

BRISTOL WATER DISTRICT
WSID #5002
APPLICATION FOR NEW CONNECTION

Date: _____ May 25, 2022 _____

Name: Firehouse Apartments Limited Partnership

Address: 100 Bank St Ste 400 Burlington VT, 05401

Telephone: 603-724-4937

Property Owner: Stoney Hill Properties LLC

Parcel Number: _____
_____ 225037.01 _____

Location: Firehouse Drive

Type of Connection: multi residential
(single family residential, multi-residential, agricultural, commercial, other)

Commentary: _____

Signature: Kathy Beyer Date: 6/15/2022

.....
Departmental Use Only

Approved: _____ Denied: _____

Remarks: _____

Reviewed by: _____ Date: _____

SECTION 331400 - WATER PIPING

PART 1.00 - GENERAL

1.01 WORK INCLUDED

- A. Water mains, services and fittings.
- B. Fire hydrants and flushing hydrants.
- C. Gate valves and post indicator valves.
- D. Testing of water piping.

1.02 REFERENCE STANDARDS

Information and requirements contained in this Specification are based on the most recent version of the following standards:

- A. AWWA/ANSI Standard C104/A21.4 for Cement-Mortar Lining for Ductile Iron Pipe and Fittings.
- B. AWWA/ANSI Standard C111/A21.11 for Rubber Gasket Joints for Ductile Iron Pipe and Fittings.
- C. AWWA/ANSI Standard C150/A21.50 for the Thickness Design of Ductile Iron Pipe.
- D. AWWA/ANSI Standard C151/A21.51 for Ductile Iron Pipe, centrifugally cast.
- E. AWWA/ANSI Standard C153/A21.53 for Ductile Iron Compact Fittings.
- F. AWWA/ANSI Standard C600 for Installation of Ductile Iron Water Mains and their Appurtenances.
- G. AWWA/ANSI Standard C605 for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
- H. AWWA Standard C509 for Resilient-Seated Gate Valves for Water and Sewerage Systems.
- I. AWWA Standard C515 for Reduced-Wall Resilient-Seated Gate Valves for Water and Sewerage Systems.
- J. AWWA/ANSI Standard C550 for Protective Epoxy Interior Coatings for Valves and Hydrants.
- K. AWWA/ANSI Standard C502 for Dry Barrel Fire Hydrants.
- L. AWWA Standard C651 for Disinfecting Water Mains.
- M. AWWA Standard C800 for Underground Service Line Valves and Fittings.
- N. ASTM Standard Specification B88 for Seamless Copper Water Tube.
- O. AWWA Standard C900 for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch.
- P. AWWA Standard C905 for Polyvinyl Chloride (PVC) Pressure Pipe, 14-inch through 36-inch.
- Q. AWWA Standard C901 for Polyethylene (PE) Pressure Pipe and Tubing, ½-inch through 3-inch.
- R. AWWA Standard C906 for Polyethylene (HDPE) Pressure Pipe and Fittings, 4-inch through 54-inch.
- S. ASTM Standard Specifications 1248 and 3350 for PE3408 High Density Polyethylene (HDPE) Pressure Pipe, with a cell classification of 345434C.
- T. ASTM Standard Specification D2241 for SDR21 (CL200) Polyvinyl Chloride (PVC) Pressure Pipe.
- U. ASTM Standard Specification D1784 for SDR21 (CL200) Polyvinyl Chloride (PVC) Resin Compound.
- V. ASTM Standard Specification D1869 and F477 for SDR21 (CL200) Polyvinyl Chloride (PVC) Rubber Gaskets.
- W. NSF standards for all materials used in the production of potable water pipe.

- X. State of Vermont's "Lead in Consumer Products Law", provisions of Act 193 (9 VSA 2470h(2)).
- Y. Title XIV of the Public Health Service Act Safety of Public Water Systems (Safe Drinking Water Act), Section 1417(d)

1.03 SUBMITTALS

- A. The Contractor shall submit manufacturer's certified data for each pipe type to be used on the Project, including: dimensions, specifications of pipe material, gasket material, pipe class/pressure rating, coatings and linings.
- B. The Contractor shall submit manufacturer's certified data for each type of fitting, valve, post indicator valve, hydrant, flushing hydrant, tapping sleeve, corporation and curb stop to be used on the Project, including: dimensions, specifications of fitting material, gasket material, class/pressure rating, coatings, linings, joint restraints and appurtenances.

