRON WATER MAIN INSTALLATION

5.01. The installation of ductile iron water lines shall conform to AWWA Standard C600, current edition.

5.02. The water main shall be laid and maintained on lines and grades established by the contract documents for the project, or as defined within these Specifications. Fittings and appurtenances shall be installed at the required locations unless approved otherwise by CFD No.2. Prior to excavation, an investigation may be required to determine the location of existing underground structures and conflicts.

5.03. Discharges from the trench shall be directed away from the trench to prevent trench instability. Excavated materials shall be placed in a manner that will not obstruct the work nor endanger workers or the public nor obstruct sidewalks, driveways, roadways, or other structures. Pavement and road surfaces shall be removed as part of the trench excavation. The amount removed shall depend on the width of trench required for the installation of the pipe and appurtenances, unless otherwise approved by the CFD No. 2 representative. Trenches shall be wide enough to permit the placement of a trench box, sheeting, bracing, and appurtenances as required by safety requirements.

5.04. When excavation of rock is necessary, all rock shall be removed to provide a clearance below the pipe, valves, and fittings of twelve-inches (12") and on all sides of at least eighteen-inches (18"), see typical A18. A layer of appropriate backfill shall be placed on the bottom of the trench to the appropriate depths, then leveled and tamped after excavation is complete. Specified clearances shall be maintained between the bottom of the pipe and any part, projection, or point of rock, boulder, or stone of sufficient size and placement that could cause a fulcrum point or point load.

5.05. If the trench passes over a previous excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.

5.06. When the excavated material is found to include ashes, cinders, refuse, organic material, or other unsuitable material, this material shall be removed to a minimum of at least twelve-inches (12") below the bottom of the pipe. The removed material shall be replaced with clean, stable backfill material as approved by CFD No.2.

5.07. The proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of pipe installation. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench using a

backhoe, crane, tagged lifting chains, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings.

5.08. All pipes, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for final disposition.

5.09. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.

5.10. When pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means specified. When practical the plug shall remain in place until the trench is pumped completely dry. All precautions shall be made to prevent flotation of the pipe in the trench.

5.11. All dead ends of new mains shall be closed with plugs or caps; such dead ends shall be equipped with suitable blow off facilities.

5.12. All new water mains shall be filled at a maximum velocity of 1ft/sec while venting air.

6.00 FITTINGS

6.01. All fittings shall be Ductile Iron with a 350 pounds working pressure, and shall conform to AWWA/ANSI C110/A21.10.

6.02. All fittings shall be domestic made in accordance with the Buy American Act, unless otherwise approved.

6.03. Pipe shall be inserted squarely into all fittings. No deflection will be allowed from any hydrant, tee, valve, or bend.

6.04. Anchor tees (aka: Hydrant tees and Swivel tees) shall be Class 350 ductile iron, cement lined, conforming to AWWA/ANSI C110/A21.10, C111/A21.11, and C104/A21.4. In lieu of Anchor tees, Mechanical Joint tees may be used if a Foster Adaptor is used to secure the valve directly to the branch of the tee. If a Mechanical Joint tee is to be used, it shall conform to the above referenced specifications.

6.05. Mechanical Joint restraints shall be incorporated into the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe increasing its resistance as the pressure increases. Glands shall be manufactured of ductile iron, and have a minimum working pressure of 350 psi. Twist off nuts shall be used to ensure proper actuating of the restraining devices.

Torque wrenches shall be used to tighten all bolts to manufacturer's specifications.

6.05.01. Mechanical joint retainer glands shall be domestic made and be either EBAA Iron MegaLug, Ford Uniflange Series 1400, Romac RomaGrip or approved equal.

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

6.07. Foster adapters shall be installed in all close-coupled connections of mechanical joint fittings and valves where a positive restraint mechanism is required. Foster adapters shall not be installed directly on hydrant shoes.

6.08. Pipeline couplings shall conform to AWWA C110 and ANSI A21.10. Mechanical Joint Connecting pieces of proper diameter shall be installed in accordance with the manufacturer recommendations and at locations directed by the plans or CFD No.2. Solid sleeve couplings shall be used when joining new pipes or like materials. Hymax couplings may be allowed when joining dislike pipe materials or new and old pipe connections.

6.09. All fittings shall be restrained; double poly wrapped and have concrete thrust blocks poured in place as defined herein.

6.10. Fittings located on the interior of vaults are to be #125 Flange fittings unless otherwise approved by CFD No.2.

7.00 CFD No.2 CONNECTION POLICY

7.01. **Definitions:** As used in these regulations the following definitions shall apply.

7.01.01. Connection: the act of direct tapping an existing water main, "cutting in" a tee and valve, or connecting to a previously installed tee and/or valve; all connections are solely at the cost of the applicant.

7.01.02. Completed Connection: a connection that has passed all required testing which may entail but is not limited to; visually inspected, hydraulically pressure tested, suitably restrained, and substantially backfilled.

7.01.03. Connection Fee: shall be a charge levied for permission to connect to a water main owned and maintained by Colchester Fire District No.3, and shall be prepaid by the applicant.

7.02. Those wishing to connect to or tap a water line within the CFD No.2 system must contact the CFD No.2 Administrator.

7.03. Any connection to or tapping on a line shall be made only after:

7.03.01. The appropriate written application has been made to Colchester Fire District No.2.

7.03.02. Written approval has been granted by CFD No.2. Application forms can be found in Appendix B.

7.03.03. The assessed connection fee has been paid to CFD No.2.

7.03.04. Appropriate prior notification; a minimum of three (3) working days, has been given to CFD No.2 regarding the date and time that the connection is to take place.

7.04. The connection can only take place in the presence of a CFD No.2 employee.

7.05. Connections shall be made by CFD No.2 approved contractors only. Work will only be allowed after a current certificate of insurance is provided by the tapping contractor.

7.06. Connections will only be permitted between the hours of 7:00am and 3:00pm and only on regular CFD No.2 business days. All connections must be completed by 3:00pm; connections that cannot be completed by 3:00pm may be suspended and completed the following business day. A suspended tap may entail back filling the excavation until the following day. CFD No.2 personnel have the authority to suspend connections that they deem cannot be completed within the time period stated above.

7.07. Excavations for connections shall comply with safety requirements outlined in Section 27.00, Protection of the Public and Work Personnel of these specifications. CFD No.2 personnel have the authority to suspend connections that they deem do not comply with applicable VOSHA Guidelines.

7.08. No connection shall be located within 3 pipe diameters of any other fitting or pipe joint.

7.09. In the case of conflict between the CFD No.2 Specifications, construction details, and specifications or codes, it shall be resolved to the satisfaction of the appropriate CFD No.2 representative.

8.00 TAPPING SLEEVES AND TAPPING VALVES

8.01. Only approved tapping companies shall be allowed to perform wet taps on any CFD No.2 owned water main. A current list of approved companies can be obtained from CFD No.2.

8.02. Taps shall be a minimum of three pipe diameters away from any joint, other tap, or fitting in the water line being tapped. Example: If tapping a 12" water

line the tapping saddle must be a minimum of 36" away from the nearest joint in the 12" water line.

8.03. All tapping sleeves shall be provided with a ¾" NPT test plug, for Hydrostatic testing of the valve and sleeve assembly. The test pressure shall be at 200 psi or not exceed the rated working pressure of any of the fittings. The sleeve and valve assembly shall hold the determined test pressure for a minimum of 30 minutes without any pressure drop. Any leaks or other problems must be remedied before the pipe is tapped.

8.04. CFD No.2 will require the use of poly wrap on water mains that are in corrosive or hot soils.

8.05. Direct taps over twelve inches (12") in diameter shall **not** be allowed. Connections that require taps larger than twelve inches (12") in diameter shall be direct tee and valve cut-ins, unless otherwise approved by CFD No.2.

8.06. All materials used when tapping for a branch connection or interconnection from any CFD No.2 owned water main shall be as specified below:

8.07. **Ductile Iron Tapping Sleeves**:

8.07.01. AWWA C110/C153 (latest version) compliant Ductile Iron tapping sleeves shall be used on all CFD No.2 owned Ductile Iron and Cast Iron water mains when the tap is 4" in diameter or larger.

8.07.02. 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 250 psi, and shall have mechanical joint ends with end and side gasket seals.

8.07.03. 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 (latest version).

8.07.04. All bolts and nuts for flanged joints of tapping sleeves shall be of high-strength, low carbon steel conforming to ANSI/AWWA C110/A21.10 (latest version).

8.07.05. All bolts and nuts shall be sound, clean, and coated with a rust resistant lubricant; and their surfaces shall be free of objectionable protrusions that would interfere with their fit in the made-up mechanical or flanged joint.

8.08. **Stainless Steel Tapping Sleeves:**

8.08.01. ANSI/AWWA C223 (latest version) compliant Stainless Steel tapping sleeves shall be used on all CFD No.2 owned Asbestos Cement and PVC C900 and HDPE water mains.

8.08.02. Tapping sleeves shall be stainless steel with mechanical joint or flanged outlets as approved by CFD No.2.

8.09. **Tapping Valves:**

8.09.01. Tapping valves shall conform to ANSI/AWWA C509 (latest version) Standard for Resilient-Seated Gate Valves for Water Supply Service. Valves shall open counterclockwise (left) and shall have a minimum working pressure of 200 psi. Inlet flanges shall be Class 125 conforming to ASME B16.1 or ANSI/AWWA C110/A21.10 (latest version), 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.

8.09.02. Gate valves used to convey or dispense water for human consumption shall comply with the Vermont Law (Act 193) An Act Relating to Prevention of Lead Poisoning By Exposure to Lead in Consumer Products, and shall contain no more than 0.25% lead by weighted average. Fixtures containing brass must comply with NSF/ANSI 61 and 372.

8.09.03. Tapping valves for Stainless Steel Tapping Sleeves shall be manufactured to meet all requirements of ANSI/AWWA C509 current edition.

8.09.04. 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 (2") square operating nut with an arrow cast in the metal indicating direction of opening.

8.09.05. All valve body bolts shall be stainless steel.

8.09.06. Each valve shall have the maker's name, pressure rating and year in which it was manufactured cast on the body. Valves shall be mechanical joint on each end. 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, Kennedy, AFC or approved equal on all water mains.

8.09.07. Tapping valves over twelve inches (12") diameter shall NOT be allowed.

8.09.08. 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 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 five feet (5'), a valve stem riser shall be provided and installed such that the depth from the valve stem riser nut to grade is from four feet to five feet (4'-5'). Valve stem risers shall be of high strength stainless steel and of welded construction (see detail A19).

8.09.09. All contractors (or others) who apply to CFD No.2 for water line taps shall submit complete specifications of the tapping material they intend to use at the time the CFD No.2 Tapping Application Form is submitted.

8.10. **Tapping Saddles (3/4" through 2"):**

8.10.01. Bodies shall be Ductile Iron per ASTM A536

8.10.02. Bodies shall have a fusion bonded epoxy or approved equal finish.

8.10.03. Body threads shall be CC per AWWA C800.

8.10.04. Bands are to be constructed of grade 304 stainless steel and have a minimum width of 2".

8.10.05. Bolts and nuts are to be constructed of grade 304 stainless steel.

8.10.06. Tapping Saddles shall be used only for the following: Ductile Iron and Cast Iron pipe for taps 1 ½" or 2" in size, All PVC and HDPE pipe, All AC pipe.

8.10.07. A connection made to a pipe that requires a tapping saddle or that 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. Service saddles with a two-inch outlet shall not be used on a two-inch main. Service saddles must meet manufacturers' guidelines and recommendations for specific pipe materials.

9.00 GATE VALVES- RESILIENT SEAT

9.01. Valves shall be manufactured to meet all requirements of AWWA C509 or C515 latest edition. 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 (left) and provide a two (2") square operating nut with an arrow cast in the metal indicating direction of opening. Each valve shall have the maker's name, pressure rating and year in which it was manufactured cast on the body. Valves shall be mechanical joint on each end, and secured to the adjoining pipe with an approved retainer

gland. 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, Kennedy, AFC, or approved equal on water distribution mains.

9.02. Gate valves used to convey or dispense water for human consumption shall comply with the Vermont Law (Act 193) An Act Relating to Prevention of Lead Poisoning By Exposure to Lead in Consumer Products, and shall contain no more than 0.25% lead by weighted average. Fixtures containing brass must comply with NSF/ANSI 61 and 372.

9.03. Buried gate 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 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 five feet (5'), a valve stem riser shall be provided and installed such that the depth from the valve stem riser nut to grade is from four feet to five feet (4'-5'). Valve stem risers shall be of high strength stainless steel and of welded construction (see detail A19).

9.04. Gate valves shall normally be placed a maximum of one thousand (1000') apart. Tee intersections shall have three (3) gate valves directly connected to all branches with the use of foster adapters (See also Section 6, Fittings). Mechanical joint cross connections (four way intersections) shall have a minimum of four (4) valves, connected with the use of foster adapters. On longer runs of pipe, valve separation of >1000' may be approved on a case-by-case basis.

9.05. All gate valve bolts, studs and nuts shall be made from corrosion resistant stainless steel.

10.00 VALVE BOXES

10.01. Valve boxes shall be of the three-piece cast iron slide type with a minimum inside shaft diameter of five and one quarter inches (5¼") and a six foot (6') trench depth.

10.02. Valve boxes shall not transfer loads onto the valve.

10.03. Valve boxes shall have a cast iron cover marked "WATER".

10.04. The boxes shall be dirt tight with the top of the cover flush with the top of the box rim.

10.05. Valve boxes located in roadways shall have one non-adjustable paving riser of a height ranging from one and a half inches (1.5") to six inches (6") as needed, to be brought to final pavement grade.

11.00 FIRE HYDRANTS AND HYDRANT BRANCHES

11.01. Fire Hydrants shall be Mueller Super Centurion 250, Kennedy K-81 D, or Waterous Pacer and shall conform to AWWA C502 with the following specifications. Note: Waterous Pacer hydrants shall be installed with a Boston Operating Nut (see detail A14).

11.02. Main Valve Opening: 5 ¼ inches

11.03. Nozzle Arrangement:

11.03.01. Two-2½ inch Hose Nozzles with National Standard Thread (NST), one approved hydrant flag.

11.03.02. One 4 inch (4") Storz Connection Pumper Nozzle.

11.04. Inlet Connection: 6 inch Mechanical Joint, "Mega-Lug" or equivalent retaining gland, and concrete thrust block

11.05. Operating Nut: Standard 1 ½ inch Pentagon

11.06. Direction of Opening: Counterclockwise

11.07. 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 pumper cap and the ground.

11.08. Hydrant Drain: The hydrant shall be non-draining or have the drains permanently plugged.

11.09. Color: Color shall be Yellow enamel.

11.10. Other: Hydrants shall be compression type closing with the pressure. Hose and pumper nozzles shall be ¼ turn type secured by stainless steel or corrosion resistant pins or screws. Pressure seals behind 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. Approve hydrant flags shall be required and placed on each hydrant at the time of installation. Wherever a traffic hazard appears to exist, curbing and/or bollards shall protect the hydrant except within municipal Right-Of-Ways.

11.11. Fire hydrants shall comply with AWWA C502 (latest version).

11.12. For single- family house subdivisions, there will be one hydrant at the beginning of the street and 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. Municipal 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. All approved subdivisions shall be installed with the same brand, make, and model of fire hydrant within the project limits.

11.13. For buildings with fire protection systems (sprinkler systems), hydrant installation shall comply with Chapter 7, Article II, Section 7-9 of the Fire Prevention and Protection Ordinance. There shall be a hydrant installed within seventy-five feet (75') of the sprinkler standpipe.

11.14. 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 shall be installed for flushing purposes. (See Section 13)

11.15. 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. Hydrants shall be located so as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians, as approved by CFD No.2.

11.16. **Hydrant Flow Test**

11.16.01. Prior to acceptance by CFD No.2, Contractors/Owners shall provide a fire flow test for each installed hydrant.

11.16.02. Fire flow test shall be witnessed and documented by a Professional Engineer and reports submitted to CFD No.2.

11.16.03. The required standard form is located in the Appendix B.

12.00 HYDRANT ASSEMBLIES

12.01. Hydrant assemblies shall consist of either a tapping sleeve and valve or 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 secured to the gate valve with an approved retainer gland, all necessary anchor couplings and approved retaining glands, the fire hydrant and appropriate thrust block.

12.02. 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. Traffic model hydrants shall be installed so that the bury line is no more than two inches (2") above established grade. Generally, fire hydrants shall not be installed within ten-feet (10') of any new or existing light pole, telephone/power pole, gas line, utility box or other utility structure. Hydrant locations are subject to the approval of CFD No.2. Installation procedures for fire hydrants can be found in AWWA C600.

13.00 BLOW-OFF ASSEMBLIES

13.01. Large diameter (4" or greater) blow-off assemblies shall consist of an anchor tee, a mechanical joint gate valve conforming to the specifications in Section 9.00, the appropriate length of Ductile Iron Cement lined, Class 52 pipe, all necessary anchor couplings, approved retaining glands, MJ and flanged fittings, and cap. The open end of a large diameter blow off shall terminate at least forty eight inches (48") above grade (See detail A4).

13.02. CFD No.2 may require the installation of a Kupferle MainGuard Model 77 two-inch (2") self-draining blow-off/flushing hydrant at various points on a water distribution line. Blow-off/flushing hydrants are typically required at the end of small diameter water lines that are not designed to support a fire hydrant. Blow-off/flushing hydrants shall be installed according to manufacturer recommendations (See detail A24). Connection to the water main shall be in accordance with Section 15.00 of these specifications.

13.03. 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.

14.00 SERVICE CONNECTIONS

14.01. Service lines on all CFD No.2 water mains shall be copper from the corporation to the curb stop. Service lines shall be installed so as to run perpendicular, in a straight line from the water main to the curb stop (See detail A13).

14.02. All service connections to mains shall comply with Section 7 of these specifications in its entirety.

14.03. Each service shall consist of a corporation, curb stop, copper tubing and an Erie style curb box with a stainless steel service rod. Service lines from three-quarter to two inch (¾" to 2") shall be copper tubing from the corporation stop to building. 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 line sizes shall be three-quarter inch, one-inch, one and one-half inch, or two-inch (¾", 1". 1-1/2", or 2").

14.04. Copper service pipe shall be one piece from the corporation to the curb stop. Services lines crossing roadways shall be required to have a curb stop on each side of the roadway.

14.05. The minimum service size for a single-family residence shall be three-quarter inch (¾"). The minimum service size for a duplex shall be one inch (1"). Service lines for single family homes and duplexes with fire sprinkler systems shall be sized appropriately for sprinkler system and domestic demands.

14.06. All underground service line valves, fittings, corporations, curb stops, meter tail setters, elbows, and angle valves shall be manufactured in accordance with AWWA Standard C-800, latest edition, and as further specified in these specifications. All service line components used to convey or dispense water for human consumption shall comply with the Vermont Law (Act 193) and must also comply with NSF/ANSI 61 and 372. Hereafter referenced as No-Lead Brass.

14.07. No-Lead brass fittings shall be by AY McDonald or Cambridge, or CFD No.2 approved equal. All No-Lead brass fittings shall have the manufacturers name or trademark integrally stamped or cast on it. Another marking, identifying the "No-Lead" brass alloy shall also be cast or stamped on the fitting.

14.08. Corporations shall have threads per AWWA C800 Table 7 / Figure 2 at the inlet, and a compression type fitting at the outlet, per AWWA C800, Figure 4. Both inlet and outlet shall be the same size. In no instance, except when a tapping sleeve and valve is used, shall a tap be made without a corporation. Corporations shall be AY McDonald or Cambridge Brass No-Lead, or CFD No.2 approved equal. Corporations shall be ball valve type with minimum allowable pressure rating of 300 psi.

14.09. Curb stops shall be a ball valve type with a minimum allowable pressure rating of 300 psi and manufactured in accordance with AWWA C800. The curb stop shall open left, have a positive stop, be full port, provide a drip-tight shutoff in the closed position, 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 AY McDonald or Cambridge Brass No-Lead, or CFD No.2 approved equal. The curb stop shall rest on a four inch by eight inch by sixteen-inch (4" x 8"x 16") solid concrete block for support. Curb stops shall be installed just inside the municipal R.O.W unless otherwise approved by CFD No.2.

