List of Exhibits

Emery Drive Extension

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NH DIOXANE SITE
WATER SUPPLY EXTENSION AGREEMENT

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AGREEMENT

ARTICLE ONE

RECITALS

1.1 THE PARTIES. This Agreement (the "Water Supply Extension Agreement" or "Agreement") is made this 16th day of December, 2013, between the Environmental Protection Agency - Region I ("EPA"), located at 5 Post Office Square, Suite, 100, Boston, MA 02109-3912, and Hampstead Area Water Company, Inc. ("HAWC"), a privately held public water utility, located at 54 Sawyer Avenue, Atkinson, New Hampshire 03811, and organized and operating under the laws of the State of New Hampshire.

1.2 DESCRIPTION OF THE AGREEMENT. Consistent with EPA's Action Memorandum, issued on June 10, 2012, authorizing a removal action for the New Hampshire Dioxane Site (the "Site"), located in Atkinson, New Hampshire, to provide a long-term domestic potable water supply to certain homes located within the Site, EPA enters into this Water Supply Extension Agreement with HAWC. Under the removal action, EPA is providing funding for the expansion and improvement of HAWC's water distribution system as set forth herein and in the Agreement Documents incorporated into this Agreement (the "Project"). EPA is installing the water line extension under and along public roads pursuant to an access agreement, dated September 19, 2013, with the Town of Atkinson, New Hampshire. The design and construction services required for the Project are being provided under a contract between the EPA and its Emergency Rapid Response Services contractor. In consideration for the payments made by the EPA for the Project, HAWC (1) has already cooperated with the EPA on the approval of the final design, as specified in the attached Construction Documents, of the water system improvements and related work, which comprise the Project; (2) will assist EPA in any inspections and testing required for Final Acceptance; and (3) accept, own, and operate the completed Project so as to provide domestic potable water to the selected homes under the removal action in accordance with federal, state and local laws and regulations.

1.3 DESCRIPTION OF THE PROJECT. Based on information available to date, the Project shall include the construction and installation of approximately 10,800 linear feet of 8-, 6- and 4-inch polyvinyl chloride (PVC) water main pressure pipe, and all associated valves, fittings, and hydrants to extend HAWC's existing water distribution system at Main Street and West Side Drive to nearby properties for service connections.

1.4 PRELIMINARY STATEMENT OF PROJECT COST AND SCHEDULE.

1.4.1 The total cost to EPA for the Project is estimated to be $1,400,000. This estimate includes the extension of the HAWC's domestic potable water system to service up to thirty (30) residential lots as shown on Attachment 2 ("Potential Addresses to Be Serviced"). EPA shall pay to HAWC, pursuant to its tariff issued by the New Hampshire Public Utilities Commission ("PUC"), a main pipe extension payment of no greater than $32,400 to help cover HAWC's engineering, inspection and administration expenses ("Administration Payment"). Should EPA issue a change order to extend the water main extension down Deer Run, the Administration

Payment will be adjusted in accordance with the three dollars per linear foot fee structure in HAWC's tariff to establish a new maximum Administration Payment. EPA will pay the Administration Payment as soon as practicable.

1.4.2 Time is of the essence of this Agreement. The parties expect to complete the Project by July 1, 2014. The timeframe for completion will be revised by EPA, as necessary, during the work. The parties agree to perform their respective obligations under this Agreement in a timely manner and with diligence so as not to delay the completion of the Project.

ARTICLE TWO

AGREEMENT DOCUMENTS AND DEFINITIONS

2.1 The Agreement Documents consist of:

i. this Water Supply Extension Agreement and attachments;
ii. any written change orders or amendments, signed by EPA;
iii. the Construction Documents, as defined below; and
iv. any additional construction documents as approved by EPA, upon consultation with HAWC.