1.04 QUALITY ASSURANCE

- A. The Contractor shall be thoroughly trained and experienced in the skills and equipment required for installation and testing of water piping and appurtenances.
- B. The Contractor shall protect water piping materials before, during and after installation. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- C. Upon direction of the Engineer, the Contractor shall remove, replace and/or rework all water piping that does not meet the requirements of this section. The Contractor shall perform all remedial measures at no additional cost to the Owner.
- D. Water System Pressure and Leakage Testing (Ductile Iron, PVC and Copper Pipe only).
 - 1. Engineer shall witness all testing.
 - 2. The maximum length of pipe to be pressure and leakage tested at one time shall not exceed 1,200 feet.
 - 3. Temporary provisions (caps, plugs, valves, etc.) shall be provided and installed by the Contractor as necessary to allow sections of differing pipe types to be isolated and tested independently, due to the differing testing methodologies.
 - 4. The Contractor shall provide all necessary temporary connections, valves and piping to allow proper expulsion of air and connection of test equipment, at no additional cost to the Owner.
 - 5. Flush all piping and exhaust all air from the test section prior to performing pressure and leakage testing.
 - 6. Provide proper temporary or permanent (as applicable) thrust restraints for all system components.
 - 7. Pneumatic (compressed air or gas) testing shall not be allowed, under any circumstances, due to the severe explosive risk danger.
 - 8. Test equipment shall have pressure relief valves so that water system components are not over-pressurized.
 - 9. The pressure and leakage test shall include all services and branch lines. The Contractor shall provide temporary "tails" as necessary to allow air to be bled from each service or branch to above grade. After the system has passed the necessary tests and prior to weather below freezing temperatures, the Contractor shall dig up each service, and as appropriate for the project, either connect the new service to the existing service, or turn off the curb stop and install a short stub of service piping out of the curb stop with a compression cap, minimum 5½ feet below grade.
 - 10. The pressure and leakage tests shall be performed as a combined hydrostatic test

- with duration of two hours at 150% of the normal operating pressure in the piping at the lowest elevation or 200 psi, whichever is greater. The test pressure shall not exceed manufacturer's recommendations for any portion of the system.
11. No water system components within the test section will be accepted if the test pressure cannot be maintained within 5 psi of the required pressure for the entire test period. During the test period, the Contractor may repeatedly pump up the test section to maintain the test pressure within 5 psi of the required test pressure, however the total volume of water added shall be logged to compare against the allowable leakage defined below.
 12. Leakage is defined as the quantity of water that must be supplied into the piping to maintain the test pressure after the pipe has been filled with water and the air expelled. The total volume of water added to bring the pressure back up to the test pressure shall be compared to the allowable leakage, even if the pressure drop is less than 5 psi during the test period.
 13. No water system components within the test section shall be accepted if the leakage is greater than that determined by the formula:
$$L = (S \times D \times \sqrt{P}) / (148,000)$$

L = the allowable leakage, in gallons per hour
S = the length of pipe being tested, in feet
D = the nominal diameter of the pipe, in inches
P = the average test pressure, in psi (gauge)
 14. The test section must pass both the pressure test and the leakage test.
 15. The Contractor shall make all repairs or replacements necessary to obtain passing test results, at no additional expense to the Owner.
- E. Water System Pressure and Leakage Testing (HDPE pipe only)
1. Engineer shall witness all testing.
 2. The maximum length of pipe to be pressure and leakage tested at one time shall not exceed 1,200 feet.
 3. Temporary provisions (caps, plugs, valves, etc.) shall be provided and installed by the Contractor as necessary to allow sections of differing pipe types to be isolated and tested independently, due to the differing testing methodologies.
 4. The Contractor shall provide all necessary temporary connections, valves and piping to allow proper expulsion of air and connection of test equipment, at no additional cost to the Owner.
 5. Flush all piping and exhaust all air from the test section prior to performing pressure and leakage testing.
 6. Provide proper temporary or permanent (as applicable) thrust restraints for all system components.
 7. Pneumatic (compressed air or gas) testing shall not be allowed, under any circumstances, due to the severe explosive risk danger.
 8. Test equipment shall have pressure relief valves so that water system components are not over-pressurized.
 9. The pressure and leakage test shall include all services and branch lines. The Contractor shall provide temporary "tails" as necessary to allow air to be bled from each service to above grade. After the system has passed the necessary tests and prior to weather below freezing temperatures, the Contractor shall dig up each service, and as appropriate for the project, either connect the new service to the existing service, or turn off the curb stop and install a short stub of service piping out of the curb stop with a compression cap, minimum 5½ feet below grade.
 10. The HDPE pipe hydrostatic leak test procedure consists of filling, an initial