14.10. Curb boxes shall be of sliding adjustable type capable of adjusting from five feet to six feet (5'-6') (Erie Style). 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 ¾" and 1" curb stops. For larger curb stops, the curb box shall be installed over a heavy foot piece. Stationary rods affixed to the key of the curb stop with a brass pin shall be thirty inches (30") in length for ¾" and 1" curb stops and twenty-four inches (24") for large curb stops. Curb box rods shall 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 those curb boxes placed in 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 a ferrous type metal locator.

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

14.12. Service connections shall be made by installing the approved service line from the curb stop/gate valve through the cellar wall or floor. A ball valve or angle valve will be installed by CFD No.2 on the end of the service line to which a CFD No.2 installed or furnished water meter shall be connected. Contractors shall be supplied meter flanges for meter connections larger than one-inch (1") to which CFD No.2 shall furnish the appropriate sized meter in accordance with CFD No.2 rules and regulations. The contractor shall be required to perform all plumbing off the downstream meter connection, including a shut off, appropriate backflow device, and recommended pressure regulator, all installed in accordance with standard plumbing practices or municipal requirements. Meters shall be installed horizontally at the point of entry into a building and before any lateral. Meters shall be installed between 12" and 48" from the floor, and 12" from any wall. Reasonable space for access shall be provided around the water meter and valving to allow for maintenance.

15.00 BACKFLOW PREVENTION DEVICES

15.01. No water service connection shall be approved by CFD No.2, unless the water supply is protected as required by State laws, and CFD No.2 system regulations and ordinances. The type of protective device shall depend on the degree of hazard that exists or may be created. Approved backflow prevention devices shall be located so as to provide containment protection at a minimum, and may be supplemented with the installation of internal protection backflow protection devices. In general, protection shall be provided by an air gap or an approved RPZ or DCV as a complete unit, installed in all commercial buildings, and a Dual Check Valve installed in residential buildings unless approved otherwise by CFD No.2.

15.02. Only the following types of backflow prevention devices shown below shall be used for the containment of commercial on-premise hazards for low and high hazard situations respectively:

Low Hazard	*High Hazard*
Air gap	Air gap
Atmospheric vacuum breaker (Where bacteria hazards aren't present)	Reduced pressure/ backflow device
Pressure vacuum breaker	Or combination of the above
Double check valve assembly	
Reduced pressure backflow device	
Or combination of the above	

15.03. In the absence of municipal backflow requirements, any domestic, commercial, institutional, and fire protection service lines, including each line of a multiple service line, and a multifamily building serving more than two units shall be equipped with an approved backflow device or an approved air gap separation on each line. All other connections to any water main, including standpipes leading to elevated tanks, temporary connections, hose connections, and irrigation systems shall be equipped with approved backflow prevention devices.

15.04. Provisions shall be made by the builder to provide for thermal expansion within a closed loop internal plumbing system (i.e. - the installation of thermal expansion devices and/or pressure relief valves).

16.00 ROCK EXCAVATION

16.01. 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 is required and shall be conducted prior to any blasting, and a written blasting plan shall be provided prior to any blasting to CFD No.2.

16.02. Rock shall be excavated, when encountered, to the lines and grades indicated on the drawings or as directed by CFD No.2. Excavated material shall be disposed of and acceptable material shall be furnished for backfill in the space voided by the excavated rock.

16.03. Rock in pipe trenches shall be excavated to a depth not less than twelve inches (12") lower than the bottom of the installed pipe, in accordance with Section 5.04. 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 (see Detail A18).

16.04. Blasting shall be in full compliance with all State and Federal laws and local ordinances. Blasting contractors shall provide a certificate of insurance and take all possible care to avoid injury to persons and damage to property. Blast areas are to be completely 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.

16.05. All blasting shall be conducted by persons qualified and experienced in drilling and controlled blasting procedures for rock excavation of the types required. Persons responsible for blasting shall be licensed blasters in the State of Vermont and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques. Drillers shall have demonstrated proficiency in collaring and drilling holes precisely. The CFD No.2 Administrator shall be notified in advance of all drilling and blasting around existing water mains.

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

16.07. Blasting contractors shall comply with 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.

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

16.09. 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.

17.00 PIPE BEDDING

17.01. 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 typical details or as defined herein.

17.02. 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.

17.03. Pipeline trenches, for which bedding is required, shall 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 excavation of rock is necessary, all rocks shall be removed to provide a clearance below all pipes, valves, and fittings of at least twelve inches (12") below and eighteen inches (18") on all sides of at least twelve-inches (12") for nominal pipe sizes up to 24". When excavation is completed, a layer of appropriate backfill material shall be placed on the bottom of the trench to the appropriate depths, then leveled and tamped. These clearances and bedding procedures shall also be observed for pieces of concrete or masonry and other debris that may be encountered during excavation. In all cases the specified clearances shall be maintained between the bottom of all pipe and appurtenances and any part, projection, or point of material of sufficient size that could cause a fulcrum point or point load.

17.04. When an unstable trench bottom is encountered and CFD No.2 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.

17.05. Pipeline trenches shall be dry during the laying of pipe. Wood supports under pipe shall be removed prior to back filling.

17.06. Pipeline installation procedures can be found in AWWA Standard C600.

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

Sieve	*Percent Passing*
1" Screen	100%
¾" Screen	100%
½"	90 – 100%
3/8" Screen	40 – 70%
#4 Sieve	0 – 15%

17.08. 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%

18.00 PIPELINE INSULATION

18.01. Approved waterlines with less than five feet (5') of cover over the crown, that cross a storm sewer, where indicated on the plans, or as required by CFD No.2, shall be protected against freezing by the installation of insulation board which is to be closed cell, extruded Polystyrene foam meeting ASTM 578, Type VI, 40 psi compressive strength (ASTM D1621) 0.1% max. Water absorption (ASTM C272).

18.02. The sheets shall be placed twelve inches (12") above the crown and twelve inches (12") from each side. Side sheets shall extend six inches (6") below the invert of the pipe (see Detail A26). The area between the pipe and insulation shall be filled with clean medium or coarse sand. No less than four inches (4") of clean medium or coarse sand shall be placed directly over the insulation sheets after they are installed. 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. In no cases shall the waterline have less than four feet (4') of cover over the top of the pipe.

19.00 POLYETHYLENE PIPE ENCASEMENT (Sleeve)

19.01. Polyethylene pipe encasement may be required in areas of corrosive soils and shall conform to the current AWWA C105/ANSI A21.5 standard. Minimum material requirements for the polyethylene film shall be high density; cross-laminated virgin polyethylene 4 mil film sleeves.

19.02. 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 AWWA/ANSI standard. Lumps of clay, mud, cinders, etc., on the pipe shall be removed prior to installation of the polyethylene encasement. During installation, soil or embedment material shall not be trapped between the pipe and polyethylene. Overlap and ends shall be secured with adhesive tape. All cuts, tears, punctures, or damage to the polyethylene shall be repaired with adhesive tape or with a short length of polyethylene sheet, wrapped around the pipe to cover the damaged area, and secured in place. Backfilling around polyethylene-wrapped pipe shall be in accordance with ANSI/AWWA C600.

20.00 CHECK VALVES

20.01. Check valves may be required in certain parts of the distribution system. Where required, check valves:

20.01.01. Shall meet ANSI/AWWA Specification C-508.

20.01.02. Shall be rated for a 250 psig working.

20.01.03. Shall have a Ductile Iron body, bonnet and disc that exceeds ASTM A-536 66-45-12.

20.01.04. Shall have a fusion bonded epoxy coating inside and out.

20.01.05. Shall not have outside lever and weights or springs.

20.01.06. Shall have the disc as the only moving part.

20.01.07. Shall have a drop tight shut off pressure as low as 5 psig.

20.01.08. Shall be suitable for buried service.

20.01.09. Shall have a 100% unobstructed flow area that is free if pockets which can trap debris.

20.01.10. Shall have a factory installed flushing actuator that can be furnished as an option.

20.01.11. Shall have a ductile iron disc fully encapsulated with Buna N rubber.

20.01.12. Shall have disc travel to closure that shall not be more than 35 degree.

20.01.13. Shall have stainless steel hardware.

20.01.14. Shall be American Flow Control Series 2100, or approved equal.

20.01.15. See details A23 and A24.

21.00 AIR RELEASE VALVES

21.01. The primary function of air release valves is to automatically release small pockets of air as they accumulate at local high points within the water system. Air release valves must also discharge high velocity air during main filling and admit air during drainage. Air release valves are to be provided at required locations as shown on drawings.

21.02. Air release valves shall be designed to open positively and vent air to the atmosphere at system working pressures up to 250 psi.

21.03. Apco style valves shall have epoxy coated ductile iron bodies, a stainless steel float and stainless steel or bronze trim.

21.04. ARI style valves shall have reinforced nylon bodies, foamed Polypropylene float and E.P.D.M seals.

21.05. Piping: the upstream connecting piping shall consist of two brass ball valves, one brass tee and brass connection piping; all shall be one inch (1") in diameter unless otherwise specified. Downstream discharge piping shall be two inch (2") galvanized piping with appropriate fittings (See detail A2).

21.06. The open end of an above grade air release venting pipe shall terminate at least forty eight inches (48") above grade and be fitted with an insect screen on the end.

21.07. Automatic air relief valves shall **not** be used in situations where flooding of the access-way or chamber may occur.

21.08. Valves shall be A.R.I D-040, APCO No. 200A, or approved equal. All air release valves shall conform to ANSI/AWWA C512 and be installed according to the VT Water Supply Rule, A-8.4.

22.00 MANHOLES AND VAULTS

22.01. Precast manholes and vaults shall conform to ASTM Designation C478 and meet the following additional requirements also see detail A2:

22.01.01. All manholes and vaults shall be designed by a professional engineer addressing design criteria, such as, but not limited to: wheel loading, thrust restraint, buoyancy, soils, wall penetrations, access . . . .

22.01.02. Sections shall have tongue and groove joints with butyl mastic rope installed between sections.

22.01.03. The exterior of all sections shall have a Bituminous coating.

22.01.04. Drainage from the manhole or vault shall be designed to run to daylight whenever possible.

22.01.05. Manhole top sections shall be eccentric except that the concentric flat top sections shall be used where shallow cover requires a top section less than three feet deep.

22.01.06. Vault top sections shall be of special design and appropriate to the application.

22.01.07. Precast bases, cast-in-place bases, or precast bases integral with base sections may be used.

22.01.08. Cement shall be Type II Portland Cement, conforming to ASTM Designation C150.

22.01.09. Ladder rungs shall be aluminum alloy 6061-T6 in accordance with ASTM designation B221, by Aluminum Company of America or Washington Aluminum Company or equal, conforming to Washington Aluminum Company Model T-14-OR. Rungs shall be set in precast sections during casting of section or grouted with a non-shrink grout. Plastic coated steel ladder rungs secured in the walls of the precast structure shall also be acceptable. Rungs shall be aligned so as to allow access from the top of the manhole to the base in a vertical line.

22.01.10. All manholes and vaults shall be equipped with an approved "ladder-up" safety device.

22.01.11. Brick or masonry shall **not** be used to raise the manhole or vault frame cover to grade. Only concrete grade rings shall be allowed for this function.

22.01.12. All sections shall be cured by an approved method. Sections shall not be shipped or manhole rungs subjected to loading until the concrete has attained a compressive strength of 3,000 psi or until 5 days after fabrication, whichever is the longer.

22.01.13. Precast concrete manhole and vault manufacturers shall incorporate flexible pipe sleeves within the construction of the manhole in such size to accommodate the size pipe being used.

22.01.14. In no case shall a manhole be constructed such that it bears directly or indirectly on the pipeline or any appurtenances thereof.

22.01.15. All joints, lift holes, and other openings inside and outside the manhole shall be filled with water plug to prevent leakage.

23.00 MANHOLE AND VAULT FRAME AND LID

23.01. All manholes shall be provided with ductile iron manhole frames and lids of the size and type as required in the drawings, unless covers of another material are required by CFD No.2

23.02. Frame and lid shall be one of the following:

23.02.01. *Standard frame and lid:* Non-rocking design with a solid infiltration resistant lid.

23.02.02. *Waterproof frames- bolted lids:* Waterproof frames shall have a solid lid with machined bearing surfaces, and sealed with a rubber gasket. Lid shall fasten securely to the frame with countersunk bronze hexagonal-head cap screws. Frame shall be supplied with anchor bolts and bolt holes. Manhole frame and lid shall be Neenah No. R-1915-F (Type L) or equal.

23.02.03. *Hinged frame and cover:* Hinged frames and covers shall incorporate a blocking feature to prevent accidental closure. The cover must be removable if required. Hinged frames and covers may be used in off road locations, or in traveled ways with approval of the Municipal Engineer. Hinged frame and cover units shall be Pamrex, Bilco or approved equal.

23.02.04. Manhole lids for manholes on buried water mains shall have the word "WATER" cast into the top surface.

24.00 CONCRETE FOR THRUST BLOCKS

24.01. Concrete shall be Portland cement concrete of 3000 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 4 inches will be allowed (See detail A1 and A20).

24.02. Concrete shall be clean and not mixed with other material, including previously prepared concrete products.

24.03. Thrust blocks shall be installed on caps, tees, hydrants, and bends of 22.5 degrees and greater.

24.04. Blocking shall be placed on all sides of each fitting in the direction of thrust and not underneath for use as a foundation or support.

24.05. All other bends less than 22.5 degrees shall be restrained by use of retainer glands on each end of each bend.

24.06. All fittings shall be poly-wrapped prior to pouring any concrete. Concrete shall not overlap any joints and/or glands, hence restricting future access to

nuts and bolts. Adequate form work shall be employed to prevent such overlap.

25.00 PROTECTION OF THE PUBLIC AND WORK PERSONNEL

25.01. Work personnel and the public shall be protected by the contractor, from any and all hazards connected with the construction work. Open trenches, materials, or equipment within the working limits of the public right of way are to be guarded by the use of adequate barricades, certified flag persons or both. All barricades left in position overnight are to be properly lighted from dawn to dusk. When work narrows the useable pavement, certified flag persons shall be used to aid the flow of traffic so that there will no undue delays. Temporary construction signs shall be erected in accordance with State and local requirements. The Contractor shall be held responsible for the safety of all work persons and the general public and all damages to property from the hazard of open trenches, materials, or equipment at any time of day or night within the working area. All work shall be in conformance to applicable VOSHA regulations and the MUTCD guidelines, latest addition.

25.02. 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.

26.00 PROTECTION AND REPAIR OF EXISTING UTILITIES

26.01. The contractor shall notify Dig Safe prior to excavation, and otherwise comply with all permit requirements of each municipality work is performed in. Wherever culverts, sewers, drains, manholes, catch basins, storm drains, water mains and services, water valves or curb stops, electric, telephone or cable TV conduits, utility poles, overhead lines or other existing facilities are encountered, they shall be protected and firmly supported by the contractor at their expense, by methods approved by the authority having control of the utility structure, until excavation is backfilled and the affected structures are made secure. Injury to such structures caused by or resulting from the contractor's operations shall be repaired at the contractor's expense within a time period that will not place an unreasonable burden on the users. The authority having charge of any particular structure shall be notified promptly of injury to its structure.

26.02. Any water distribution component damaged during excavation shall be replaced with an in-kind material or a material approved by CFD No.2.

26.02.01. All materials used for the repair of an existing water main shall be disinfected in accordance with AWWA C651. Repairs shall be made so as to have the water service interrupted for as short a period of time as possible.

26.03. No CFD No.2 water main excavation shall be left open, unattended. All unattended excavations shall be completely backfilled to grade with adequate protection around the excavation site, as approved by CFD No.2.

26.04. Approval for relocation of any existing facilities shall be obtained from CFD No.2 prior to relocation. The contractor shall be responsible for the work and for providing notice to users before planned interruptions of service.

27.00 WORK OUTSIDE OWNED PROPERTY LIMITS OR PUBLIC RIGHTS OF WAYS

27.01. The contractor shall not, without written consent of a property owner enter or occupy with persons, tools, materials or equipment, any private land without written consent of the property owner. In a similar manner, no excavation shall take place within the public right of way without first obtaining authorization from the Municipality or State, as applicable.

27.02. The contractor shall obtain permission from CFD No.2 for any change to the approved plans of the project that may require work outside of the defined areas.

28.00 PLAN ERRORS OR OMISSIONS

28.01. The fact that specific mention of a fixture or of any part of the work is omitted in the specifications, whether intentionally or otherwise, when the same is clearly indicated on the plan drawings, or is usually and customarily required to complete fully such work as specified, will not entitle the Contractor of the project to consideration in the matter of any claim for extra compensation. Said fixtures, work, or both shall be installed or done the same as if called for both by drawings and by the specifications.

28.02. All work indicated on the drawings and not mentioned in the project specifications, or vice versa, and all work and material usually necessary to make the work complete in all its parts, whether or not they are indicated on the drawings or mentioned shall be considered the same as if they were called for both by drawings and by the specifications.

29.00 GENERAL INSTALLATION

29.01. Contractors shall notify CFD No.2 and Dig Safe at least seven days prior to any work on the water system. CFD No.2 shall be contacted at least 48 hours prior to any scheduled work within the project limits, unless different from other sections of these specifications.

29.02. The contractor shall at all times be responsible for conduct and discipline of his employees and/or any subcontractor or persons employed by subcontractors. All workers must have sufficient knowledge, skill, and experience to perform properly work assigned to them. Tools shall be

adequate for the work and in good condition so as to produce good, clean cut ends and threads of the correct size, pitch, and taper.

29.03. Any contractor who does not maintain local headquarters 24 hour a day must make satisfactory arrangements with CFD No.2 to service emergencies or complaints which may occur at night, over the weekend, or when the job is shutdown (these arrangements shall include road maintenance and repairs). The contractor shall provide CFD No.2 with emergency telephone numbers of the Superintendent and Project Manager.

29.04. Installation of all water mains shall be in accordance with the latest version of AWWA C600 or AWWA C605 or AWWA C900 as applicable. Materials and equipment shall be stored as to insure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated into the work shall be located so as to facilitate prompt inspection by authorized CFD No.2 personnel.

29.05. Temporary water lines may be required as appropriate for existing water customers and must remain in service until a new water main has been tested, disinfected, and accepted by CFD No.2. Planned water outages during the course of project work, for all or portions of any existing customers connected to the water distribution system, shall first be coordinated with, and approved by CFD No.2, with a minimum of seventy-two (72) hours notice. All work shall be performed to minimize planned water outages to existing water customers to the greatest degree possible.

29.06. Upon final acceptance of the proposed water main, the temporary water mains shall be disconnected. At least one-week in advance of a planned shutdown of any service line, notices must be delivered to all affected customers. Due to the nature of certain business activity, planned shut downs may be required to be scheduled after normal working hours of the affected customer.

29.07. Excavated material shall be placed in a manner that will not obstruct the work nor endanger the workers or the public, or obstruct sidewalks, driveways, roadways or other structures. Excavated materials shall be placed in compliance with federal, state, or local regulations.

29.08. Connection to an existing water main shall be done under the supervision of and with the approval of the CFD No2 representative. It is the applicants, developers, or owner of record 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 CFD No.2 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 CFD No.2. Any damage

occurring after the use of any valve operated by the contractor shall be the contractors' responsibility.

29.09. Care shall be taken to prevent damage to valves and other appurtenances during the handling and installation. All materials shall be carefully inspected for defects in workmanship and materials:

29.09.01. All debris and foreign material cleaned out of valve openings, etc.;

29.09.02. All operating mechanisms operated to check their proper functioning, and all other nuts and bolts checked for tightness.

29.09.03. 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.

29.10. Valves and valve boxes shall be set plumb. Valve boxes, besides being plumb, shall be centered directly over the valves.

29.11. All pipes showing cracks shall be rejected. If cracks occur in the pipe, the contractor may, at his own expense and after approval of CFD No.2 cut off cracked portions at a point at least twice the pipe diameter from the visible limits of the crack and use the sound portion of the pipe.

29.12. Repairs on any damaged newly installed pipe shall include two solid sleeve couplings, retainer glands, and an appropriate length of pipe of the same material as that which was broken, or approved equal.

29.13. Prior to the date of acceptance by the system owner, the contractor shall replace any new pipe or accessory found to be defective at any time, at no expense to the system owner.

29.14. All water mains shall have no less than five feet six inches (5'-6") of cover unless waived by CFD No.2. 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. 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 contractors' expense.

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

29.16. 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. Disposal may also require protection of storm drain facilities. Pipes under construction shall not be used for drainage of excavations.