2.2 The Construction Documents consist of the following documents, already approved by EPA and HAWC as final:

i. Plans for Removal Action Watermain Extension and Services NH Dioxane Contamination Site Atkinson, NH, July 2013 ("Project Plans");
ii. Technical Specifications Watermain Extension and Services NH Dioxane Contamination Site Atkinson, NH, August 30, 2013, ("Project Specifications"), and;
iii. HAWC'S Water Systems Standards & Technical Specifications, August 31, 2011 ("HAWC Systems Standards").

2.3 The "Extension" or "Emery Drive Extension" shall mean the fully completed Project, including all materials, and equipment installed in accordance with the Construction Documents upon Final Acceptance by EPA in consultation with HAWC, and upon the franchise expansion approval of PUC.

2.4 "Substantial Completion" shall mean the point when construction is sufficiently complete in accordance with the Construction Documents such that the Extension may be operated for the use for which it is intended. This date shall be confirmed by a Certificate of Substantial Completion issued by EPA upon consultation with HAWC. The Certificate shall also list the items to be completed or corrected ("Punch List") prior to Final Acceptance, and establish time deadlines for their completion or correction.

2.5 "Final Acceptance" shall mean the point at which EPA, upon consultation with HAWC determines that the Project is fully complete after all Punch List work has been completed

following the issuance of a Certificate of Substantial Completion, and delivery of final as-built drawings. The Final Acceptance date shall be confirmed by a Certificate of Final Completion issued by EPA upon consultation with HAWC.

ARTICLE THREE

OBLIGATIONS RELATED TO DESIGN, CONSTRUCTION AND ACCEPTANCE

3.1 PUBLIC UTILITIES COMMISSION. EPA is exempt from the requirement to obtain permits with respect to planned cleanup actions under Section 121(e)(1) of CERCLA, 42 U.S.C. § 9621(e)(1), which provides that "[n]o Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite." HAWC, however, shall apply for and procure PUC approval at HAWC's expense. EPA shall cooperate with HAWC as appropriate to secure PUC's approval for HAWC's franchise expansion to accommodate the Extension. Until PUC franchise expansion approval is received, HAWC cannot accept the Extension even if the Extension is completed. Further, if any EPA change order requires PUC action or impacts upon obtaining PUC approval, the parties acknowledge that this may delay obtaining final approval from the PUC and accordingly, HAWC's acceptance of the Extension.

3.2 CONSTRUCTION DOCUMENTS. The EPA has procured professional engineering and design documents (the above-defined Construction Documents) that are necessary for completion of the Project. The Construction Documents include plans and specifications fixing and describing the requirements for the Project, including all necessary mechanical, electrical, site work and other elements necessary to ensure the successful construction of the Project so as to provide domestic potable water to the affected homes. The Construction Documents include objective standards which shall form the basis for determining Substantial Completion of the Project. The Construction Documents have been prepared by a duly qualified and licensed design professional as required by applicable law or industry code and shall be in accordance law, statutes, and regulations of the State of New Hampshire and HAWC's Systems Standards.

3.2.1 As of the date of signature of this Agreement, HAWC has reviewed and accepted the Construction Documents. HAWC's acceptance of the Construction Documents constitutes its endorsement of the overall design and its agreement that the Project can be constructed in accordance with the Construction Documents to achieve the intended purposes of this Water Supply Extension Agreement. The Construction Documents shall be used by EPA for completion of the Project.

3.3 CONSTRUCTION SCHEDULE. As specified in Section 1300, Part 2.1 of the Project Specifications, a detailed Project schedule ("Schedule"), identifying all critical tasks necessary for completion of the Project and the estimated duration for each such task, shall be prepared. The EPA shall submit the Schedule to HAWC for its review and comment, to be provided to EPA no greater than seven days of receipt. Upon EPA approval, the Schedule establishes the timeframes and applicable deadlines for completion of the Project.