- expansion phase, a test period, and depressurizing.
11. Fill the restrained test section completely with water.
 12. Initial Expansion Phase - Gradually pressurize the test section to test pressure, and maintain test pressure for the three (3) hour expansion phase. During the initial expansion phase, polyethylene pipe will expand slightly. Additional water will be required to maintain pressure. It is not necessary to monitor the amount of water added during the initial expansion phase.
 13. Immediately following the initial expansion phase, monitor the amount of make-up water required to maintain within 5 psi of the required test pressure for the two (2) hour test period.
 14. The pressure and leakage tests shall be performed as a combined hydrostatic test with duration of two hours at 150% of the normal operating pressure in the piping at the lowest elevation. The test pressure shall not exceed manufacturer's recommendations for any portion of the system.
 15. No water system components within the test section will be accepted if the test pressure cannot be maintained within 5 psi of the required pressure for the entire test period. During the test period, the Contractor may repeatedly pump up the test section to maintain the test pressure within 5 psi of the required test pressure, however the total volume of water added shall be logged to compare against the allowance for expansion under test pressure defined below.
 16. The maximum test duration is eight (8) hours including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize the test section. If the test is not completed due to leakage, equipment failure, or for any other reason, depressurize the test section completely, and allow it to relax for at least eight (8) hours before pressurizing the test section again.
 17. Leakage is defined as the quantity of water that must be supplied into the piping to maintain the test pressure after the pipe has been filled with water and the air expelled, after the expansion period. The total volume of water added to bring the pressure back up to the test pressure shall be compared to the allowance for expansion under test pressure, even if the pressure drop is less than 5 psi during the test period.
 18. No water system components within the test section shall be accepted if the total volume of water added to bring the pressure back up to the test pressure is greater than allowance for expansion under test pressure determined from the following table:

Table of Allowance for Expansion Under Test Pressure (HDPE Pipe)

Nominal Pipe size (in.)	2-Hour Test (Gal/100 ft of pipe)
2	0.11
3	0.15
4	0.25
6	0.60
8	1.0
10	1.0
12	2.3
14	2.7
16	3.3
18	4.3
20	5.5
22	7.0
24	8.9

19. The test section must pass both the pressure test and the leakage test.
 20. The Contractor shall make all repairs or replacements necessary to obtain passing test results, at no additional expense to the Owner.
- F. Bacteriological Testing
1. After disinfection and final flushing, but before the water system components are activated, the first set of samples shall be taken from each sampling point on the new system. After 24 hours, the second set of samples shall be taken from each sampling point on the new system. The system shall not be flushed between the samples. Two consecutive samples, taken 24 hours apart, must be taken from each sampling point on the new system. Each sample shall be tested by an approved laboratory and determined to be absent of coliform bacteria. If one of the tests fails, the sequence shall be repeated until two (2) consecutive passing tests are obtained from each sample point.
 2. There shall be one sampling point for every 1,200 feet of new water main, including one sampling point from each end of the main and a minimum of one sampling point from each branch.
 3. Sample collection, delivery, preservation and holding times shall comply with the requirements of the laboratory, in accordance with Health Department and AWWA standards.
 4. One sample shall be taken where the project involves Building Services only.
 5. The Contractor is responsible for sample collection, delivery, analysis and all fees. If deemed necessary by the Engineer, the Engineer shall be allowed to take custody and deliver samples to the laboratory.