29.17. Any deflection of joints in D.I. pipe shall be within the limits specified by the manufacturer.

29.18. Concrete thrust blocks shall be installed on all hydrants, plugs, tees, and bends deflecting 22.5 degrees and 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 typical's and approved by CFD No.2. 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 CFD No.2 and engineer, concrete encasement of the waterline may be required for stream crossings and similar purposes. Where required on the plans or as directed by CFD No.2 or engineer, a concrete cradle shall be used to bolster and strengthen the pipe. CFD No.2 or his designee shall inspect all thrust blocks prior to backfilling.

29.19. There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks that are supplied with water that is, or may be, contaminated.

29.20. As necessary, temporary PVC markers shall be supplied at all gate valves, curb boxes, and at the end of water lines to a minimum of twelve inches (12") above finish grade until accepted by CFD No.2.

29.21. All surplus material and debris shall be removed as the project progresses, leaving all areas clean and presentable.

29.22. Unless otherwise required, all paving and sidewalks that may be damaged during construction shall be replaced with the same kind of material that previously existed, as required by the municipal authority.

29.23. All areas within the limits of a set of drawings shall be loamed and seeded as called for in the project specifications. This shall include areas of new construction, except as the actual area occupied by structures, roads, parking areas, and walks, and shall include areas of established landscape and flora through which the work may pass where grassed areas are affected. Areas to be seeded may have subgrade placed at any time of the year. However, placement and preparation of loam (topsoil) and seeding shall be performed only between the dates of April 20 and October 15, or as approved otherwise by CFD No.2. Eroded areas shall be graded to specific contours prior to loaming or seeding.

29.24. No water lines shall be installed after November 15 or before April 1 without prior approval from CFD No.2. CFD No.2 may restrict work before November 15 and after April 1 during adverse weather conditions. CFD No.2 will not allow excavating for water mains during the winter months except by special permission.

29.25. The project contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in association with the project. The contractor will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees and other persons who may be affected thereby, materials or equipment to be incorporated therein, whether in storage on or off the project site, and other property at the project site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

29.26. The contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction within the project area. The contractor will erect and maintain all necessary safeguards for safety and protection. He will notify owners or adjacent utilities or properties when prosecution of the project may affect them. The contractor will remedy all damage, injury or loss to any property caused, directly or indirectly by work associated with the project. In emergencies affecting the safety of persons or the project, or property at the site or adjacent thereto, the contractor shall act to prevent threatened damage, injury, or loss.

29.27. Prior to commencement of any project, the contractor shall provide construction signage and traffic control plans in accordance with the Manual of Uniform Traffic Control Devices to the appropriate public works official of each community. Adequate notification must also be given to landowners that may be affected by traffic changes.

30.00 BACKFILLING

30.01. Trenches shall be backfilled to subgrade with, wherever possible, material excavated from the trench, provided the material consists of loam, sand, gravel or other suitable material and shall be done only after the approval of the CFD No.2 representative. Material for backfilling shall be free of roots, stumps, and frost. Backfill shall not be placed on frozen material. Materials used for backfilling trenches shall be free of stones weighing more than thirty (30) pounds. No stones measuring over three inches (3") in the longest dimension shall be placed within one foot (1') of the pipeline being backfilled. Stones found in the trench shall be removed for a depth of at least six inches (6") below the bottom of the pipe. In general, use of blasted rock, as trench backfill will not be permitted. Any materials excavated from the site not conforming to these Specifications, shall be disposed of and replaced with approved material by the contractor, as required.

30.02. Backfill material shall be tamped in layers around the pipe to a sufficient height above the pipe to adequately support and protect the pipe. Backfill for pipelines under roadways shall be placed in six-inch (6") lifts, each lift being compacted to not less than 95% of maximum dry density as determined by the AASHTO-T-99 Standard Proctor. Pipelines outside of roadways or in cross country routes shall be compacted to 90% maximum density as determined by the AASHTO-T-99 Standard Proctor. If conditions warrant, the backfilling of trenches may be done with mechanical equipment. Particular precautions shall be taken in the placement and compaction of the backfill material in order not to damage the pipe, pipe coating or structure. The backfill shall be brought up evenly. Around valve boxes, the backfill shall be tamped to a distance of four feet (4') on all sides of the box, or to the undisturbed trench face, if less than four feet (4'). Backfilling in all public roadways shall be so compacted as to leave no depression in the road. Additional backfill requirements may apply within State or local Municipal Highway Right-Of-Ways. All public road surfaces shall be restored to a condition at least equal to that, which existed prior to the start of construction unless approved otherwise by the appropriate public works or street department authority. Precautions shall be taken against undue damage to existing surface materials.

30.03. No compacting shall be done when the material is too wet to be compacted properly. At such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions are taken as may be necessary to obtain proper compaction.

30.04. Surplus excavated materials shall be disposed of in a satisfactory manner. Surplus material or spoil shall be removed promptly and disposed of so as not to be objectionable to abutters or the general public.

30.05. Trenches that have been improperly backfilled, enclosed or covered before inspection of fittings and joints shall be reopened and re-backfilled at the contractor's expense.

31.00 WATER/SEWER SEPARATION

31.01. Water mains crossing sewers shall be laid to provide a minimum vertical distance of eighteen inches (18") between the outside of the water main and the outside of the sewer line. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of pipe shall be located so both joints will be as far from the sewer as possible. This vertical separation shall be maintained for that portion of the water main located within ten feet (10') horizontally of any sewer it crosses. Water mains must be laid at least five feet (5') horizontally from any existing or proposed storm sewer and ten feet (10') from any existing or proposed sanitary sewer (See Detail A9 and A10).

31.02. When it is impossible to obtain horizontal and vertical separation on new water installations, all joints that fall within ten feet (10') of a crossing shall be double wrapped with poly-wrap and then encased in flowable fill. No water main shall pass through or come in contact with any part of a sewer manhole (See detail A8).

31.03. Water mains shall not be placed closer than fifty feet (50') horizontal distance from any septic tank or leach field unless approved by the VT Water Supply Rule Provisions under Chapter 21.8.6.4 and the CFD No.2 Administrator. In the event of a variance in the 50' separation requirement, supplemental protective measures as mentioned above shall be required.

31.04. Service lines shall not be placed closer than twenty five feet (25') horizontal distance from any septic tank or leach field. If this separation cannot be achieved, then the service line must be place in a PVC sleeve with both ends sealed. If a sleeve is used, the service line must be placed no closer than ten feet (10') from any septic tank or leach field.

31.05. Sewer and waterline separation shall conform to all VT Water Supply Rule requirements, and installed in accordance with the latest edition of the "Ten States Standards- Recommended Standards for Water."

32.00 STEEL SLEEVE, JACK AND BORE

32.01. Before beginning operations related to excavation by jacking, the Contractor shall submit to CFD No.2 a detailed, written description of the equipment and methods he /she proposes to use and acceptable sketches showing details of the jacking pit, head, frame, reaction blocks, and arrangement of the jacks. The contractor shall not proceed with work until authorized by CFD No.2. All requests to construct new water lines across existing municipal streets shall be reviewed by CFD No.2 and the

appropriate municipal official responsible for highway maintenance and permits (See details A6 and A7).

32.02. All work to construct highway crossings as indicated on drawings shall be performed by a contractor with at least three years experience in jacking. Three (3) weeks prior to start of work, the contractor shall furnish CFD No.2 a Statement of Experience and Welding Certification for such work from those doing the jacking.

32.03. The wall thickness of the steel casing pipe shall be 3/8" as indicated on the drawings and steel plate for steel casing pipe shall conform to ASTM A36. The steel plate shall be rolled and welded to the diameter size as indicated on drawings. Welding shall be done by approved standard welding practice. When more than one section of casing is to be used, the ends of the section to be joined shall be welded in accordance with approved standard welding practices for the use intended.

32.04. Services up to two inches (2") may use PVC pipe for a sleeve with approval of CFD No.2.

32.05. All carrier pipes larger than two inches (2") shall be ductile iron as shown in drawings.

33.00 EXECUTION OF SLEEVE JACK AND BORE

33.01. The jacking pit shall be of adequate size to accommodate the sheeting, shoring or trench box, jacking head, frame, jacks, reaction blocks, added section of pipe, and other material and equipment, and to provide sufficient working space. The pit shall be excavated by suitable methods as specified for normal excavations and shall be kept free of water.

33.02. Sleeves shall be at the same elevation as the water main.

33.03. The jacking head shall be of suitable bearing pieces to protect the pipe from damage due to the thrust from the jack to the pipe, and to transfer that thrust from the jack to the pipe.

33.04. The jacking frame, upon which the pipe being jacked will rest, shall be on railroad rails or suitable steel or wooden members set to correct line and grade to act as guides for the true alignment of the pipe.

33.05. The jacks shall be of ample capacity to provide more than the anticipated jacking capacity needed.

33.06. The reaction blocks shall be suitable to provide resistance to, and distribution of, the reaction from the jacks.

33.07. It is extremely important that the jacking apparatus be strongly constructed, set, and maintained in proper relative position and alignment in order to minimize forces that would tend to bend the pipe, cause it to deflect from true alignment, or displace the reaction blocks.

33.08. Joints of steel casing pipe shall be welded before being subjected to the jacking operation.

33.09. All welds shall conform to the AWWA C206 for Field Welding of Steel Water Pipe Joints.

33.10. In excavation from within the jacking pipe, extreme care shall be used to avoid the loss of material from outside the limits of the pipe in the final position. Excavation shall be carried ahead of the pipe only to the extent possible without the loss of material. Should material, either earth or rock, be lost outside the limits of the pipe in its final position, pressure grout shall be applied outside the casing with such equipment as may be directed.

33.11. Should rock or boulders be encountered after jacking has commenced and blasting is necessary, blasting shall be done only after required permits have been approved and then in such a manner that neither the jacked casing nor the road above the blast will be damaged. The size of the blast and the procedures for blasting shall be acceptable to the agency controlling the road.

33.12. Once jacking has started, it shall be a continuous operation until completion of the jacking operation in order to reduce the possibility of a so-called "stuck" pipe, even though this may involve working outside the normal workday.

33.13. Care shall be taken during excavation and jacking operations to ensure that the jacked pipe remains true to line and grade. Maximum deviation from line and grade shall be ½"/100' for carrier pipe and casing pipe. Guided boring equipment utilizing a pilot tube for steering to the target with an LED illuminated target within the tube should be utilized to ensure the accuracy of the jacking process. Steel sleeve jacking and boring shall be performed in such a manner so as to avoid any bends or extra fittings on the water main.

33.14. During jacking operations, voids shall be prevented outside of the sleeve being jacked. If they occur they shall be filled with a lean grout to the satisfaction of the CFD No2. Representative.

33.15. The carrier pipe shall be installed in the sleeve, using casing spacers described below, two (2) per each section of pipe. Pipe shall be Tyton-Joint or approved flexible restrained joint pipe.

33.16. Following installation, the carrier pipe shall be tested for leakage in accordance with testing procedures outlined in Section 36, Testing and Disinfecting.

33.17. The sleeve ends shall be plugged using hydraulic cement or concrete or otherwise sealed.

33.18. A weep hole shall be installed in the lower end of the sleeve for drainage.

34.00 CASING SPACERS

34.01. Casing spacers shall be bolt on style with a two-piece shell made from T-304 stainless steel of a minimum 14-gauge thickness. Each shell section shall have bolt flanges and/or a hinged side; bolt flanges shall be formed with ribs for added strength. Connecting flange shall have a minimum of three 5/16" T-304 bolts. The shell shall be lined with ribbed PVC extrusion with a retaining section that overlaps the edge of the shell and prevents slippage. Bearing surfaces (runners) made from UHMW polymer with a static coefficient of friction of .11-.13 shall be attached to support structures (risers) at appropriate positions to properly support the carrier within the casing and to ease installation. The runners shall be attached mechanically by T-304 threaded fasteners that are inserted through the punched riser section and TIG welded for strength. Risers shall be made of T-304 stainless steel of a minimum 10 gauge. All risers over six inches (6") in height shall be reinforced. Risers shall be MIG welded to the shell. All metal surfaces shall be fully chemically passivated (See detail A5).

34.02. Casing spacers shall be model CCS as manufactured by Cascade Waterworks Mfg. Co. or prior approved equal.

34.03. Annular space may remain void as directed by the CFD No.2 representative when casing spacer's fit tightly within the casing. However, sleeve ends shall be plugged using hydraulic cement or concrete.

35.00 EROSION CONTROL

35.01. The contractor shall construct and maintain all erosion control measures in accordance with Municipal standards. In the case of no standard, then erosion measures shall conform to the "Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites", current edition. The contractor shall carry out project construction in such a manner as to give adequate protection of water courses and minimize surface erosion.

35.02. The contractor shall be perform all erosion control measures as indicated on approved plans and specifications, including installation, maintenance and removal of temporary dams and inlet protection.

35.03. Dust shall be controlled through the application of calcium chloride or water, as required by the municipality.

36.00 TESTING AND DISINFECTION

36.01. All water mains shall be constructed, tested and disinfected in accordance with AWWA Standards C-600, C-605, C-651 and The Vermont Water Supply Rule. Minimum testing pressure shall be 1.5 times the working pressure of the installed line or 200 psi, whichever is greater, and will be monitored at the lowest elevation in the length of the pipeline being tested. The longest length of test pipe shall be 1,000 feet unless waived by CFD No.2. Pressure tests shall be up to the curb stop with corporations fully open.

36.02. No hose or fire hydrant shall be used in collection of samples. A corporation stop shall be installed in the main with a copper gooseneck assembly for testing. After testing is completed and samples have been collected, the corporation on the test line shall be shut off and disconnected and the gooseneck assembly removed.

36.03. Maximum allowable leakage will be $L=\frac{SD\sqrt{P}}{148{,}000}$ (as outlined in AWWA Standards)

36.04. Where:

L* = *allowable leakage, in gallons per hour

S* = *length of pipe tested, in feet

D* = *nominal diameter of the pipe, in inches

P* = *average test pressure during the leakage test, in pounds per square inch (gauge).

See attached Colchester Fire District No.2 - Water Main Pressure Test Inspection Record

36.05. *Testing:* All tests shall be conducted by and at the expense of the Contractor. The Engineer will give direction pertaining to the test methods and observe the field-testing.

36.06. *Hydrostatic Test of Pipeline:* The pipeline, including hydrant laterals, shall be tested in accordance with AWWA C-600 Section 4.

36.07. *Disinfection:* Disinfection of the pipeline shall be directed by the Engineer and at the Contractor's expense. AWWA C-651 shall be used as a basis for the disinfection process.

36.08. The Engineer or CFD No.2 will require as minimum:

36.08.01. Complete flushing of the pipeline to wash out all dirt, debris, etc. which may have accumulated in the pipeline during construction.

36.08.02. Following flushing to clean clear water, the Contractor will add chlorine to the entire pipeline volume of water such that the water will have not less than 25 mg/L free chlorine, and let the mixture set for at least 24 hours.

36.08.03. After the 24-hour duration, the water in the pipeline shall be tested for residual free chlorine and must contain a minimum of 10 mg/L chlorine. If less than 10 mg/L are found, then the disinfection procedure shall be repeated until at least 10 mg/L chlorine residual is indicated by test.

36.08.04. Upon successful completion of step 3 above, the pipeline shall be flushed again until the chlorine concentration in the pipeline is no higher than that prevailing in the supply system. A reducing agent (de-chlorinating agent) should be used to eliminate the free chlorine residual in the flushing process per the direction of CFD No.2

36.08.05. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main, and submitted to the Vermont Health Department for analysis. At least one set of samples shall be collected from every 1,000 feet of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall show the absence of coliform organisms and, if required the presence of a chlorine residual. (AWWA C651.) If the initial disinfection fails to produce samples, which pass the V.S.H.D. requirements for potable drinking water, then the new main shall be re-flushed and shall be resampled until satisfactory test results are obtained. All sample reports must be submitted to CFD No.2 prior to opening any connection to an existing water line.

36.08.06. Upon satisfactory results by the Vermont State Health Department or State certified laboratory, the pipeline may be placed in service. All costs for water, materials, equipment and labor to perform the required testing disinfection, and flushing of the pipeline shall be paid by the Contractor.

37.00 SUBMITTAL OF TEST RESULTS

37.01. The applicant or project engineer shall be responsible for submittal of test results to CFD No.2. The applicant or project engineer shall also provide a letter to the CFD No.2 Administrator certifying that the water system has passed all tests, is constructed in accordance with the approved plans, except as may have been modified by approved change order, and is in condition to be placed in service. Submittal of all test results shall be required prior to the water main being placed into service.

38.00 FINAL INSPECTION

38.01. The applicant, developer/contractor will be responsible for any necessary repairs or corrections as part of the project warranty. The project warranty period will be no less than two (2) years from project completion. Repairs made during the warranty period will carry a minimum warranty of one year from the time that the repair was completed. At the end of the warranty period, and after Record Drawings have been submitted, an inspection will be performed by CFD No.2 prior to assuming ownership of any of the lines and appurtenances. The contractor shall correct any punch list items accumulated during the inspection after receipt of this list. Incomplete work on the system shall not be included in the initial inspection, but shall be inspected as the project continues. The contractor shall repair, replace, or retest promptly as directed by CFD No.2 and without further charges, all work equipment, materials or parts, which may fail during the warranty period.

38.02. The final walk through inspection conducted by the CFD No.2 representative shall include but not be limited to:

38.02.01. Valves, hydrants, and curb stops operating properly.

38.02.02. Valve boxes and covers set plumb and at proper elevations.

38.02.03. Proper hydrant nozzle height above grade.

38.02.04. Proper hydrant opening direction, nozzle thread, and barrel color.

38.02.05. Proper distance from the face of the curb of hydrant nozzles.

38.02.06. Hydrant flags meeting CFD No.2 specifications installed on each fire hydrant at the time of installation.

38.02.07. Static and residual hydrant pressures and flow rates if requested.

38.02.08. Curb boxes inside ROW, set to grade, containing stainless steel operating rod, and plumb.

38.02.09. Tie information on record drawings complete and correct.

38.02.10. Material testing results, lab reports, manufacturer's certificates, and leakage test results complete and on file.

38.02.11. General appearance and restoration.

38.03. Submittal of accurate Record Drawings in hardcopy format.

38.04. Generally, Record Drawings shall include:

38.04.01. Accurate measurements of all water lines

38.04.02. Measurement to within six inches (6") to all valves and curb stops, from permanent fixtures such as telephone poles, fire hydrants, buildings, transformers, etc.