3.4 CONSIDERATION. HAWC acknowledges through its signature below that the funds paid by the EPA for completion of the Project, including the payment contained in Section 1.4.1 above, represent a specific and tangible benefit to HAWC in the form of improvements to and expansion of its water distribution system, and constitute adequate consideration, the receipt of which is hereby acknowledged such that the obligations of HAWC set forth herein are binding and enforceable.

3.5 CONSTRUCTION. HAWC, as the eventual owner of the Project, may attend biweekly meetings, as specified at Section 1010, Part 1.4 and Section 1300, Part 3.1 of the Project Specifications, regarding progress and schedule of the Project. HAWC may also advise and assist EPA in EPA's inspections and monitoring of the construction services, materials, and equipment provided and installed to ensure that the Project is constructed in accordance with the Construction Documents. Any defect, deficiency, or deviation from the Construction Documents that HAWC observes or could have observed with reasonable diligence, shall be reported to the EPA within 7 days of the date of discovery of the defect. Failure to timely notify the EPA shall constitute and waiver and acceptance of such defect, deficiency or deviation by HAWC for purposes of Final Acceptance of the Project and any costs associated with correcting same. In its role of assisting and advising EPA, HAWC shall not be responsible for means or methods of construction nor shall it assume any responsibility for site or job site safety. Neither shall HAWC be responsible for any payments to EPA's contractors, subcontractors, or material suppliers.

3.6 COMPLETION AND ACCEPTANCE OF THE PROJECT.

3.6.1 Upon request initiated by EPA, HAWC may assist and advise EPA when EPA undertakes its inspections and observes testing to ensure that Project meets the objective standards of the Construction Documents as the basis for a determination that Substantial Completion of the Project has been achieved. This shall not prevent HAWC from conducting its own inspections of the work, accompanied by an EPA representative at EPA's discretion, to assure that it complies with HAWC's Systems Standards. Any deviation or deficiency from HAWC's Systems Standards shall be reported to EPA as soon as possible but no later than seven days for action and correction.

3.6.2 If following the completion of inspections and observation of testing pursuant to Section 1010, Part 1.3.g of the Project Specifications, the Project is determined to comply with the Construction Documents, EPA shall issue, upon consultation with HAWC, a Certificate of Substantial Completion together with a list of any remaining items of work ("Punch List") to be completed prior to Final Acceptance. If EPA, after consultation with HAWC, determines that the Project is not Substantially Completed, either because the Project does not pass the required tests, does not comply with the Construction Documents, or for other reasons, the EPA shall direct such additional work, materials, services or equipment as required to achieve Substantial Completion.

3.6.3 Upon Substantial Completion of the Project, the EPA shall provide HAWC with an electronic base map of the extension of the "as-built" plans it has received from its contractor pursuant to Section 1015, Part 1.9 of the Project Specifications that shows the location of all

mains, pipes, valves, and other improvements constructed. EPA's contractor has indicated that it will provide this base map with data to EPA in CAD and PDF format, which EPA will share with HAWC when received.

3.6.4 Once Substantial Completion is achieved and all Punch List work has been completed and the as-built plans submitted to EPA and HAWC, EPA shall issue, upon consultation with HAWC, a Certificate of Final Completion to indicate EPA's Final Acceptance of the Project. Following the issuance of a Certificate of Final Completion, the Project shall be known as the Emery Drive Extension. To the extent that it has such rights and the ability to transfer them, the EPA shall promptly assign to HAWC any and all warranty rights it has with respect to the Emery Drive Extension, including but not limited to the warranty rights specified at Section 2446, Part 1.3.c of the Project Specifications.

3.6.5 Upon Final Acceptance of the Emery Drive Extension, and upon approval of the franchise expansion by PUC, EPA will transfer ownership of the Extension to HAWC after which HAWC shall be solely responsible for its maintenance, use, operation, except for construction warranty items and claims for nonpayment by any of EPA's contractor, subcontractor and material supplier arising from the Construction of the Extension, which shall remain the responsibility of EPA. EPA will cooperate with HAWC in the resolution of any warranty claims. Otherwise, the EPA shall have no further obligation to HAWC under this Agreement or otherwise with regard to the Extension. HAWC shall indemnify and hold the EPA harmless from any and all claims, expenses, damages, costs, fines, and penalties, including legal fees, arising from the maintenance, use, or operation of the Extension, except those otherwise arising from another party's liability for the contamination of the NH Dioxane Site.