PART 2.00 - PRODUCTS

2.01 WATER PIPING

- A. Refer to Drawings for locations and sizes of various pipe types required.
- B. Ductile Iron (DI) Water Pipe shall meet the reference standards and the following requirements, as applicable:
 1. Pipe shall be Class 52, ductile iron O.D.
 2. Pipe shall be double cement mortar lined and seal coated.
 3. Pipe shall be coated on the outside with bituminous coating.
 4. Pipe joints shall be push-on bell and spigot type with rubber gaskets, where a different joint type is not indicated on the Drawings or Specifications.
 5. Where indicated on the Drawings, Pipe Joints shall be Restrained Mechanical Joint (MJ) type with “Mega-Lug Series 1100” mechanical joint restraint glands as manufactured by EBAA Iron Sales, Inc., “Uni-Flange Series 1400 Wedge Action” mechanical joint restraint glands as manufactured by Ford Meter Box Co., “One-Lok” mechanical joint restraint glands as manufactured by Sigma Corporation, “Tuf Grip” mechanical joint restraint glands as manufactured by Tyler Union, “RomaGrip” mechanical joint restraint glands as manufactured by Romac Industries, or approved equal, with T-bolts and rubber gaskets.
 6. Where indicated on the Drawings or in this Specification, Pipe Joints shall be “Field Lock” Gasket System restrained push-on bell and spigot joint type, as manufactured by U.S. Pipe & Foundry Co., or approved equal.
 7. Pipe shall be furnished in 18 to 20 foot laying lengths.
 8. Pipe shall be installed with two bronze conductivity wedges per joint for pipe diameters of 3 inches through 12 inches, and three conductivity wedges for pipe diameters greater than 14 inches.

9. Pipe shall be manufactured by Atlantic States Pipe Company, Clow, U.S. Pipe, Griffin, McWane Pipe Company, or approved equal.
- C. Copper Tubing Pipe shall meet the reference standards and the following requirements, as applicable:
 1. Tubing shall be soft tempered, Type “K”, Copper.
 2. Pipe shall be supplied in copper tubing size (CTS) outside diameter.
 3. Pipe shall be furnished in coils.
 4. Pipe joints shall be made with Mueller “110”, Ford “Quick Joint”, Cambridge “CB”, or approved equal, compression fittings.
- D. Each pipe length shall be clearly marked with the manufacturer’s name or trademark, nominal pipe size, material designation, pressure class, dimensional ratio (DR), quality control code and AWWA/ASTM designations.
- E. Pipe Joint Restraints shall be furnished and installed for the required number of joints back from each fitting, as required by the Drawings and details, regardless of the pipe material type.
 1. For ductile iron pipe, Pipe Joint Restraints shall be “Field Lock Gasket System” restrained push-on joint type, as manufactured by U.S. Pipe & Foundry Co.; equivalent product by Tyler Union, or approved equal.

2.02 FITTINGS

- A. Ductile Iron fittings shall be Class 350 compact style with restrained mechanical joints with tee bolts as recommended by the manufacturer. Fittings, glands and gaskets shall be of appropriate style and size for the pipes being connected.
- B. Fittings shall be double cement mortar lined and seal coated.
- C. Fittings shall be coated on the outside with bituminous coating.
- D. All mechanical joint fittings for DI and PVC pipe shall have “Mega-Lug” mechanical joint restraints as manufactured by EBAA Iron Sales, Inc., “Uni-Flange Wedge Action” mechanical joint restraints as manufactured by Ford Meter Box Co., “One-Lok” mechanical joint restraints as manufactured by Sigma Corporation, “Tuf Grip” mechanical joint restraints as manufactured by Tyler Union, “RomaGrip” mechanical joint restraint glands as manufactured by Romac Industries, or approved equal, of the proper style for the pipe type being restrained.
- E. All mechanical joint fittings for HDPE pipe shall be connected to the HDPE pipe with a butt fusion HDPE restrained mechanical joint adaptor of the proper style for the pipe and fitting type being joined. Mechanical joint adaptors must be provided with a stainless steel stiffener that is included in the manufactured fitting.
- F. All mechanical joint fittings for existing cast iron pipe only shall have “Grip Ring” mechanical joint restraints, equivalent product by Griffin Pipe, or approved equal, of the proper style for the pipe type being restrained.
- G. All couplings shall be restrained mechanical joint solid sleeves with ductile iron long body and ductile iron glands. Sleeves, glands and gaskets shall be of appropriate style and size for the pipes being connected. Transition couplings shall be “Alpha Wide Range Restrained Coupling” for ductile iron/cast iron, PVC transitions by Romac Industries, or approved equal.