38.04.03. Accurate depths of water lines.

38.04.04. Locations of all other buried utilities and structures.

CFD No.2 RESPONSIBLE PERSONS

Jeffrey Bessette - Administrator	**CFD No.2 862-4621** jbessette@colchesterfiredistrict2.com
Jeffrey Shappy - Operator	**CFD No.2 862-4621**
Dale Newton – Service Technician	**CFD No.2 862-4621**

Appendix A

Specifications Details Index

MINIMUM AREA IN SQUARE FEET, OF BEARING SURFACE REQUIRED FOR CONCRETE THRUST BLOCKS

3"				4"				6"				8"				12"				16"				SOIL CONDITIONS	SAFE BEARING LOAD (PSF)
ENDS & TEES	90° ELB	45° ELB	22.5° ELB	ENDS & TEES	90° ELB	45° ELB	22.5° ELB	ENDS & TEES	90° ELB	45° ELB	22.5° ELB	ENDS & TEES	90° ELB	45° ELB	22.5° ELB	ENDS & TEES	90° ELB	45° ELB	22.5° ELB	ENDS & TEES	90° ELB	45° ELB	22.5° ELB		
0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	1.0	1.5	1.0	0.5	2.0	2.5	1.5	1.0	4.0	5.5	3.0	1.5	8.0	10.0	5.0	4.0	SOUND SHALE	10,000
1.0	1.0	1.0	0.5	1.5	2.0	1.0	0.5	3.0	4.0	2.0	1.0	4.5	6.5	3.5	2.0	10.0	14.0	7.5	4.0	25.0	30.0	15.0	12.0	CEMENTED GRAVEL & SAND	4,000
1.0	1.5	1.0	0.5	2.0	2.5	1.5	1.0	3.5	5.0	3.0	1.5	6.0	8.5	5.0	2.5	13.0	18.5	10.0	5.0	30.0	35.0	20.0	15.0	COARSE & FINE COMPACT SAND	3,000
1.5	2.5	1.5	1.0	2.5	3.5	2.0	1.0	5.5	7.5	4.0	2.0	9.0	13.0	7.0	3.5	20.0	27.5	15.0	8.0	40.0	45.0	25.0	20.0	MEDIUM CLAY (CAN BE SPADED)	2,000
3.0	4.5	2.5	1.5	5.0	7.0	4.0	2.0	10.5	15.0	8.0	4.0	18.0	25.0	14.0	7.0	39.0	55.0	30.0	15.0	80.0	90.0	50.0	40.0	SOFT CLAY	1,000

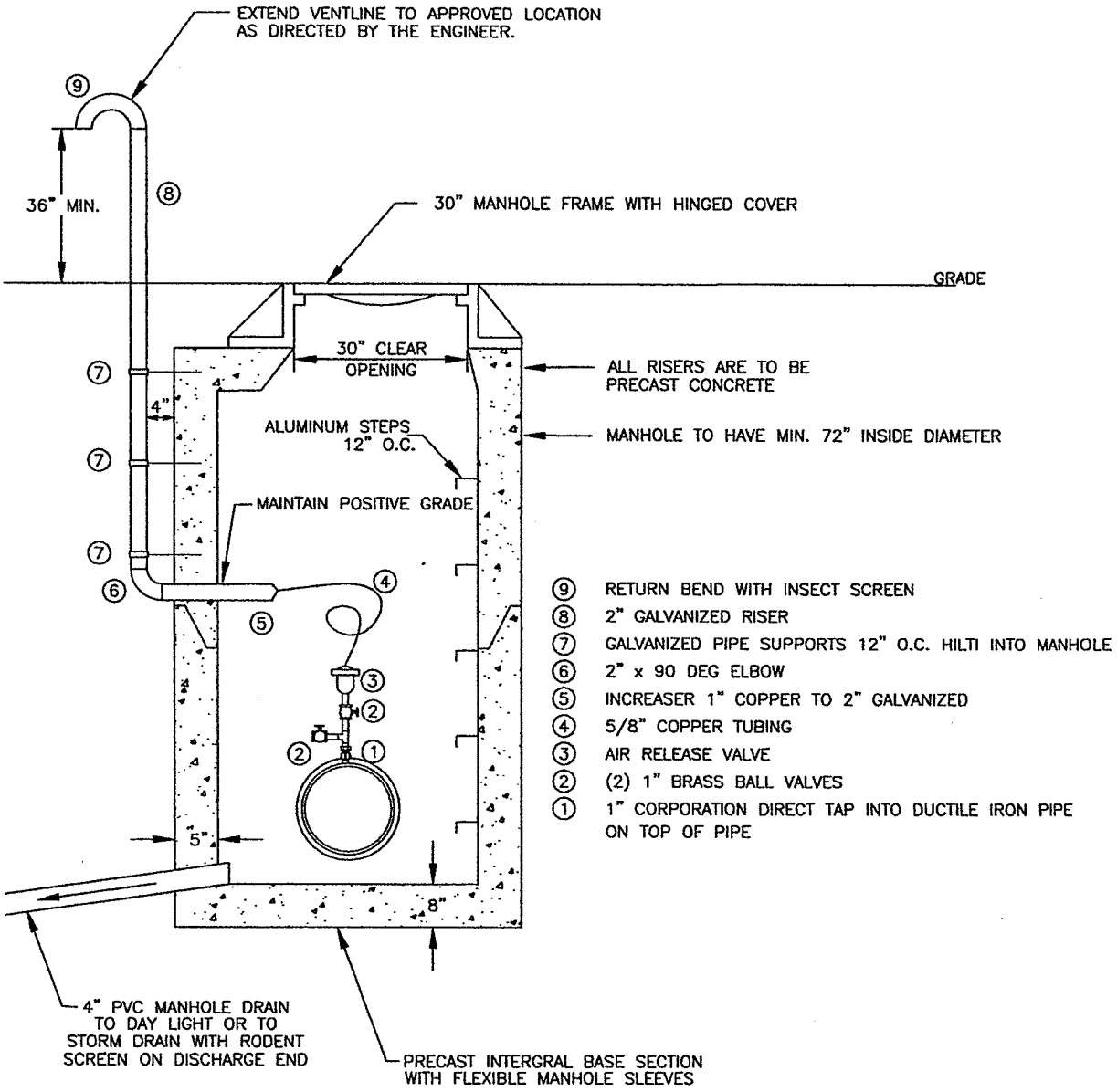
MAXIMUM WATER PRESSURE = 300 PSI NOTE: REDUCER BEARING AREA = 45° BEND, LARGER PIPE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2

Colchester Fire District No.2
Concrete Thrust Block Data
Min. Area of Bearing Surface

March 2018

Drawing No. A1

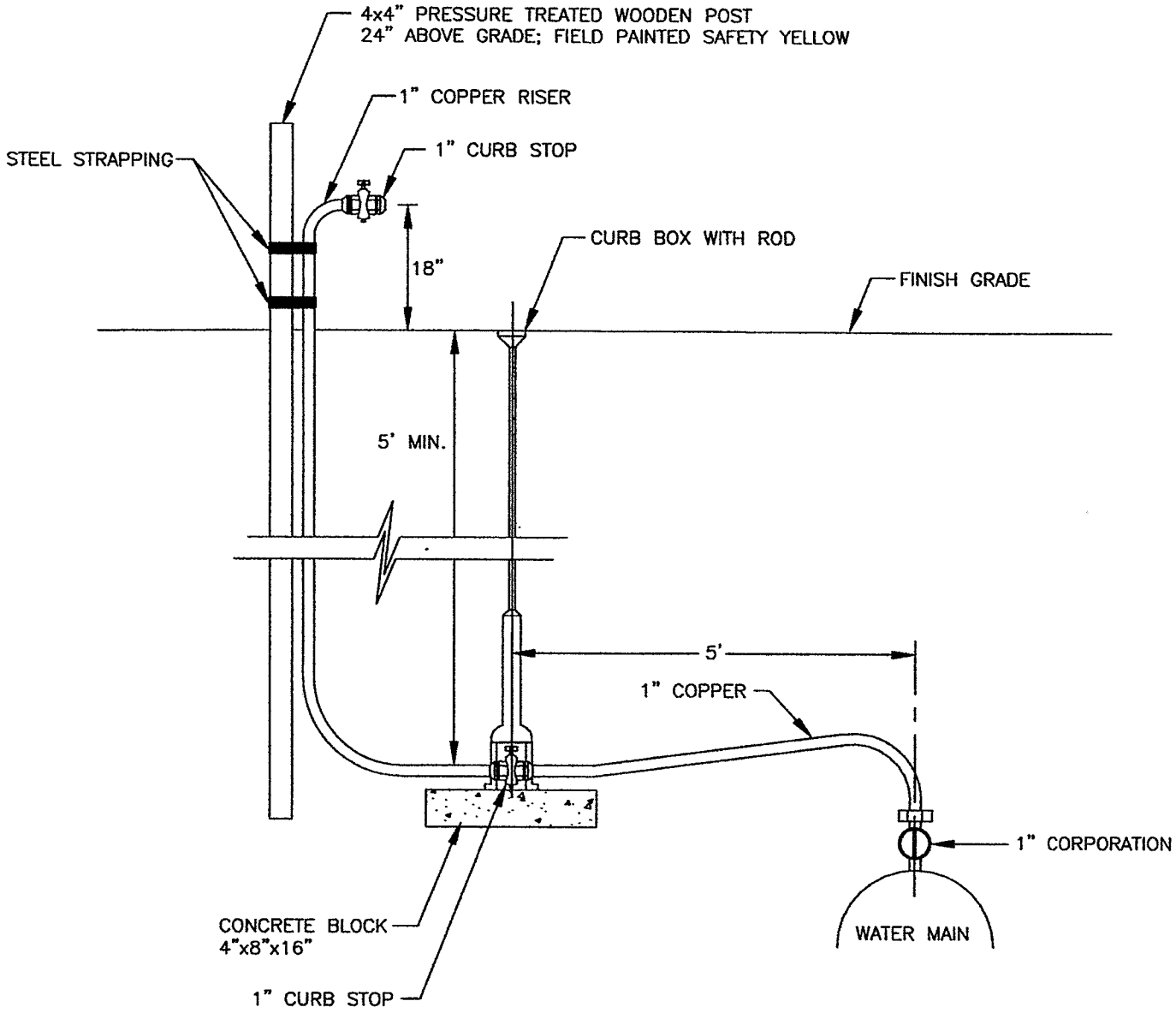


⑨ RETURN BEND WITH INSECT SCREEN
⑧ 2" GALVANIZED RISER
⑦ GALVANIZED PIPE SUPPORTS 12" O.C. HILTI INTO MANHOLE
⑥ 2" x 90 DEG ELBOW
⑤ INCREASER 1" COPPER TO 2" GALVANIZED
④ 5/8" COPPER TUBING
③ AIR RELEASE VALVE
② (2) 1" BRASS BALL VALVES
① 1" CORPORATION DIRECT TAP INTO DUCTILE IRON PIPE ON TOP OF PIPE

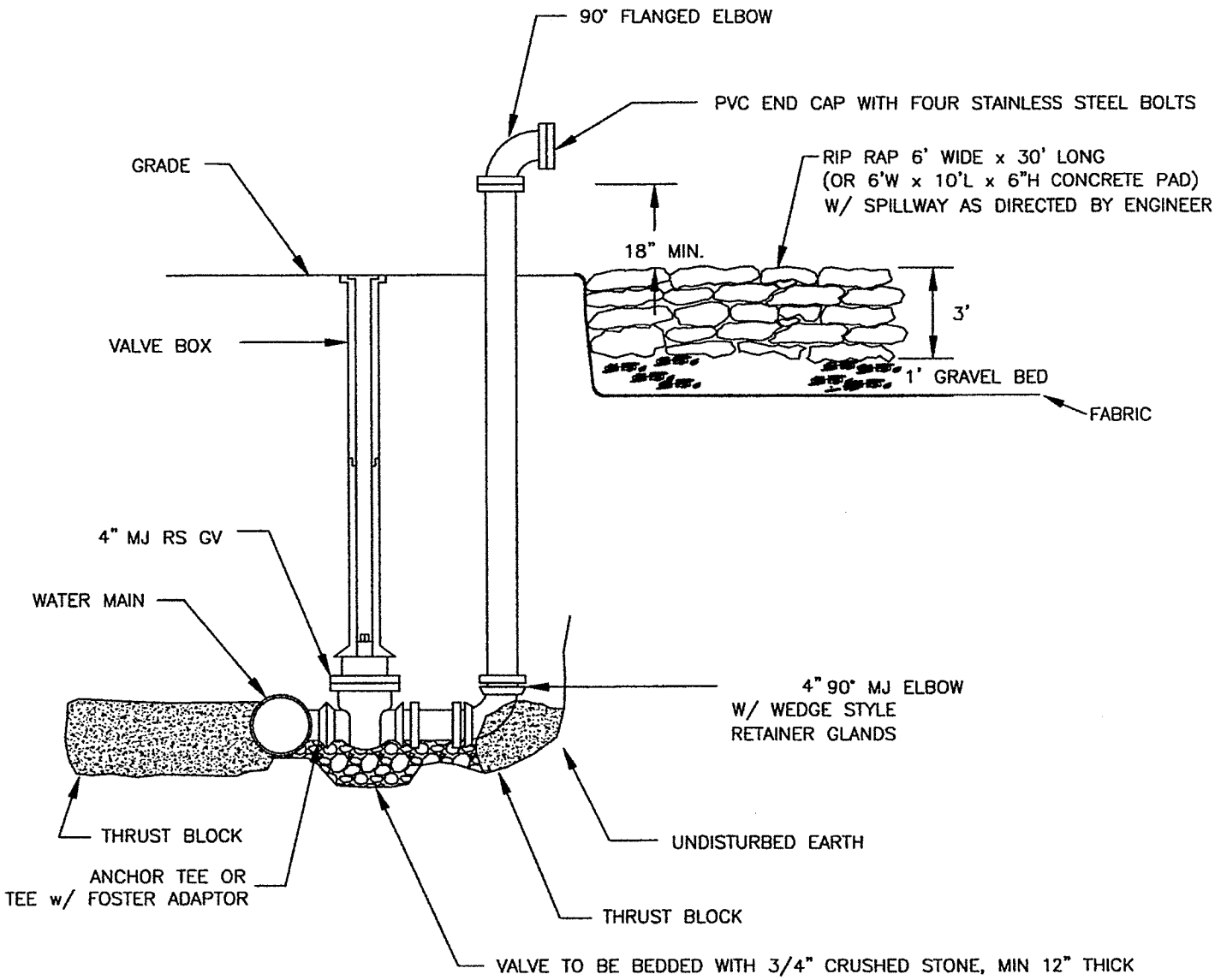
NOTES:
1) ALL 1" PIPE & FITTINGS TO BE BRASS AND COPPER
2) ALL 2" PIPE & FITTINGS TO BE GALVANIZED UNLESS OTHERWISE NOTED.
3) ALL MH PENETRATIONS TO BE PRECAST WITH RUBBER PIPE BOOTS.

AIR RELEASE MANHOLE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Specifications Detail Air Release Manhole	March 2018 Drawing No. A2



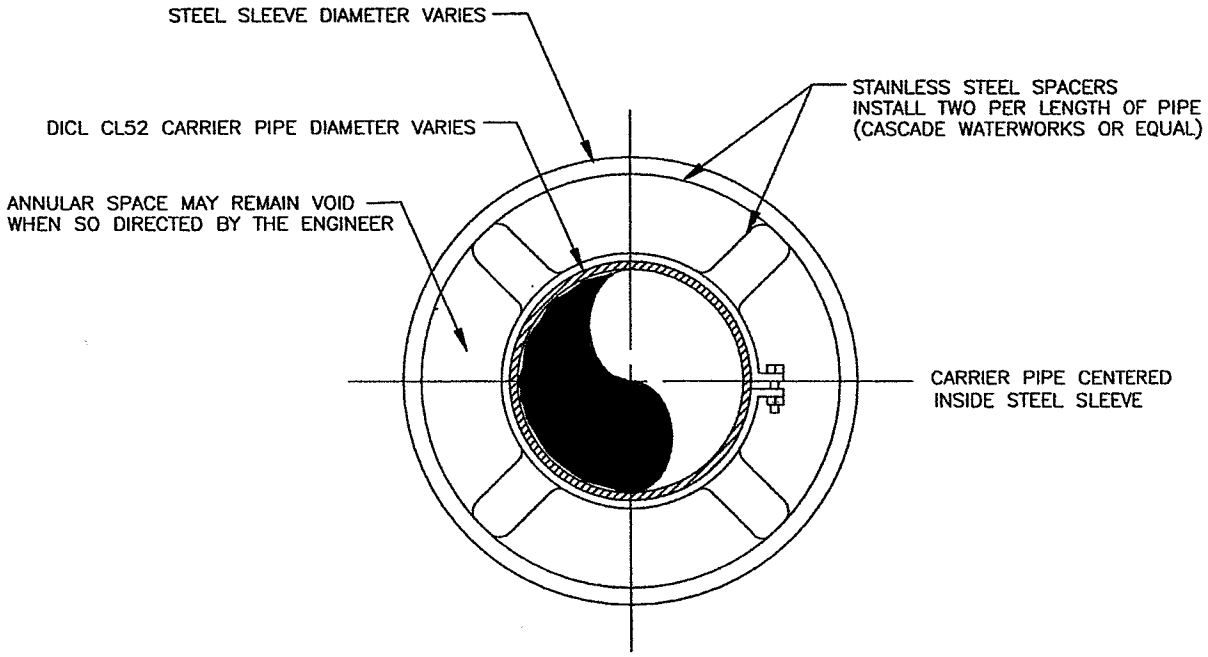
COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Manual Air Release	March 2018 Drawing No. A3



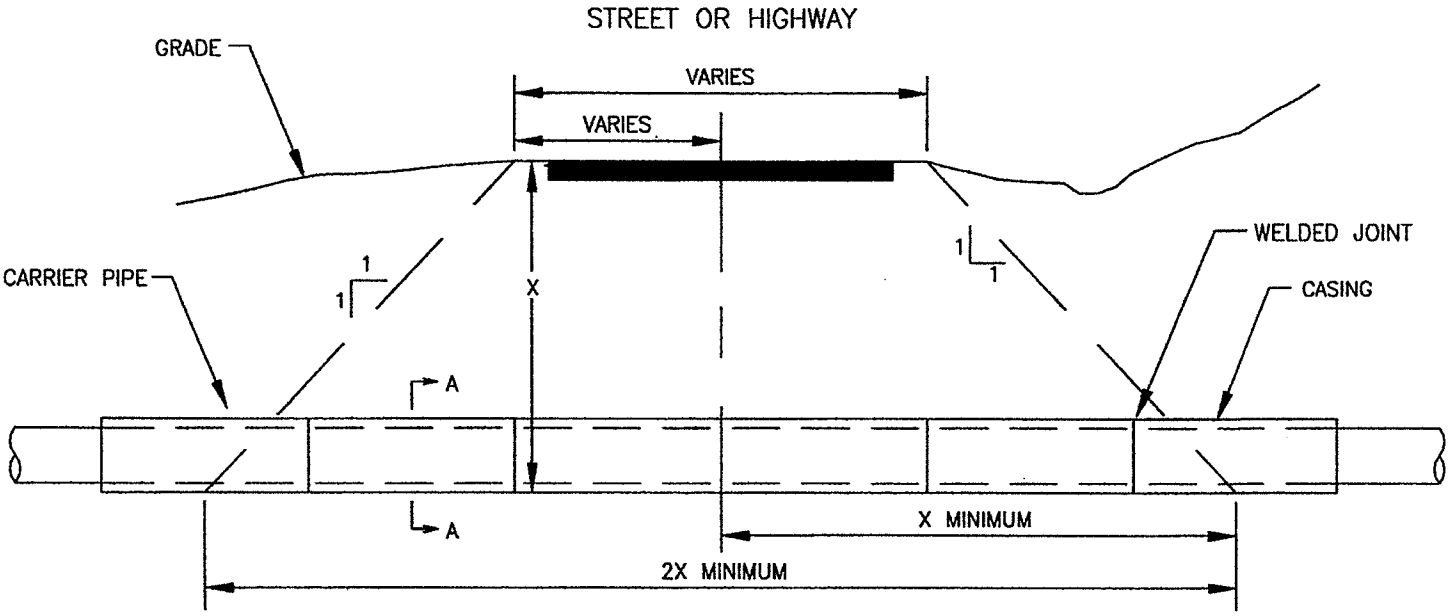
NOTES:

1) PRIOR TO POURING THRUST BLOCKS, ALL FITTINGS ARE TO BE WRAPPED IN 4 MIL. POLYETHELENE
2) MEGA-LUG RETAINER GLANDS OR APPROVED EQUAL ARE TO BE USED ON ALL MJ FITTINGS.