ARTICLE FOUR

EPA'S ADDITIONAL OBLIGATIONS

In addition to the above-described obligations set forth in this Agreement, EPA's duties and responsibilities for performance of this Agreement are as follows:

4.1 The EPA shall transfer to HAWC the Extension upon approval of the franchise expansion by the PUC in substantially the same form set forth in Attachment 3 (Quitclaim Transfer of Water Utility Assets) as a Contribution in Aid of Construction (CIAC).

4.2. In the event that an address to be serviced has the average water pressure for water service greater than the maximum pressure of 80 psig, construction shall include the installation of the necessary pressure reducing valves and HAWC and EPA shall cooperate in obtaining of a high pressure agreement in the form of Attachment 4, to be signed by the homeowner. All costs for the foregoing shall be paid by EPA.

4.3 The EPA shall execute documents consistent with this Agreement which are reasonably required by HAWC and legally allowable based on EPA's authority under federal law and policy, as a condition of PUC's approval of HAWC's franchise expansion and HAWC's acceptance of the Extension.

ARTICLE FIVE

HAWC'S ADDITIONAL OBLIGATIONS

In addition to the above-described obligations set forth in this Agreement, HAWC's duties and responsibilities for performance of this Agreement are as follows:

5.1 HAWC shall petition the PUC within twenty one days of signature of this Water Supply Extension Agreement for permission to expand its franchise to accommodate the Extension as set forth herein and in the Construction Documents. The Parties agree that the dates listed in this Agreement may be adjusted due to the completion of the PUC petition process.

5.2 Upon approval by the PUC, and after conveyance of the Extension to HAWC, HAWC shall operate, repair, and maintain the Extension in order to provide sufficient domestic potable water pursuant to New Hampshire Department of Environmental Services standards and regulations to the connected homes.

5.3 HAWC shall accept as Contribution in Aid of Construction (CIAC) the Extension assets so contributed by the EPA.

ARTICLE SIX

PROJECT REPRESENTATIVES

6.1 The Project representative for the EPA is John McKeown. The representative shall have authority to make decisions on behalf of the EPA. EPA shall promptly notify HAWC if EPA's Project representative is changed to another person. Mr. McKeown may be reached at Environmental Protection Agency Region I, Emergency Planning and Response Branch ("EPA"), 5 Post Office Square, Suite, 100 (Mailcode OSRR02-2), Boston, MA 02109-3912; and at mckeown.john@epa.gov.

6.2 The Project representative for HAWC is Charles Lanza. The representative shall have authority to make decisions on behalf of HAWC. HAWC shall promptly notify EPA if HAWC's Project representative is changed to another person. Mr. Lanza may be reached at Hampstead Area Water Company, Inc., 54 Sawyer Avenue, Atkinson, New Hampshire 03811; and at charlie@hampsteadwater.com.

ARTICLE SEVEN

INSURANCE

7.1 Under EPA's contract requirements, EPA's hired contractors that will perform work to complete the Extension must maintain insurance coverage with minimum liability coverage as follows:

- Comprehensive general liability: $1 million
- Comprehensive automobile liability insurance: $1 million
- Worker's compensation and employers liability: $1 million

ARTICLE EIGHT

DISPUTE RESOLUTION

8.1 **RESOLUTION OF DISPUTES**. The parties shall attempt to resolve any and all disputes arising out of or relating to this Agreement through direct negotiations within 20 days after receipt of a notice of dispute from a party. At any time during the 20-day informal dispute resolution period, either HAWC or EPA may propose the use of a mediator, as mutually agreed to by EPA and HAWC, to assist in resolving the dispute. In addition, upon the request of HAWC or EPA, a meeting shall take place between the parties to the dispute with the assistance of a mediator for the purpose of resolving the dispute and/or determining whether to undertake further mediated discussions. This initial meeting shall take place within ten business days of the party's request, unless HAWC and EPA agree to extend that period. Upon the written agreement of HAWC and EPA, the period for informal dispute resolution may be extended for the purpose of mediating the dispute.