2.03 GATE VALVES

- A. All Gate Valves shall be epoxy coated, resilient wedge type, with non-rising stem, Waterous model “AFC 2500,” Mueller model “2360 series”, Kennedy model “Ken-Seal II”, or approved equal with restrained mechanical joints.
- B. Valves shall be bubble tight, zero leakage at a minimum working pressure of 200 psi.
- C. All gate valves shall open counter-clockwise (left) with a two inch square operating nut.

- Opening directional arrow shall be cast into the valve body.
- D. Gate Valves shall have stainless steel (304) nuts and bolts.
 - E. Gate Valves shall have a gate wrench extension stem with a centering ring installed when the valve depth exceeds six feet.
 - F. Buried valves shall be equipped with an adjustable, flanged, 5-inch diameter, cast iron valve box with a flush cover marked "WATER",. The box shall enclose the valve operating nut and stuffing box. Box length shall be adequate to allow a minimum of four inches of overlap of sections with top extended to final grade.
 - G. The Contractor shall supply the Owner with quantity three (3), eight foot (8') long, two-inch (2") square, gate valve wrenches, prior to the start of construction.
 - H. Regardless of any named manufacturer, all water main valves shall be "Lead Free". "Lead Free" shall mean that the gate valve shall have a weighted average lead content of less than 0.25%. In addition, all gate valves shall be in compliance with Vermont's Lead in Consumer Products Law, provisions of Act 193.
 - I. Buried valves shall be supplied with a High-Strength Plastic Box Seat, installed on the valve stem beneath the operating nut.

2.04 TAPPING SLEEVES

- A. Tapping Sleeve shall be suitable for direct taps on pressurized water mains.
- B. Tapping sleeves shall be furnished with a test port, and shall be pressure tested by the tapping contractor prior to tapping the pipe. The test shall be witnessed by the Engineer.
- C. Tapping sleeves shall be:
 - 1. Stainless steel, model "3490MJ PowerMJ", as manufactured by Powerseal Pipeline Products Corp., model "SST-MJ", as manufactured by Romac Industries, or approved equal, with a mechanical joint gate valve that complies with Section 2.03.
 - a. Stainless Steel tapping sleeve shall have mechanical joint outlet. Stainless Steel tapping sleeve with flanged outlet shall not be acceptable.
 - b. Stainless Steel tapping sleeve shall have end rings/shoulders to prevent lateral blowout of gasket.
 - c. All materials of construction and hardware shall be stainless steel (304) construction.

2.05 CORPORATIONS

- A. Corporations shall be open left, full flow, ball valve type as manufactured by Mueller, Ford, Cambridge Brass or approved equal.
- B. Corporations shall have AWWA/CC taper threads on the inlet Mueller "110", Ford "Quick Joint", Cambridge "CB" or approved equal restrained compression fitting on the outlet.
- C. Services larger than 2-inch shall be installed utilizing an in-line tee (see Section 2.02 FITTINGS).
- D. Corporations tapped into any pipe type other than ductile iron CL 52 shall utilize a service saddle with double stainless steel straps and nuts, of the appropriate style for the pipe type. Service saddles with U-bolt type straps are unacceptable.
- E. Regardless of any named manufacturer, all corporations shall be Lead Free. Lead Free shall mean that the brass alloy used to manufacture the corporation shall have a lead level equal to or less than 0.1%. In addition, all corporations shall be in compliance with NSF-61, Section 8.