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail 4" Blow-Off Assembly	March 2018 Drawing No. A4

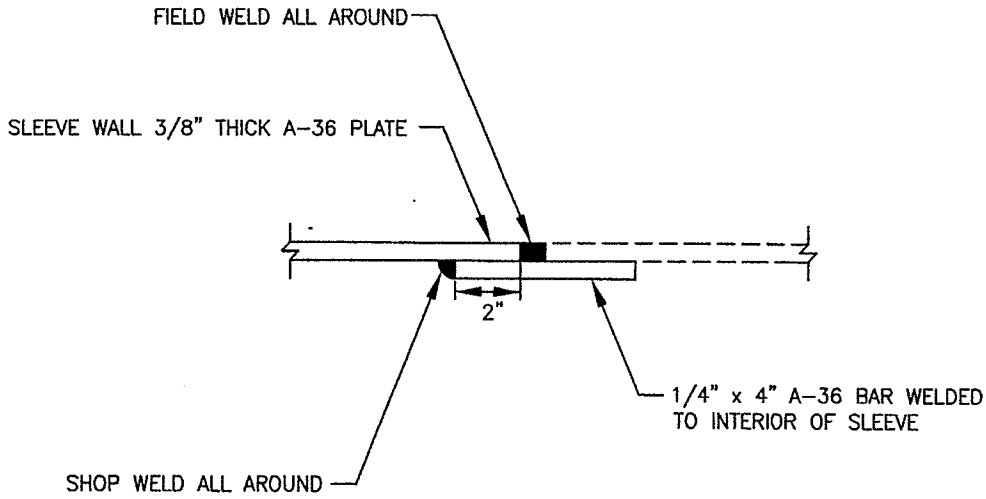


COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Specifications Detail Steel Sleeve Casing Spacers	March 2018 Drawing No. A5



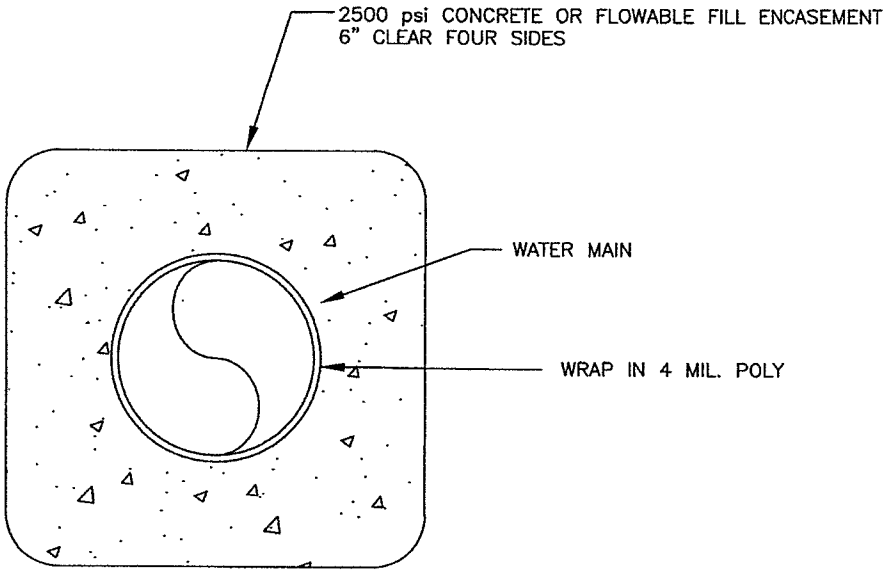
NOTES:
1) SEE PAGE A–7 FOR JOINT WELD DETAIL
2) MINIMUM LENGTH OF CASING ON HIGHWAY BORES IS DETERMINED FROM SHOULDER POINT OF ROAD AT A ONE ON ONE SLOPE
3) SEAL BOTH ENDS OF SLEEVE TO PREVENT INFILTRATION
4) A WEEP HOLE SHALL BE INSTALLED IN THE LOWER END OF THE SLEEVE FOR DRAINAGE

STEEL SLEEVE ENCASEMENT



STEEL SLEEVE ENCASEMENT JOINT WELD DETAIL

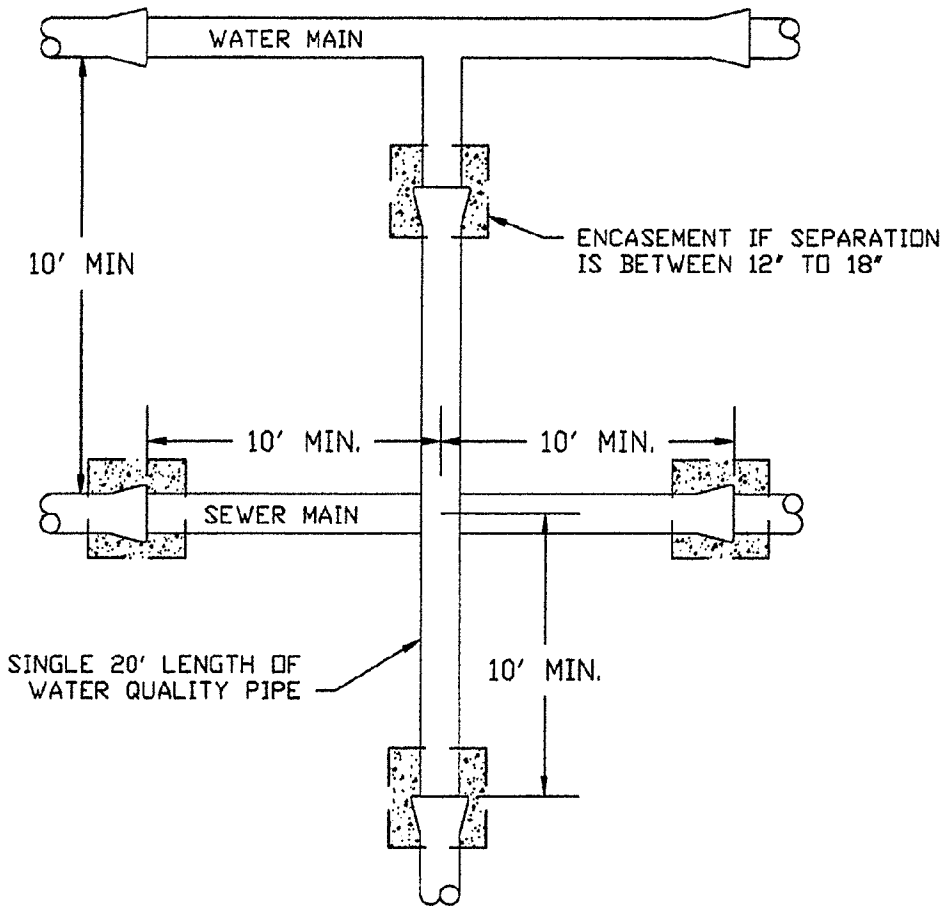
COLCHESTER WATER DEPT. FIRE DISTRICT NO. 2	Colchester Fire District No.2 Specifications Detail Steel Sleeve Encasement Joint Weld	March 2018 Drawing No. A7



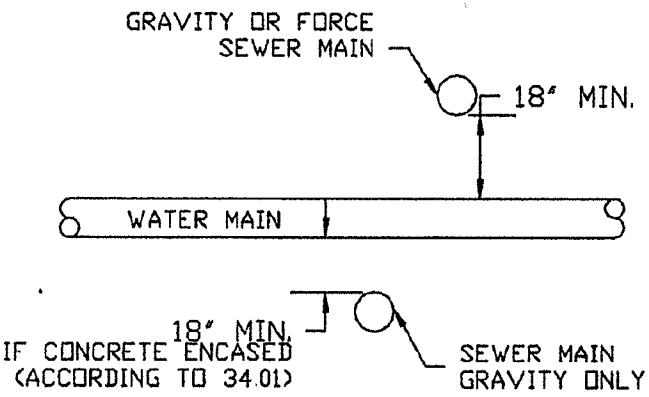
CONCRETE / FLOWABLE FILL ENCASEMENT

COLCHESTER WATER DEPT. FIRE DISTRICT NO. 2	Colchester Fire District No.2 Specifications Detail Concrete / Flowable Fill Encasement	March 2018 Drawing No. A8

PLAN VIEW
NTS



PROFILE VIEW
NTS



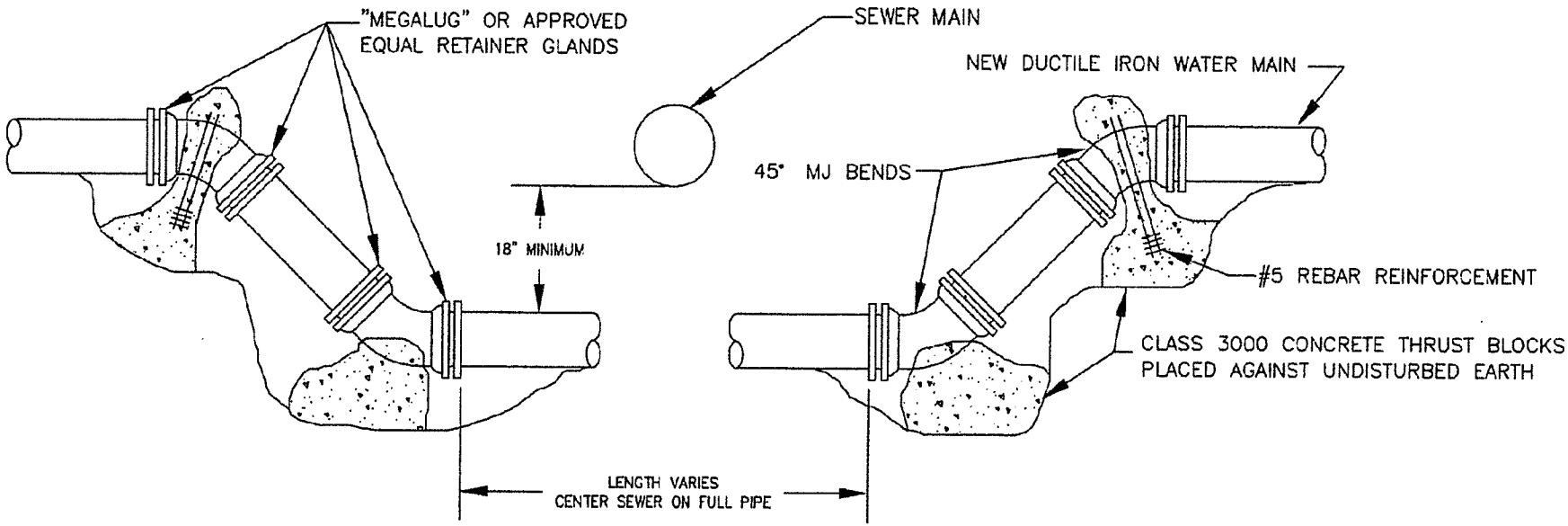
REFERENCE:
VT. WATER SUPPLY RULE
CHAPTER 21 SECTION 8.6

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2

Colchester Fire District No.2
Water / Sewer Crossing

March 2018

Drawing No. A9

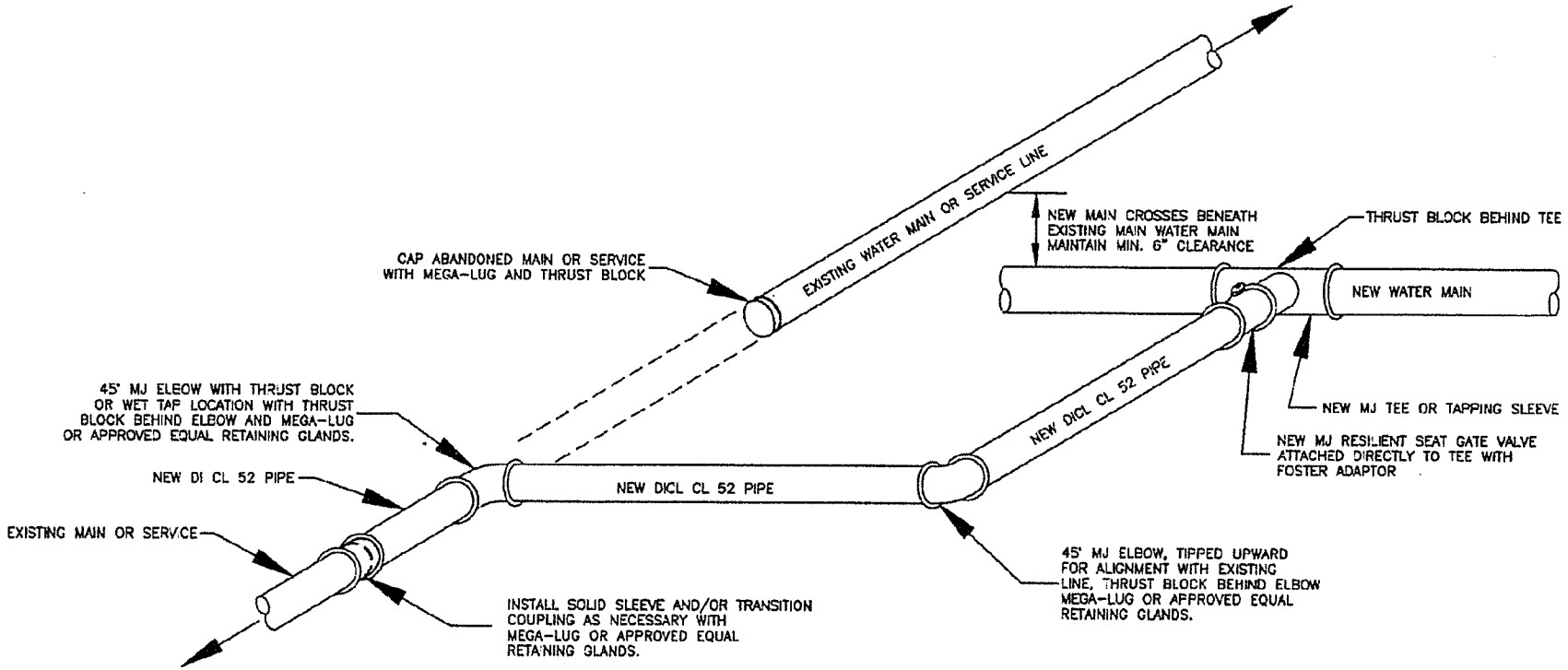


WATER UNDER SEWER LINE CROSSING

-DETAIL TO BE EMPLOYED WHEN WATER CANNOT CROSS ABOVE SEWER LINE

-PRIOR TO POURING THRUST BLOCKS, ALL FITTINGS ARE TO BE WRAPPED WITH 4 MIL POLYETHELENE

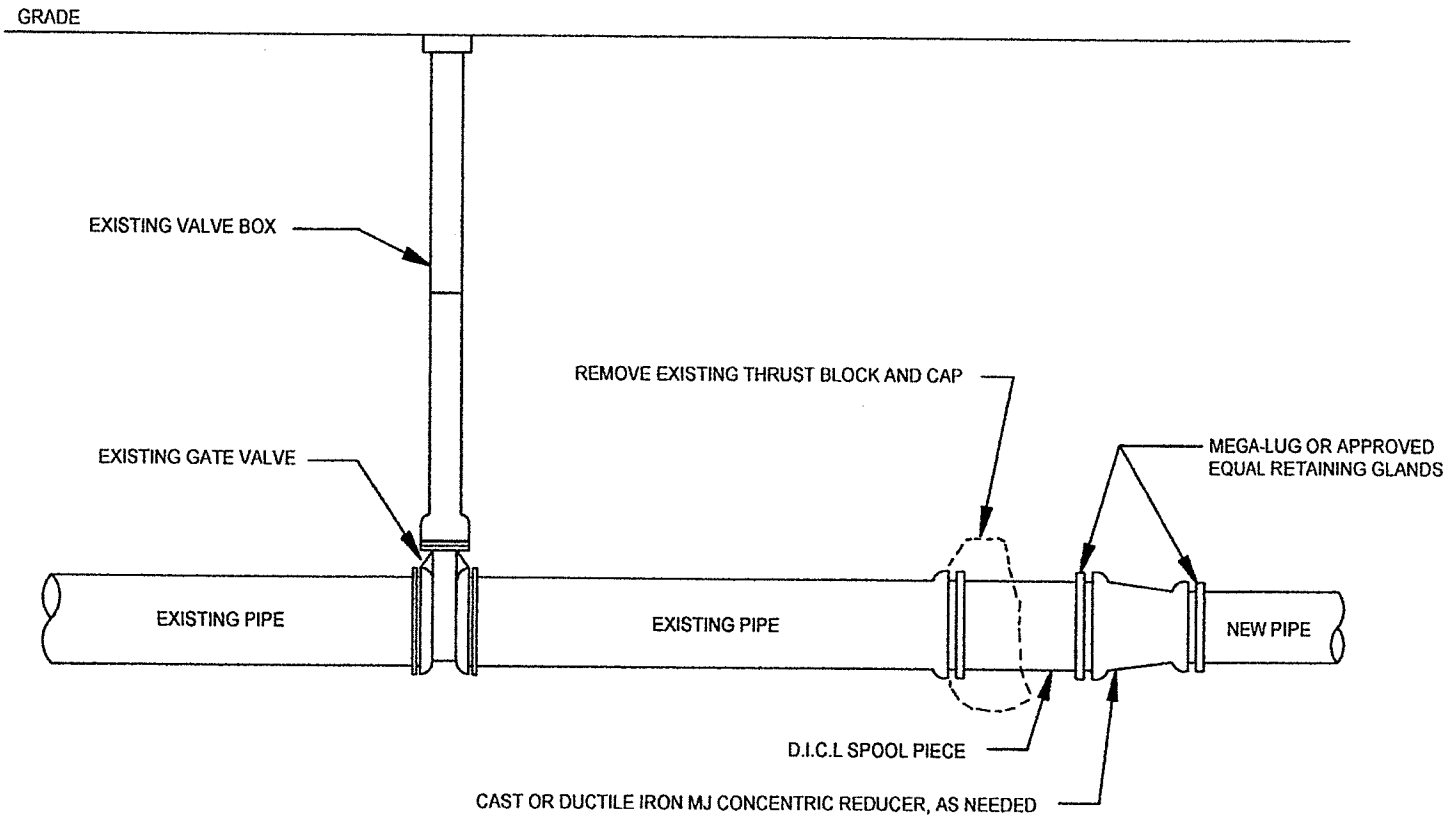
COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Water Under Sewer Line Crossing	March 2018 Drawing No. A10



TYPICAL TIE-IN TO EXISTING WATER MAIN OR LARGE DIAMETER SERVICE

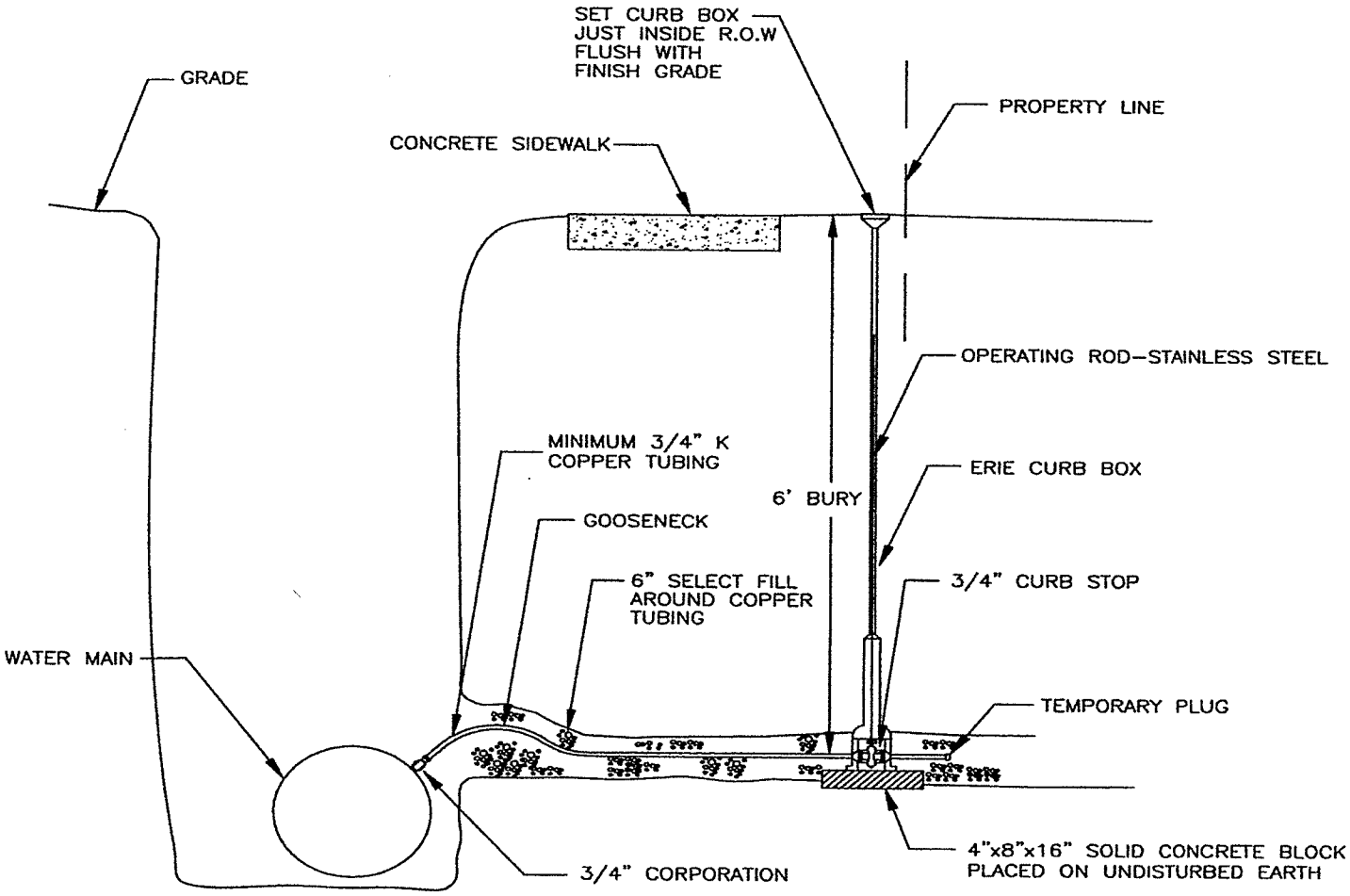
NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Typical Tie-in to Existing Water Main	March 2018 Drawing No. A11