8.1.1 After the initial mediated meeting, the decision to continue the mediation shall be in the sole discretion of each party.

8.1.2 All claims, disputes, or other matters in controversy arising out of or related to the Agreement shall be subject to mediation as described above as a condition precedent to litigation. In the event that the parties cannot resolve a dispute by informal negotiations or under mediation, then the parties may resolve the dispute by other available legal means as necessary.

8.2 **COSTS OF MEDIATION**. The parties agree that they will share equally the costs of mediation, subject to the availability of EPA funds for this purpose. EPA's ability to share the costs of mediation will be determined by EPA in its sole discretion and shall not be subject to dispute resolution or judicial review. If EPA determines that no mediation funding is available, Respondent shall have the option to cover all of the mediation costs or to request the services of a trained mediator from EPA's in-house ADR program or any other dispute resolution professional whose services may be available to the parties at no cost.

8.3 CONFIDENTIALITY. The parties agree that participants in mediated discussions pursuant to this Section shall execute a confidentiality agreement in a form agreeable to both parties.

ARTICLE NINE

MISCELLANEOUS PROVISIONS

9.1 GOVERNING LAW. This Agreement shall be governed by the laws of the United States and the State of New Hampshire, and constitutes the entire agreement of the Parties.

9.2 NOTICES. Notice to the parties shall be given to the parties' Project representatives at the above addresses.

9.3 EXTENT OF AGREEMENT. This Agreement is solely for the benefit of the Parties, represents the entire and integrated agreement between them, and supersedes all prior negotiations, representations, or agreements, either written or oral.

US ENVIRONMENTAL PROTECTION AGENCY

By _____
James T. Owens, III, Director
Office of Site Remediation and Restoration

HAMPSTEAD AREA WATER COMPANY, INC.

By _____
Harold J. Morse, Its President

Attachment 1

CONSTRUCTION DOCUMENTS

TECHNICAL SPECIFICATIONS
WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE
ATKINSON, NEW HAMPSHIRE

Contract EP-W-05-042, Task Order 0008

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Prepared by:

WESTON SOLUTIONS, INC.
45 Constitution Avenue
Concord, New Hampshire 03301

30 August 2013

ISSUED FOR CONSTRUCTION

W.O. No. 20114.082.008.0800

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DRAWINGS
Bound Separately

SECTION 01010

SUMMARY OF WORK

PART I – GENERAL

1.1 BACKGROUND

a. Purpose

Prior environmental assessments at the project area indicate elevated levels of 1,4-Dioxane have been detected in the private water supply wells at several of the area residences. It has been determined by others that extension of the public water supply to affected and potentially affected residences is a cost effective means to ensure public health/safety from the groundwater contamination.

The Project Scope of Work includes construction of extensions to the existing water distribution system owned and operated by the Hampstead Area Water Company (HAWC) and water services from the extensions and existing system to selected residences in accordance with these specifications and drawings.

b. Authority

This work will be performed for the U.S. Environmental Protection Agency (EPA, referred to as "Owner") acting through its On-Scene Coordinator (OSC) as part of a Time Critical Removal Action. Weston Solutions, Inc. (WESTON®, referred to as "Engineer") prepared the design and may provide construction phase engineering for the EPA. The Engineer may provide technical consultation and recommendations to the Owner. References in these specifications to approval or approval by the Engineer shall be understood as an approval sought from and granted by the Owner. The Engineer has no authority to direct or approve the work of the Contractor. References in these specifications to submittals shall be understood as submittals to be made to the Owner. References in these specifications to Contract and Contract Documents shall be understood to mean the agreement or order authorizing the Contractor to perform the work and the associated documents describing the work, including these specifications and drawings.