2.06 CURB STOPS

- A. Curb Stops shall be open left, full flow, ball valve type as manufactured by Mueller, Ford, Cambridge Brass or approved equal.
- B. Curb Stops shall have Mueller "110", Ford "Quick Joint", Cambridge "CB" or approved equal restrained compression fittings on the inlet and outlet.
- C. Services larger than 2-inch shall utilize gate valves (see Section 2.03 GATE VALVES).
- D. Curb Stops shall be equipped with a sliding adjustable, cast iron curb box with a Mueller pentagon plug type marked "WATER". Where curb stop box is located in paved or concrete areas, cover shall be pentagon plug type. Where curb stop box is installed along with utility tracer wire, the cover shall be Curb Box EM2-XX-5x-TW with optional tracer wire screw by the Ford Meter Box Company, Inc or approved equal. The box shall be arch-type so as to enclose the curb stop and rest on a concrete base pad and not transfer force to the service or curb stop. Boxes for curb stops larger than 1-inch shall have a heavy foot piece. Box length shall be adequate to allow a minimum of four inches of overlap of sections with top extended to final grade. Curb stops in gravel roads and driveways shall be equipped with an adjustable, flanged, 5-inch diameter, cast iron valve box riser with a flush cover marked "WATER",. The box shall enclose the curb stop cover.
- E. A 30-inch long stainless steel stationary operating rod shall be affixed to the key of the curb stop with a stainless steel cotter pin.
- F. Regardless of any named manufacturer, all curb stops shall be Lead Free. Lead Free shall mean that the brass alloy used to manufacturer the curb stops shall have a lead level equal to or less than 0.1%. In addition, all curb stops shall be in compliance with NSF-61, Section 8.

2.07 PRODUCT STORAGE AND HANDLING

- A. Handle and transport pipe and fittings to insure they are in sound, undamaged condition and to prevent damage to coating and lining, in accordance with manufacturer's instructions.
- B. Furnish slings, straps and other devices to support pipe and fittings when lifted. Do not drop or drag pipe or fittings from trucks onto the ground or into the trench.
- C. Examine all pipe and fittings before installing. Defective or damaged materials shall be rejected.
- D. Pipe or fittings with damaged coatings and/or linings shall be rejected.
- E. Cracked or chipped pipe or fittings shall be rejected.
- F. If defective pipe or fittings are discovered after installation, the Contractor shall remove and replace the defective piece(s) at no additional cost to the Owner.

PART 3.00 - EXECUTION

3.01 GENERAL

- A. Refer to Section 310000 for excavating, bedding, envelope, backfilling and compaction requirements.
- B. When cutting of pipe is required, the cutting shall be done with power saws. Cut ends shall be smooth and at right angles to the pipe. Cut pipe ends shall be beveled and deburred on interior and exterior.

3.02 INSTALLATION

- A. Water mains, building services, and appurtenances shall be installed according to the Drawings.
- B. Pipe shall be laid accurately to the lines and grades indicated on the Drawings.

- C. Pipe shall be bedded uniformly throughout its length and care shall be taken to not have any part of the pipe bearing on rocks or stones. "Point contact" at fittings, joints or along the pipe length is not allowed.
- D. All field cut pipe ends shall be chamfered to avoid damage to the gasket and facilitate assembly.
- E. Push-on bell and spigot type joints shall be assembled per the manufacturer's recommendations.
- F. Deflection of push-on joint pipe shall not exceed manufacturer's recommended limits.
- G. Restrained Mechanical Joints shall be assembled per the manufacturer's recommendations.
- H. Install two or three (depending on pipe diameter) bronze conductivity wedges, installed at "3-o'clock, 9-o'clock and 12-o'clock", per manufacturer's recommendations, at all ductile iron pipe joints.
- I. All fittings shall be adequately supported to prevent undue strain on the pipe, fittings, gaskets and bolts.
- J. All hydrants, valves and curb stops shall be set plumb and in compliance with the Drawings.
- K. Valve and curb boxes shall be installed plumb with the covers level with final grades.
- L. Pipe Joint Restraints shall be installed for the required number of pipe joints back from each fitting, as required by the Drawings and details. Plant batched, poured in place, concrete thrust blocks shall be provided at all directional changes of the main, when restrained pipe joints cannot be used (i.e. connections to existing systems) in compliance with the Drawings. Thrust Blocks shall not be backfilled within 1/2 hour of being poured to allow sufficient time for setting of the concrete. Onsite mixed concrete, such as "Sakrete," is not acceptable.
- M. When pipe laying is not in progress, the open ends of the pipe shall be closed with a water tight plug.
- N. Where water mains or building services cross within two feet of drainage pipe or site conditions do not allow the minimum 5½ foot cover, the Contractor shall install two inches thick, four foot wide, of rigid insulation, suitable for direct burial, for frost protection.
- O. Cover of less than 5½ feet, shall be approved by the Engineer prior to pipe installation. Under no circumstances shall water mains or building services have less than four feet of cover over the top of the pipe. Insulation shall be installed six inches above the pipe on compacted envelope material with care taken to not damage the sheets during trench backfill and compaction.
- P. Where water mains or building services are required to cross wastewater piping, the installation shall comply with the following requirements:
 - 1. Water and sewer mains or services which cross shall have a minimum vertical clearance of 18-inches.
 - 2. Water and sewer pipe joints shall be located as far apart as possible.
 - 3. The Contractor shall provide structural support for exposed water and sewer pipes.
 - 4. For Parallel Installation, there shall be a horizontal separation of 10 feet between water mains and sanitary sewer, and a separation of 5 feet between water mains and storm sewers.
 - 5. In the event 18 inches of vertical clearance (water over sewer) or 10 feet of horizontal separation cannot be achieved or in all cases where sewer is over water (regardless of vertical separation distance), the sanitary sewer pipe must be constructed to water main standards (CL52 D.I. or C-900 PVC) for a minimum of 10 feet in each direction as measured perpendicular to the water main.