TIE-IN DETAIL

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Tie-In Detail	March 2018 Drawing No. A12

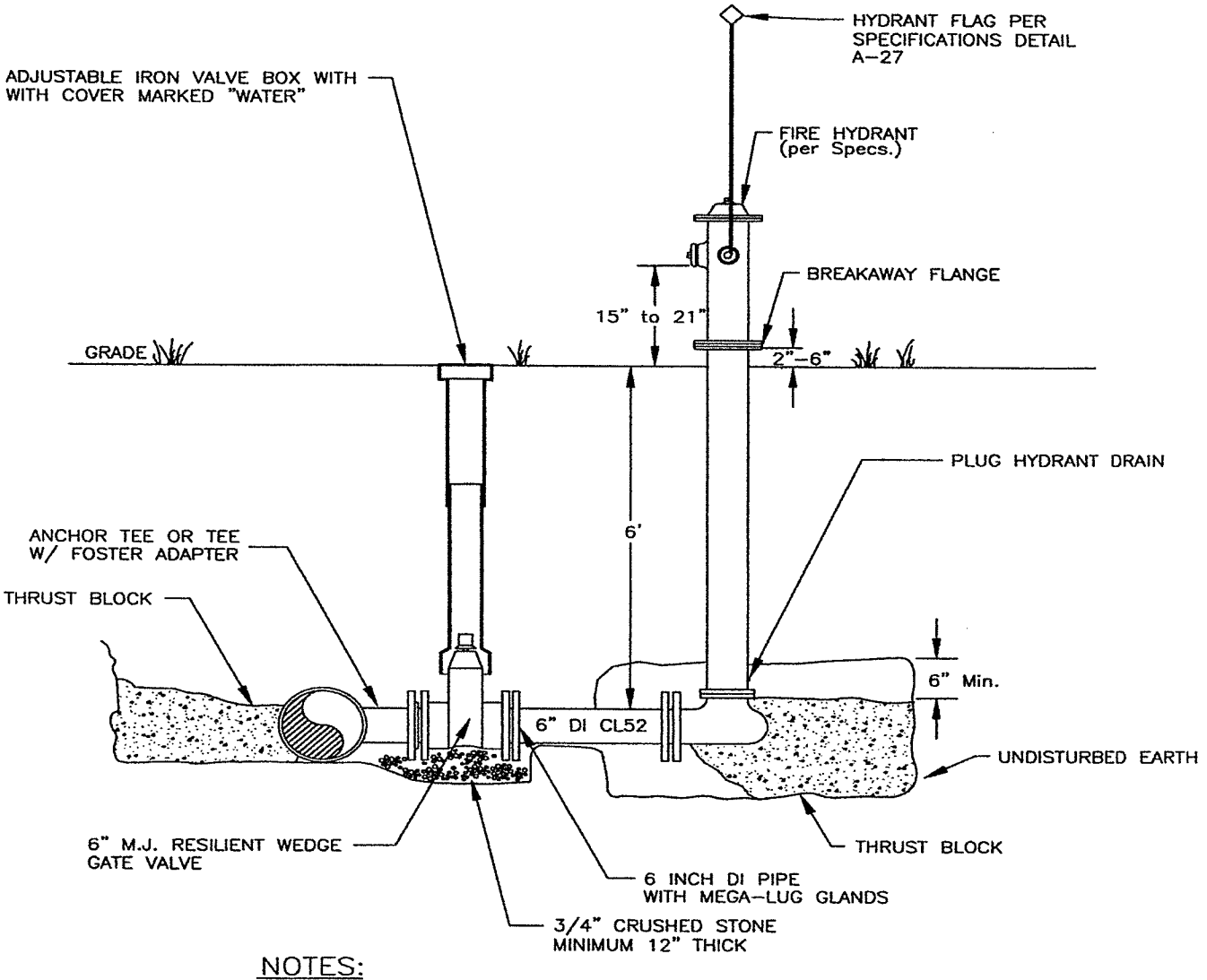


NOTES: 1) SEE SPECIFICATIONS FOR TAPPING SADDLE, CORPORATION, AND CURBSTOP REQUIREMENTS

WATER SERVICE CONNECTION

NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Specifications Detail Water Service Connection	March 2018 Drawing No. A13



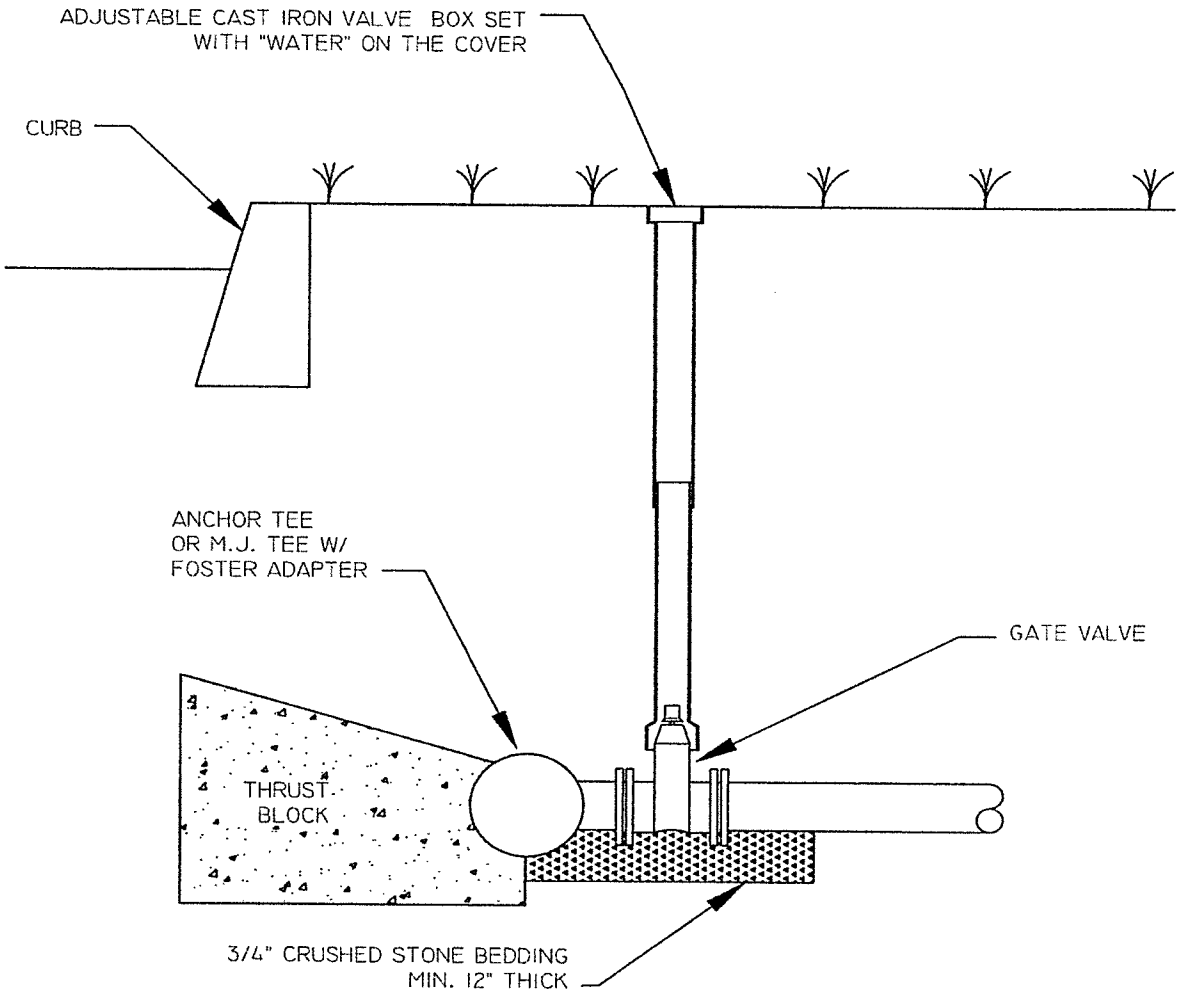
NOTES:

1) ALL FITTINGS ARE TO HAVE WEDGE STYLE RETAINER GLANDS
2) PRIOR TO POURING THRUST BLOCKS ALL FITTINGS ARE TO BE WRAPPED WITH 4mil. POLYETHYLENE.

HYDRANT ASSEMBLY DETAIL

NOT TO SCALE

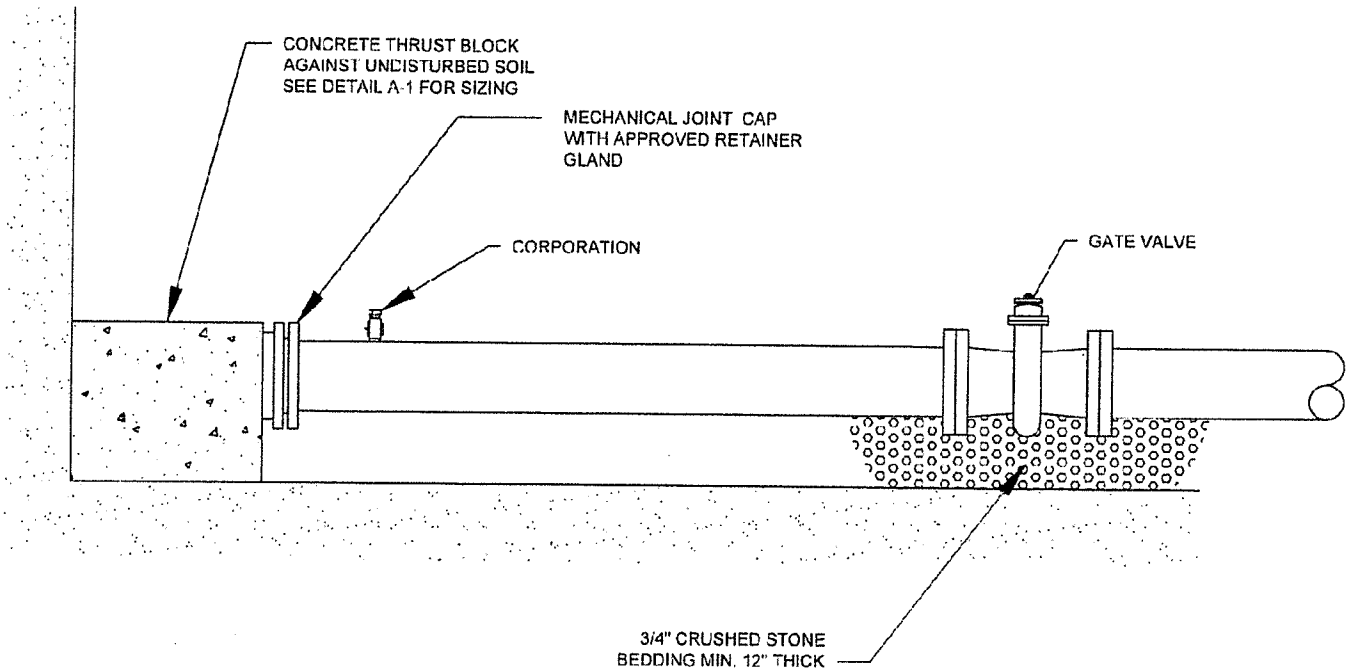
COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Hydrant Assembly Detail	March 2018 Drawing No. A14



TYPICAL FIRE SERVICE CONNECTION DETAIL

NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Specifications Detail Typical Fire Service Connection	March 2018 Drawing No. A15



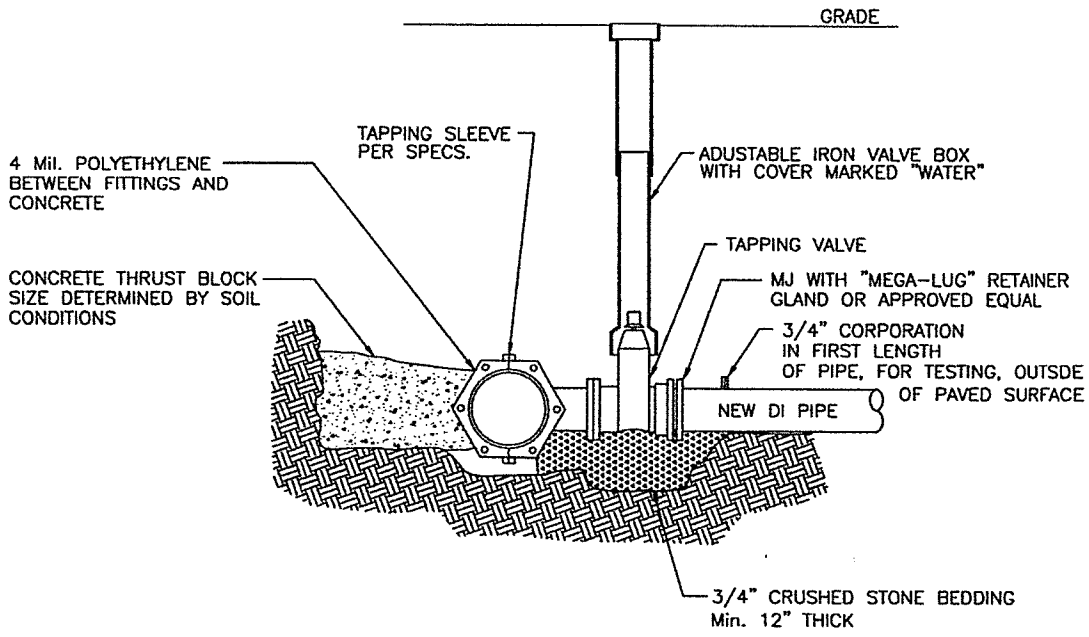
TYPICAL END OF LINE PIPE ANCHOR

NTS

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Typical End of Pipe Anchor	March 2018 Drawing No. A16

NOTES :

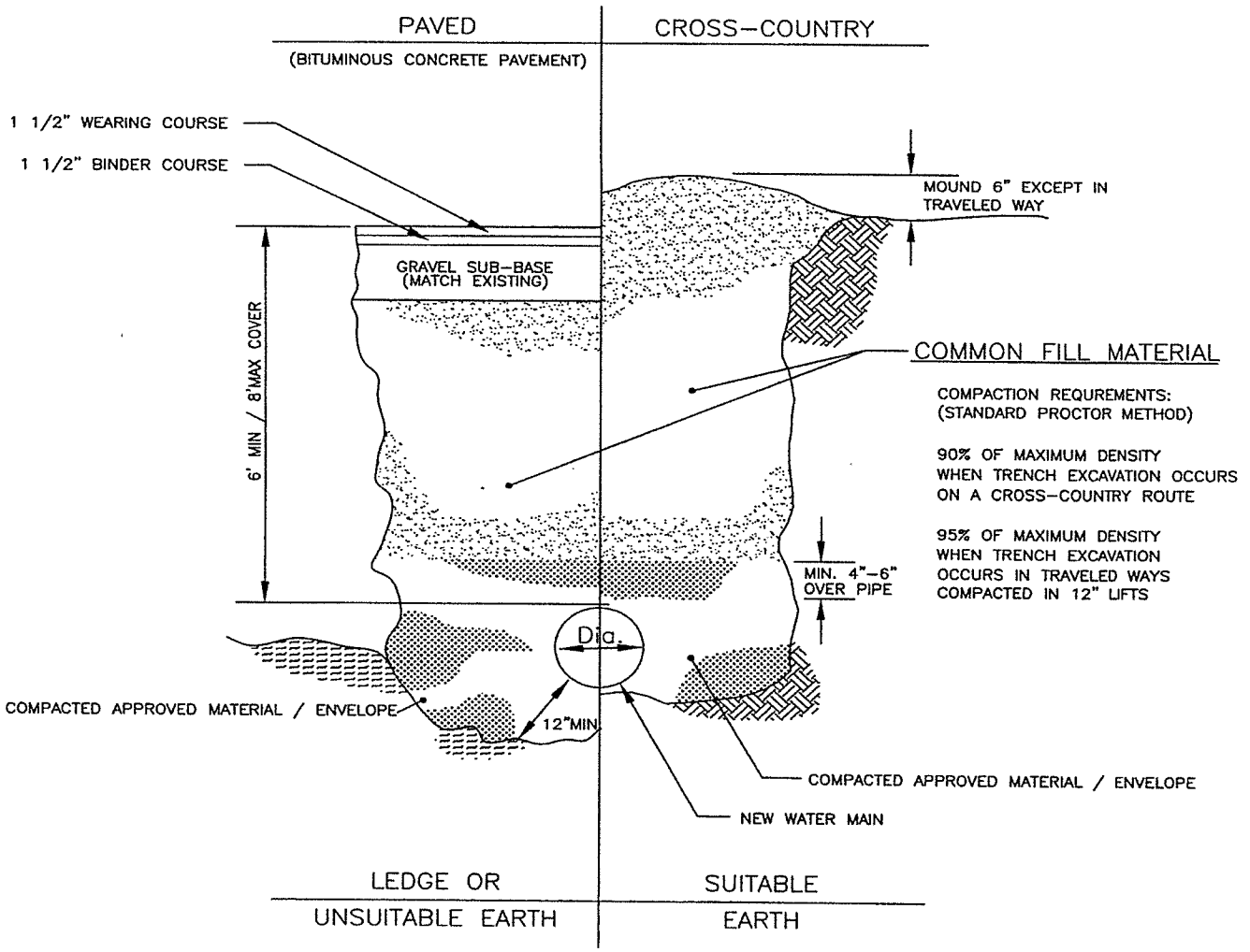
1) WET TAPS SHALL BE PREFORMED BY PRE–APPROVED FIRMS ONLY. POSSESSING A CURRENT CERT. OF INSUR.
2) ALL FITTINGS THAT ARE TO HAVE CONCRETE POURED AROUND THEM ARE TO BE WRAPPED WITH 4 mil. POLYETHYLENE PRIOR TO CONCRETE PLACEMENT.