6. Connections at each end shall be made with "Fernco" style couplings.

3.03 FLUSHING

- A. All Water Piping shall be flushed at a minimum velocity of 2.5 feet per second. All pipes shall be flushed prior to Leakage and Pressure Testing, Disinfection and Bacteriological Testing.
- B. Care shall be taken to protect property from erosion or other damage during flushing operations.
- C. The flushing operation shall include all services. The Contractor shall provide temporary "tails" as necessary to flush through each service to above grade. After the system has passed the necessary tests and prior to weather below freezing temperatures, the Contractor shall dig up each service, and as appropriate for the project, either connect the new service to the existing service, or turn off the curb stop and install a short stub of service piping out of the curb stop with a compression cap, minimum 5½ feet below grade.

3.04 DISINFECTION

- A. At a point not more than ten feet downstream from the beginning of a new main, water entering the main shall be dosed with chlorine, fed at a constant rate, such that the entire volume of water will have a concentration of not less than 25 mg/l free chlorine. Chlorine levels shall be confirmed with a test kit, however, the following table is provided as a general guide to estimate the volume of chlorine required.

<u>PIPE SIZE (IN.)</u>	<u>1% CHLORINE SOLUTION (GAL.)</u>
4	0.16
6	0.36
8	0.65
10	1.01
12	1.44

Chlorine required to produce 25 mg/l concentration in 100 feet of pipe, by pipe diameter.

- B. Disinfection operations shall not cease until the entire main is filled with heavily chlorinated water.
- C. The disinfection operation shall include all services. The Contractor shall provide temporary "tails" as necessary to disinfect each service to above grade. After the system has passed the necessary tests and prior to weather below freezing temperatures, the Contractor shall dig up each service, and as appropriate for the project, either connect the new service to the existing service, or turn off the curb stop and install a short stub of service piping out of the curb stop with a compression cap, minimum 5½ feet below grade.
- D. The Chlorinated water shall be retained for a minimum of 24 hours, during which all curb stops, valves and hydrants in the treated section shall be operated to ensure disinfection of appurtenances. The water in all portions of the main shall have a minimum residual of 10 mg/l of free chlorine after 24 hours.
- E. The Contractor shall prevent the introduction of heavily chlorinated water into any active portions of the water distribution system.
- F. At the end of the 24 hour period, the main shall be flushed with water from the distribution system until the discharge chlorine concentration is equal to that of the

- system or 1mg/l free chlorine.
- G. The Contractor shall comply with all laws relevant to the discharge of chlorinated water. Water discharged directly or indirectly to water bodies shall not have a chlorine level greater than 0.1 ppm. Water bodies shall include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, wetlands, and any body of surface water, artificial or natural.
 - H. The Contractor shall supply all necessary de-chlorination equipment, materials, chemicals and labor necessary to reduce the chlorine level prior to discharge.
 - I. Any required permits for the discharge of chlorinated water (local or State), are the responsibility of the Contractor.