TAPPING SLEEVE AND VALVE DETAIL

NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Tapping Sleeve and Valve	March 2018 Drawing No. A17



NOTES:

1) ALL TRENCHES SHALL MEET VOSHA STANDARDS PRIOR TO ANY PERSONNEL ENTERING A TRENCH.
2) PAVEMENT REQUIREMENTS PER MUNICIPALITY SPECIFICATIONS
3) SEE DETAIL A–33 IF 6' MIN COVER IS NOT MET

TYPICAL TRENCH DETAIL

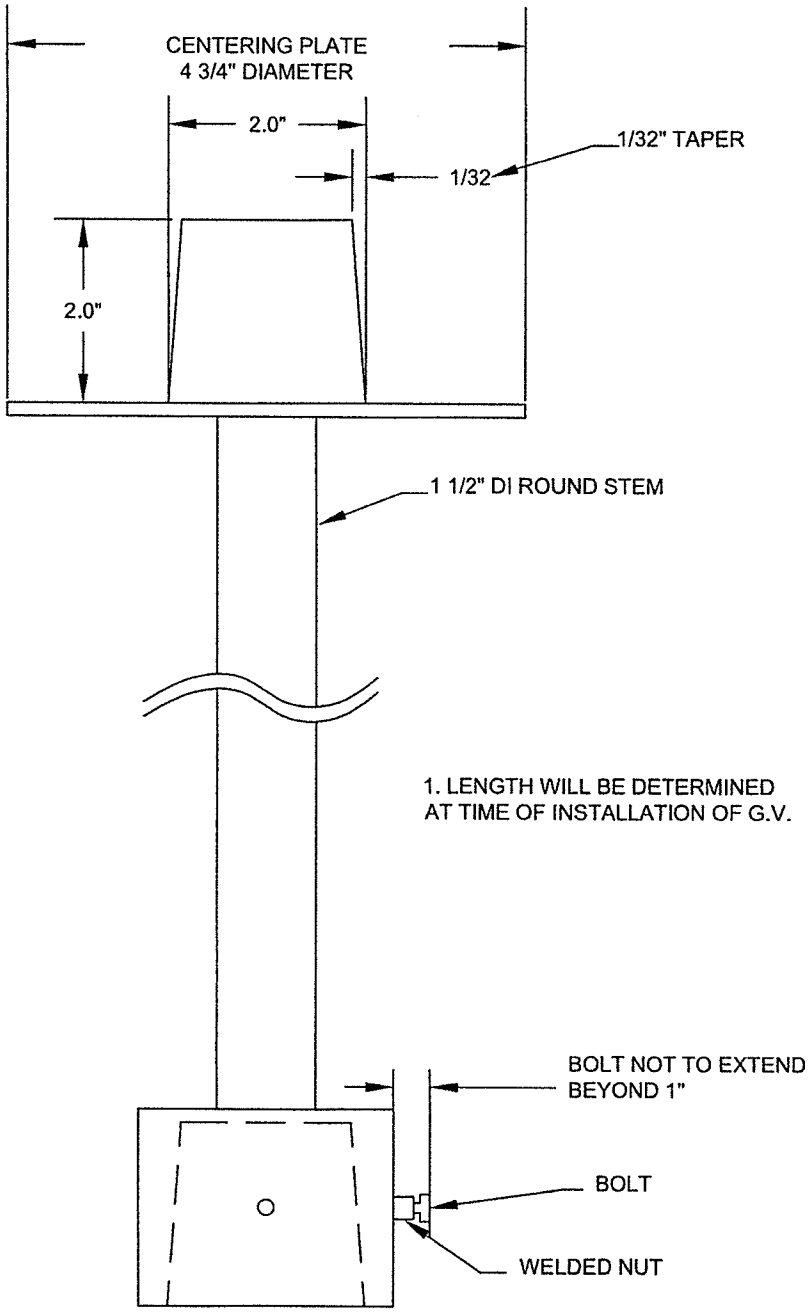
NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO.2

Colchester Fire District No.2
Specifications Detail
Typical Trench Detail

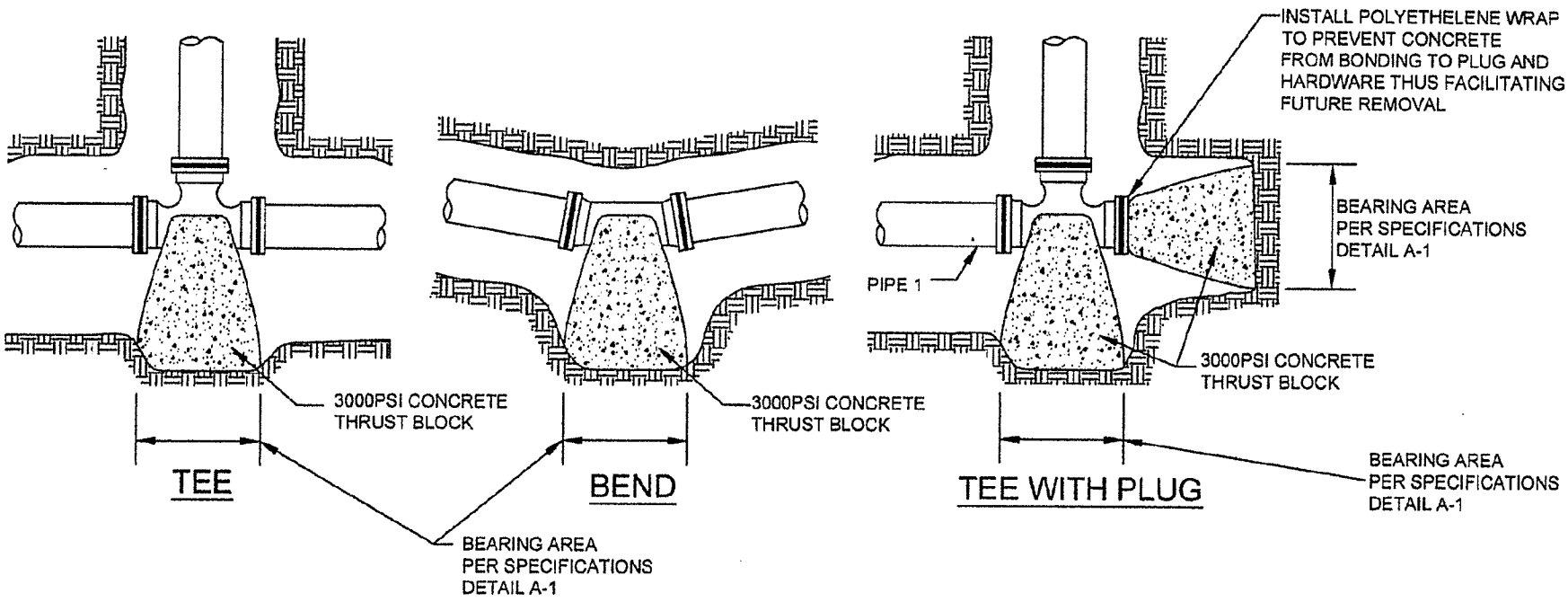
March 2018

Drawing No. A18



STAINLESS STEEL VALVE STEM EXTENSION

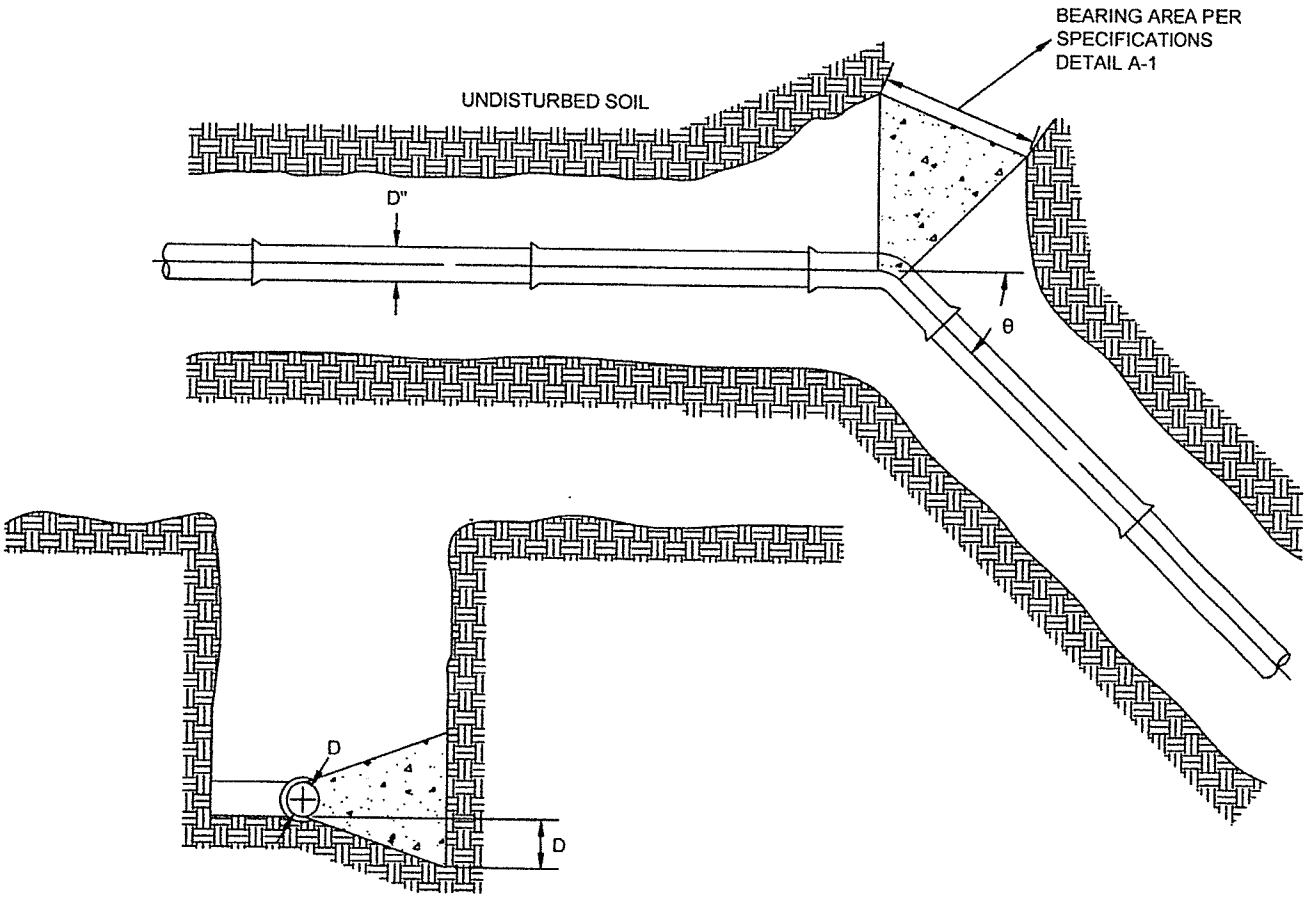
COLCHESTER WATER DEPT. FIRE DISTRICT NO. 2	Colchester Fire District No.2 Specifications Detail Stainless Steel Valve Stem Extension	March 2018 Drawing No. A19



NOTES:

1. CONCRETE NOT TO OVERLAP ANY JOINT.
2. CONCRETE TO BE PLACED SO AS NOT TO INTERFERE WITH REMOVING OR INSTALLING ANY OF THE JOINTING HARDWARE.
3. ALL MECHANICAL JOINT FITTINGS TO HAVE RETAINER GLANDS.

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Typical Concrete Thrust Block Detail	March 2018 Drawing No. A20



SECTION

NOTES:

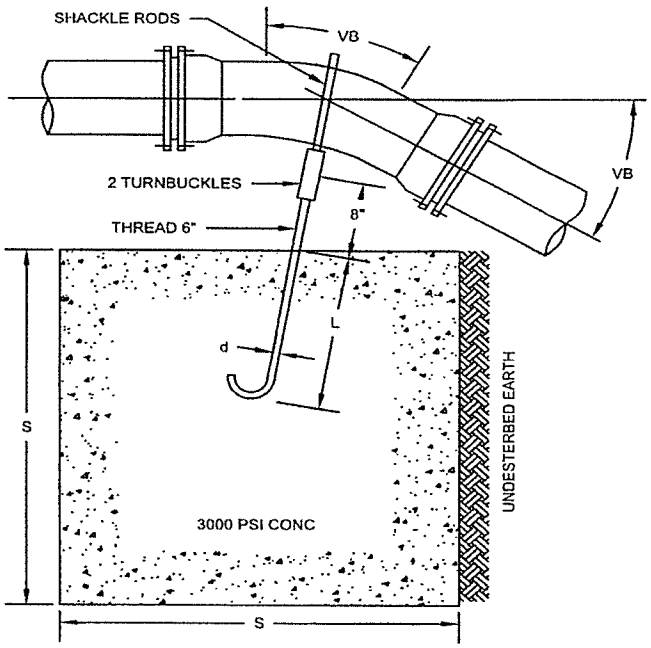
1. BEARING SURFACE SHOULD, WHERE POSSIBLE BE PLACED AGAINST UNDISTURBED SOIL. WHERE IT IS NOT POSSIBLE, THE FILL BETWEEN THE BEARING SURFACE AND UNDISTURBED SOIL MUST BE COMPACTED TO AT LEAST 90% STANDARD PROCTOR DENSITY.

2. BLOCK HEIGHT SHOULD BE CHOSEN SUCH THAT THE CALCULATED BLOCK WIDTHVARIES BETWEEN ONE AND TWO TIMES THE HEIGHT.

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Bearing Block Details	March 2018 Drawing No. A21

TYPE A BLOCKING FOR 11 1/2 - 22 1/2 VERTICAL BENDS					
	VB		S	d	L
PIPE SIZE NOM DIA (INCHES)	VERTICAL BEND DEGREES	NO. OF CUFT OF CONC BLOCKING	SIDE OF CUBE (FEET)	DIA OF SHACKLE RODS(2)* (INCHES)	DEPTH OF RODS IN CONC. (FEET)
4"	11 1/4	8	2.0	3/4"	1.6
	22 1/2	16	2.5		
8"	11 1/4	16	2.5	3/4"	1.6
	22 1/2	32	322		
16"	11 1/4	28	3.0	3/4"	1.6
	22 1/2	55	3.8		
12"	11 1/4	60	3.9	3/4"	1.6
	22 1/2	118	4.9	7/8"	2.2

* FOR 60 KSI THREADED REBAR



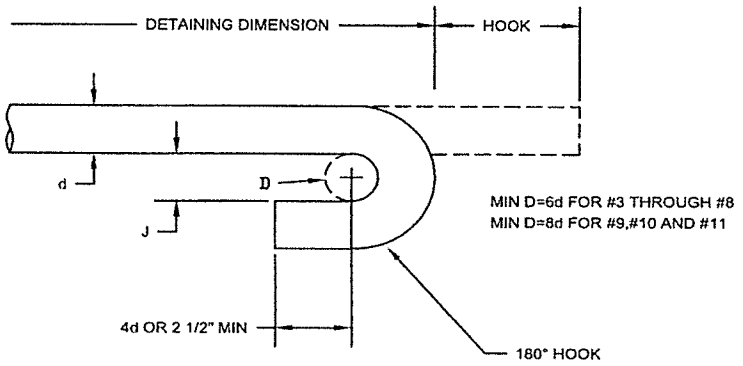
TYPE A BLOCKING
FOR 11 1/2 - 22 1/2 VERTICAL BENDS

GRAVITY THRUST BLOCK DETAILS

NO SCALE
(FOR VERTICAL BENDS ONLY)

RECOMMENDED 180° END HOOK DIMS

BAR SIZE	J (IN)
#6	6
#7	7
#8	8
#9	11 1/4
#10	12 3/4
#11	14 1/4



ACI STANDARD HOOKS

NO SCALE

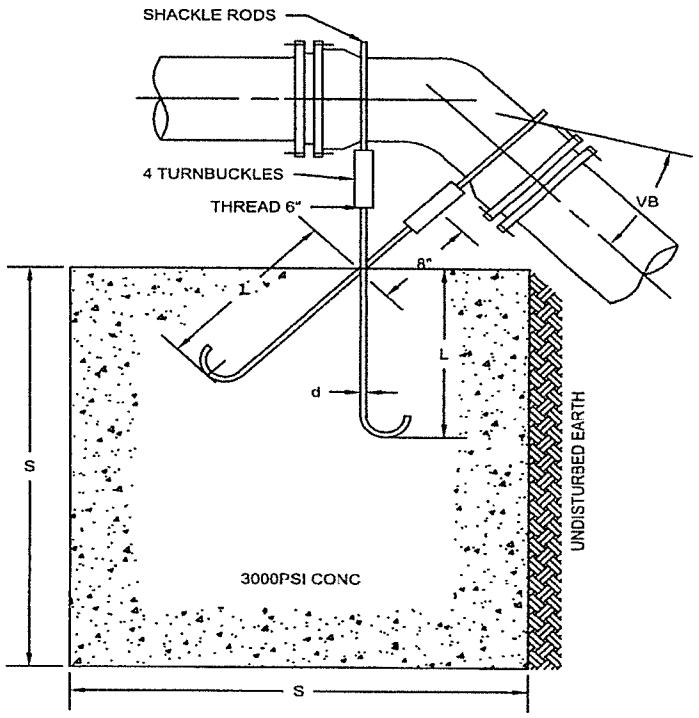
COLCHESTER WATER DEPT. FIRE DISTRICT NO 2

Colchester Fire District No.2
Specifications Detail
Gravity Thrust Block Details

March 2018

Drawing No. A22

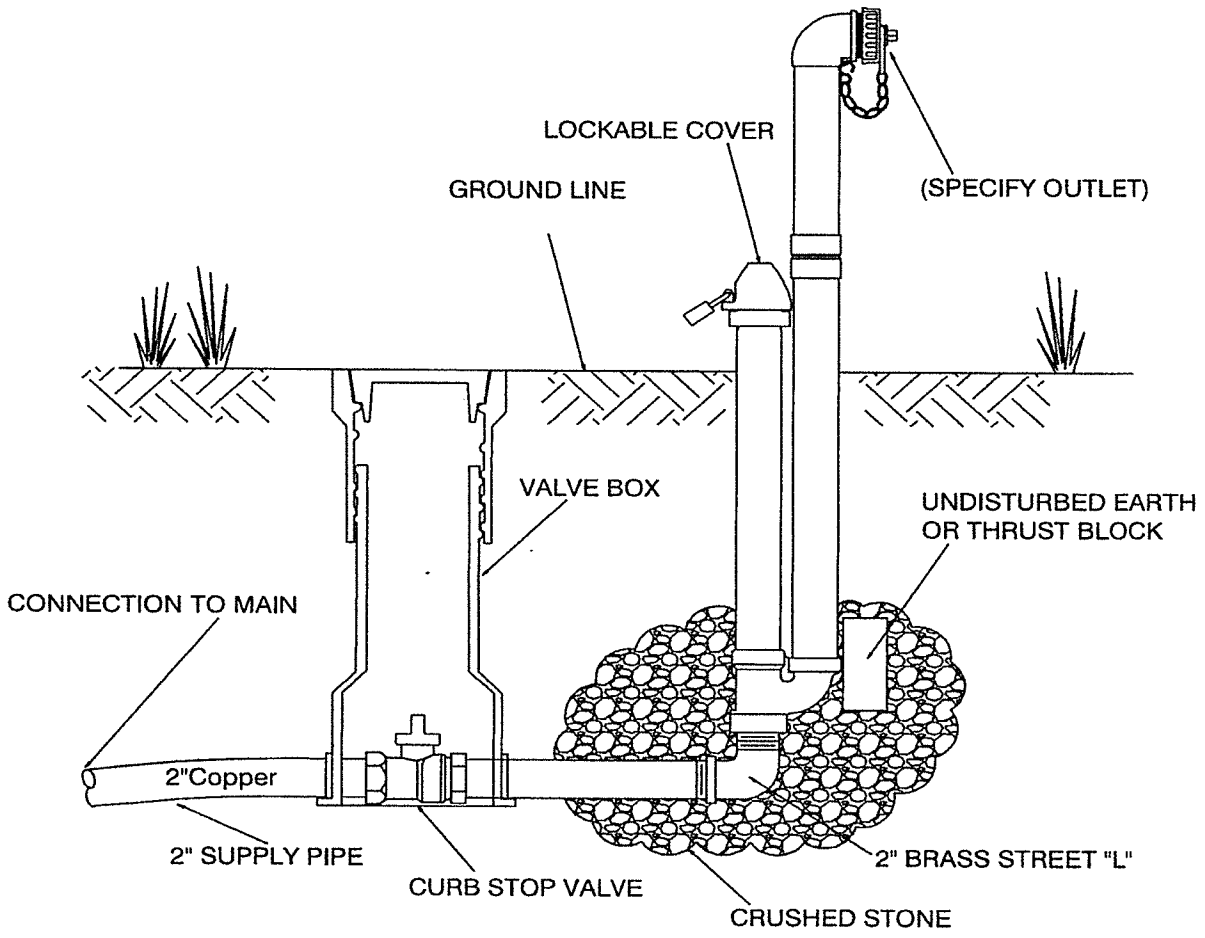
TYPE B BLOCKING FOR 45° VERTICAL BENDS				
		S	d	L
PIPE SIZE NOM DIA(INCHES	NO. OF CUFT OF CONC BLOCKING	SIDE OF CUBE (FEET)	DIA OF SHACKLE RODS(2) (INCHES)	DEPTH OF RODS IN CONC (FEET)
4"	29	3.1	3/4"	1.6
6"	59	3.9		
8"	102"	4.7		
12"	218	6.0		



TYPE B BLOCKING
FOR 45° VERTICAL BENDS

GRAVITY THRUST BLOCK DETAILS

FOR DI BENDS ONLY



Post Hydrant shall be non-freezing, self-draining type with a 5' bury. These hydrants will be furnished with a 2" FIP horizontal, vertical or 2" MJ inlet. A non-turning operating rod and shall open left. Bronze operating mechanism and aluminum plunger design, and be serviceable from above grade with no digging. The outlet shall also be bronze and be 2 1/2" NST or smaller. Hydrants shall be lockable to prevent unauthorized use as manufactured by Kupferle Foundry Co.,St. Louis, MO or approved equal.