END OF SECTION 331400

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FIREHOUSE APARTMENTS
Bristol, Vermont

ARCHITECT:
S2 Architecture
3224 Shelburne Rd.
Shelburne, VT 05482
Phone: (802) 985-5595

CIVIL ENGINEER:
Oter Creek Engineering, Inc.
PO Box 712
East Middlebury, VT 05740
Phone: (802) 382-8522



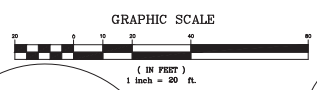
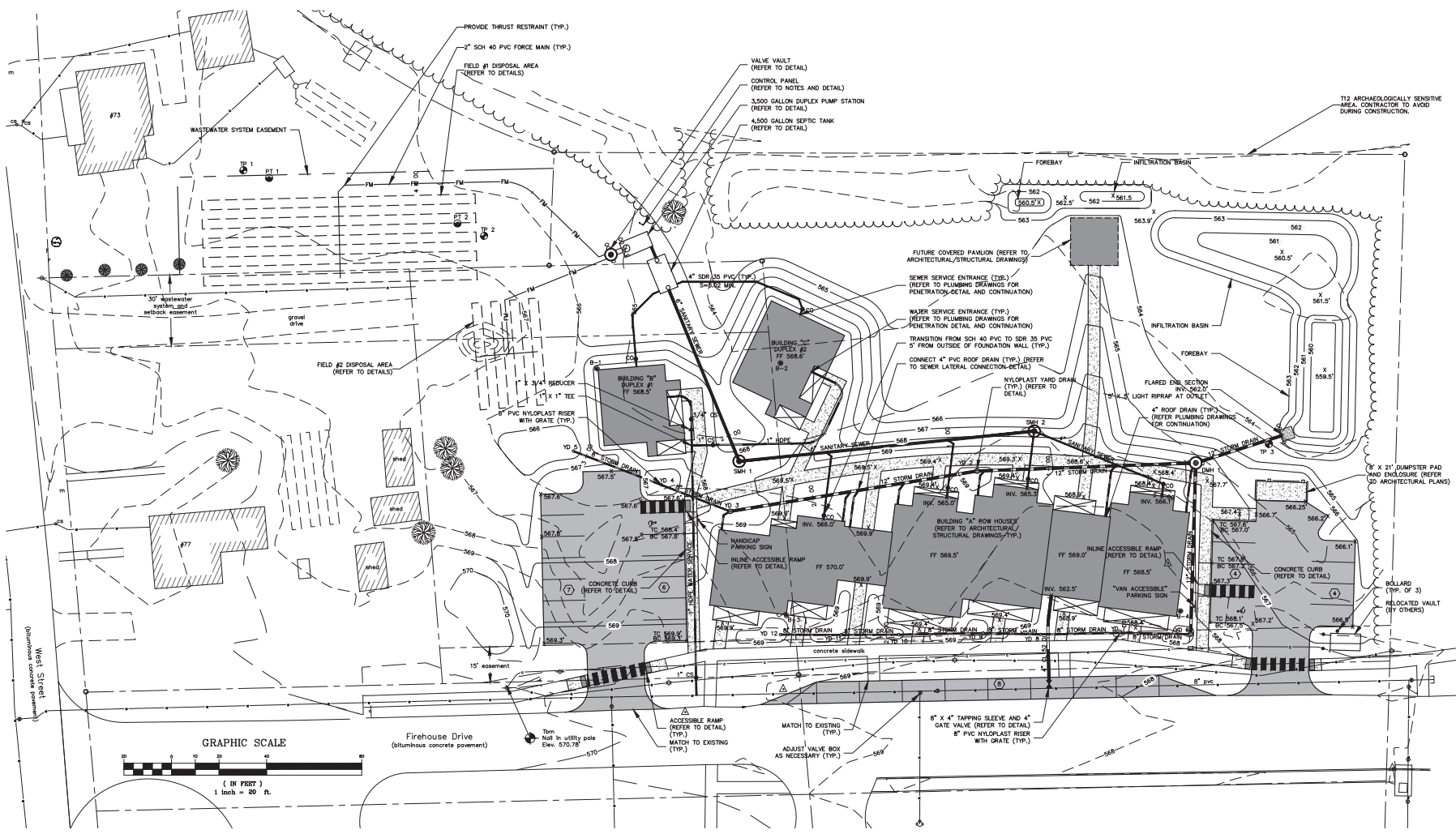
95%
CONSTRUCTION

DATE: 1.6.2022

REVISIONS
2.7.2022 UTILITY REVISIONS

PROPOSED
SITE PLAN

C-1.2



Firehouse Drive
(bituminous concrete pavement)

West Street
(bituminous concrete pavement)