Inlet Pressure (psi)	Flow Rate (gpm)
75	675
100	742
125	800
150	856

FLUSHING HYDRANT DETAIL

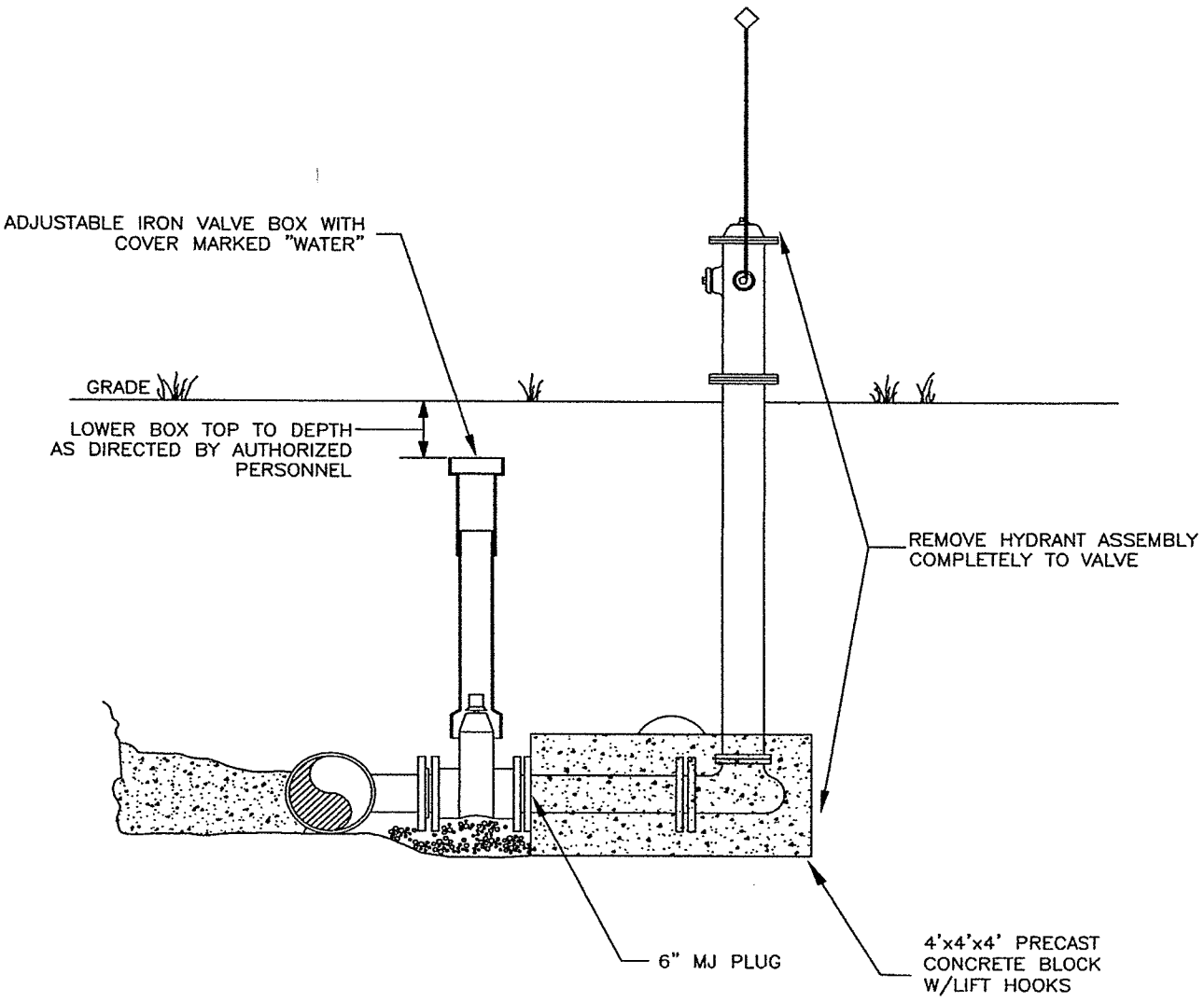
NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO 2

Colchester Fire District No.2
Specifications Detail
2" Flushing Hydrant

March 2018

Drawing No. A24



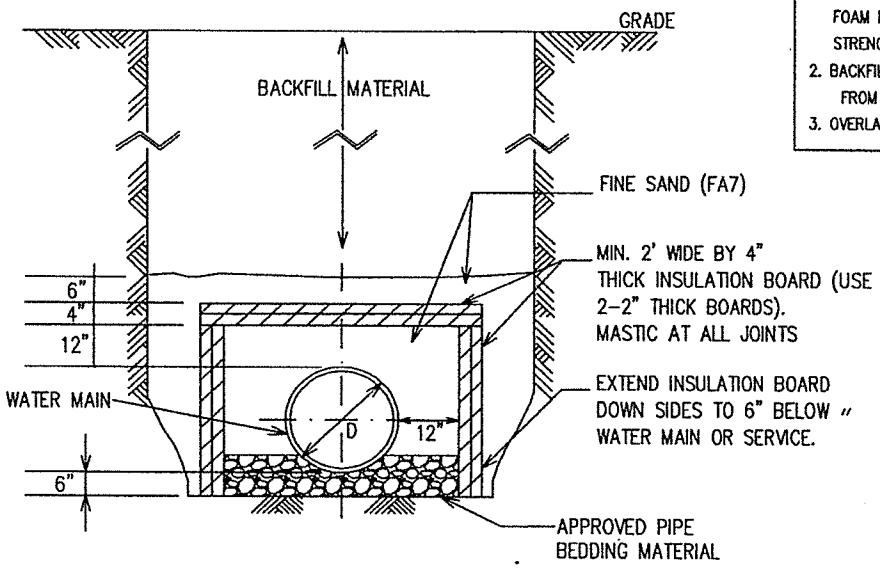
HYDRANT REMOVAL DETAIL

NOT TO SCALE

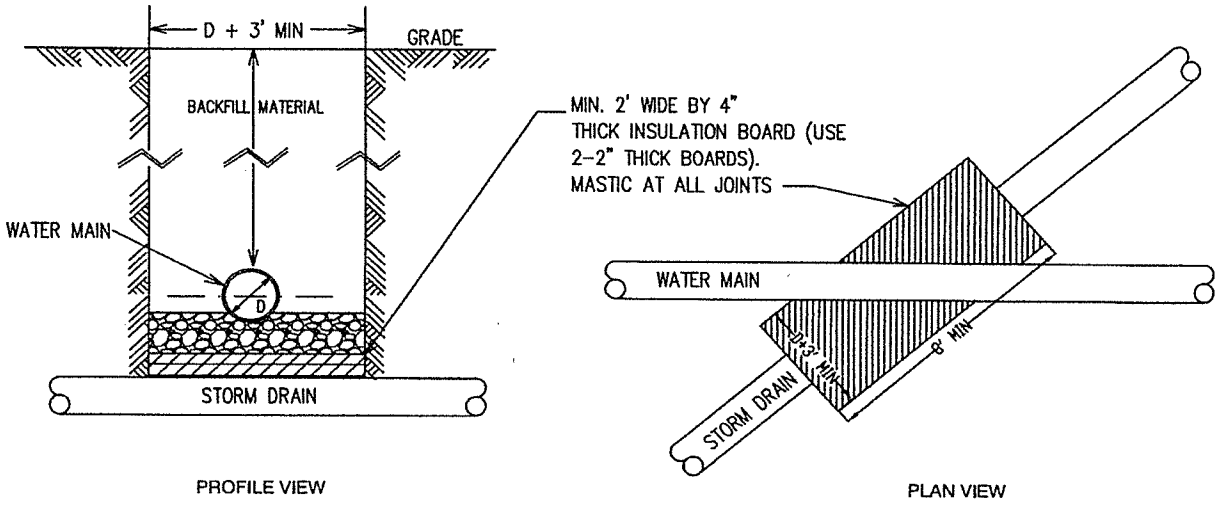
COLCHESTER WATER DEPT. FIRE DISTRICT NO 2	Colchester Fire District No.2 Specifications Detail Hydrant Removal Detail	March 2018 Drawing No. A25

PROVIDE INSULATION WHEN DEPTH OF COVER IS LESS THAN 6 FEET

NOTES:
1. INSULATION BOARD TO BE CLOSED CELL, EXTRUDED POLYSTYRENE FOAM MEETING ASTM 578, TYPE VI, 40 PSI COMPRESSING STRENGTH (ASTM D1621), 0.1% MAX. WATER ABSORPTION (ASTM C272).
2. BACKFILL MATERIAL AROUND INSULATION MUST BE FINE SAND FREE FROM ROOTS, ORGANIC MATTER, OR OTHER INJURIOUS MATERIALS.
3. OVERLAP ALL INSULATION BOARD JOINTS.



PROVIDE INSULATION WHEN WATER MAIN CROSSES ABOVE STORM DRAIN



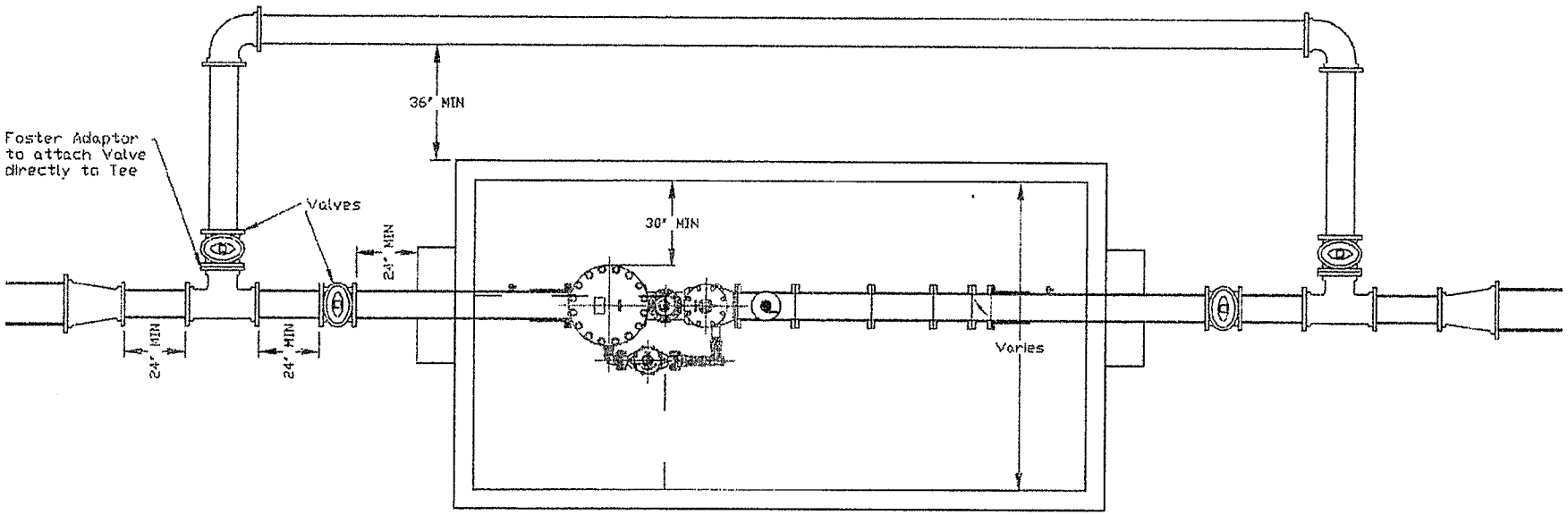
PROFILE VIEW

PLAN VIEW

WATER MAIN INSULATION

NOT TO SCALE

COLCHESTER WATER DEPT. FIRE DISTRICT NO. 2	Colchester Fire District No.2 Specifications Detail Water Main Insulation Detail	March 2018 Drawing No. A26



COLCHESTER WATER DEPT. FIRE DISTRICT NO.2	Colchester Fire District No.2 Meter Vault and Piping Detail	March 2018 Drawing No. A27

Appendix B

Specifications Details Index

Water Main Extension Application

Water Tap Application

Fire Flow Data Sheet

COLCHESTER FIRE DISTRICT No. 2
P. O. BOX 4
COLCHESTER, VERMONT 05446

APPLICATION FOR WATER MAIN EXTENSION AND APPURTENANCES IN DEVELOPMENTS OR PRIVATE LOCATIONS

Application is hereby made to Colchester Fire District No.2 for approval of extension of water lines, hydrants, gate valves, shut-off at the property lines, and all other appurtenances and equipment, to be connected to Colchester Fire District No. 2 water system with water to be supplied by the District. **This application, and any approval thereof, is subject to the Rules & Regulations, Schedule of Rates and Charges, as well as any other requirement as set forth below by the Prudential Committee.** The application for and actual construction of any water main extension shall be at ***NO COST*** to Colchester Fire District No. 2. The Applicant understands that a fee will be imposed by the Fire District to compensate the Fire District for any cost incurred as a result of this application and construction. Applicant and the District agree to the following:

1) A complete set of final engineering plans must be reviewed by the District before any water is supplied or approval issued. After the District has reviewed the final engineering plans, and approves the same, no changes shall be made by anyone without the prior written approval of the District. The District thereto shall install all water line extensions and appurtenances in accordance with District standards and subject to final inspection and approval.

2) A check that is **10%** of the total cost of the planned water extension and all appurtenances must be paid to the District before construction begins. The District will hold the deposit until after water has been on and under constant pressure for a two-year period and proven satisfactory to the District. If repairs have to be made to any part of the water line extension or appurtenances within the two-year period, Applicant will be notified to make the necessary repairs immediately. If repairs are not made, the District will hire a contractor to make the repairs and all expenses and costs of the repairs will be deducted from the aforesaid deposit. The District reserves the right to bring legal suits against Applicant for any deficiency which may result if the deposit is insufficient to cover the cost and expenses of repairs. If the District initiates legal action, the District shall be entitled to recover all costs and reasonable attorney's fees from the Applicant. The deposit, less any repair cost necessary, will be returned to the Applicant two years from the date the entire new water line extension system begins operating, but not until the Applicant has deeded to the Fire District the extensions, water lines, and all other appurtenances thereto, at the applicant's expense.

3) Colchester Fire District No.2 will maintain control of supply of water furnished to anyone within the District and all users must pay for all water, whether used or wasted.

4) It is understood and agreed between the District and the named Applicant's that this extension will automatically become the property of Colchester Fire District No. 2 as a public water supply, free and clear of all encumbrances and free & clear of any costs to the District, if proven

satisfactory, after water has been on and under constant pressure for a two year period. Commencing upon the completion of the last phase of the aforesaid water line extension and any appurtenances thereto, a complete set of" as build" plans will be forwarded to the District as their permanent records. However, the District shall not have any obligation to pay for any cost or expenses incurred for repairing the aforesaid water line extension until the Applicant deeds over to the District the water main extension and all appurtenances thereto. Until the extension and appurtenances thereto are deeded over to the District as a public water supply, the forenamed. Applicant will be liable for maintenance and repair of said extension and all appurtenances.

5) All persons taking the water must keep the fixtures and service pipes within their own premises in good repair and fully protected from frost and must prevent all unnecessary waste of water.

6) The undersigned Applicant (s) agree(s) to all the requirements set forth in the above application.

DATE _____ SIGNED _____

PRINT _____

DATE _____ SIGNED _____

PRINTED _____

Final Plan Submitted (yes or no) DATE _____

Deposit funds received DATE _____

Deposit funds returned DATE _____

Name of Applicant (s) _____

Type of Business Entity State if: Corporation Private Individual or UC other Group)

_____

Location of Planned Water Main Extension, etc.

_____

Number of feet of water main planned _____

Amended/approved September 10, 2015

Water Tap Application

Date: _____

Physical Address: _____

Number of Bedrooms: _____ Number of Bathrooms: _____

Name: _____

Phone No.: ( ) - _____

Billing Address: _____

_____

_____

Water Tap Fee(s) ($2000 per tap) $ _____

Meter Connection Fee(s) ($1000 per meter) $ _____

Impact Fee(s) ($585.00 per bedroom - minimum charge $1,755.00) $ _____

I request _____ water tap(s) for the above stated site.

I, (Owner), acknowledge the following:

(A) Account(s) will be billed quarterly after water is turned on.

(B) I, (Owner), understand that I will be charged 15% on delinquent account balances (those not paid by the due date).

(C) I, (Owner), will provide to the District one (1) set of Engineering Plans that will be approved by the District prior to the approval of this Application.

(D) I, (Owner), understand I need to call Colchester Fire District No.2 at (802)-862-4621 for an inspection of the water tap(s) and curb stop while the ditch is still open.

(E) I, (Owner), understand that closing, tamping and restoration of any road cut is the Owners responsibility. This also includes any settling that may occur later on.

(F) I, (Owner) agree to pay all impact fees per the Fire District Fee Schedule.

(G) I, (Owner) understand that water meters are required on all water service lines in the District.

(H) I, (Owner) agree that I am subject to and will abide by the District Rules and Regulations.

(I) I, (Owner) agree that service connections are to be excavated and tapped by licensed and approved Contractors. If the water main is damaged in any manner in the process of excavating and tapping, the Homeowner and/or Contractor shall ultimately be held responsible for any and all repair costs.

I AGREE TO ALL OF THE ABOVE,

Owner Signature _____ Date: _____

Print Name _____

Contractor Signature (if signing on behalf of owner) _____

Print Name _____ Date: _____

DISTRICT APPROVAL,

Signature: _____ Date: _____

Title: _____

Colchester Fire District No.2
Fire Flow Test Report

Date:_____ **Time:**_____

Test Location:_____ **Test Performed By:**_____

MEASUREMENTS:

USE A 2½" HYDRANT OUTLET (Indicate if other than 2½")_____ *(d)*

FLOW HYDRANTS:

FLOW HYDRANT STATIC PRESSURE:

Hydrant #1_____psi Hydrant #2_____psi Hydrant #3_____psi

FLOW HYDRANT RESIDUAL PRESSURE:

Hydrant #1 _____psi **(P)** Hydrant #2 _____psi **(P)** Hydrant #3 _____psi **(P)**

FLOW READINGS: (Use Formula #1 To Calculate Flows **(Q)**)

Hydrant #1_____GPM(Q_1) Hydrant #2_____GPM(Q_2) Hydrant #3_____GPM(Q_3)

Total Flow ($Q_1 + Q_2 + Q_3$)_____(Q_F)

RESIDUAL HYDRANTS:

RESIDUAL HYDRANT STATIC PRESSURE:

Hydrant #1 _____psi Hydrant #2 _____ psi Hydrant #3 _____psi

RESIDUAL HYDRANT RESIDUAL PRESSURE:(Residuals Must Be At Least 10 psi Below Static)

Hydrant #1 _____psi Hydrant #2 _____ psi Hydrant #3 _____psi

DISCHARGE AT 20 psi RESIDUAL_____ GPM (Q_{20}) (Use Formula #2 below)

FORMULAS:

1) $Q = 29.83\ C\ d^2\ \sqrt{P}$

2) $$Q_{20} = Q_F \frac{H_R^{0.54}}{H_F^{0.54}}$$

Q = Discharge in GPM

C = Hydrant Coefficient (SEE BACK)

d = Diameter of outlet in inches

P = Vel. Pressure in psi.

Q_{20} = Discharge at 20 psi

Q_F = Actual Test Discharge(total flow)

(Use the worst case residual hydrant info.

for the following values)

H_R = Drop from original static pressure to 20 psi residual

H_F = Pressure drop during test in psi

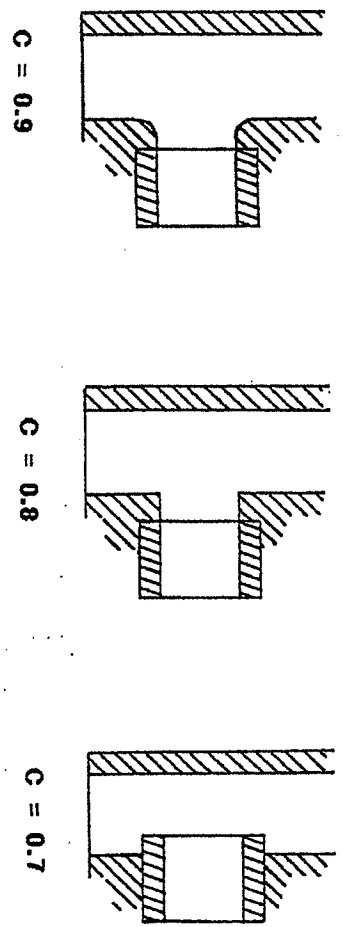
Draw Sketch and Other Information On Back (ie: tank, tank level, pumps, ex...)

CFD No.2 Fire Flow Test Report

Sketch Plan:

NORTH

To determine C for forumla #1
match the hydrant outlet to one below



C = 0.9

C = 0.8

C = 0.7