1.2 SCOPE OF WORK

a. Water Main

This work includes installation of approximately 10,800 LF of 8-, 6- and 4-inch molecularly oriented polyvinyl chloride (PVCO) water main pressure pipe, and all associated valves, fittings, and hydrants to extend the existing water distribution

system from connections to the existing HAWC system at Main Street and West Side Drive. The work includes trenching, dewatering, ledge and boulder excavation, bedding, pipelaying, backfill and compaction, horizontal directional drilling, pressure testing, flushing, disinfection and re-flushing, bacterial testing, and related work to place the water main extensions into service.

b. Services

The installation of water services to designated residences is not included at this time but may be added to this work.

c. House Service Connections

The work of completing the water services, making connections to existing plumbing within the designated residences including valves, backflow preventer, meter and remote reader, where specified, and fittings, and disconnecting the existing private water services is not included at this time but may be added to the work.

d. Restoration

Included in this work is the restoration of the work area including disturbed roads, driveways, lawns and cross country areas, and utilities.

1. Roads - The roads that are to be disturbed for the water main extension are to be saw cut as shown on the Drawings and as noted in the Specifications. For restoration, the Contractor will place the binder course of bituminous concrete pavement within five (5) calendar days of completing the water main and the wearing course within thirty (30) calendar days of the placement of the binder course.

2. Driveways – Existing surfaces of driveways include bituminous concrete and crushed gravel. The restoration of each driveway will match the existing surface make-up.

3. Lawns and Cross Country – Restoration of lawns and cross-country areas will include placement of topsoil and establishment of turf. Restoration of stonewalls, shrubs, and/or other types of landscaping will also be performed.

4. Utilities – Utilities (including stormwater culverts) disturbed as a result of the Work shall be restored to the standards established by the respective utility owner to the satisfaction of the Owner. Unplanned and unnecessary disturbance of utilities shall be minimized.

e. Traffic Control

The Contractor will be responsible for maintaining traffic through the work area through the use of work phasing, proper traffic control devices, and maintenance of the traveled surface until the work is complete. Trained flagger personnel are to be provided when working in or adjacent to traveled ways. Uniformed officers are to be provided to supplement flaggers at locations specified by the local police. If possible, two way traffic will be maintained. At a minimum, one way traffic will be maintained during the working day. A traffic control plan must be submitted and approved prior to beginning work. Disturbance and obstruction of private driveways shall be minimized and coordinated with the respective property owner through the Owner.

f. Incidental Work

The work includes other incidental work associated with the construction as required by these specifications and drawings and as ordered by the Owner. Incidental work includes but is not limited to the following:

1. Utility notification, Dig-Safe notification, and pre-excavation clearance.
2. Miscellaneous clearing, grubbing, and stripping.
3. Clean-up.
4. Traffic control and signage.
5. Restoration of disturbed property.
6. Restoration of disturbed property markers.
7. Cooperation with other contractors and others.
8. Utility and culvert crossings.
9. Steel and/or wood sheeting as required (not left in place).
10. Preparation and maintenance of a Stormwater Pollution Prevention Plan and filing NOI.
11. Temporary erosion control.
12. All dewatering including trenches and structure excavations.
13. Connections to all water lines.
14. Preconstruction survey.
15. Pre-blast survey.
16. Road Opening Permit and associated bonds.
17. Blasting Permit
18. Permits, bonds and insurance not otherwise identified.
19. Holding or otherwise supporting utility poles.

1.3 SPECIAL REQUIREMENTS

a. During execution of any and all items of the Work, extreme care shall be exercised by the Contractor to preclude any interference/disturbance of existing structure, roadways, above-grade and below-grade utilities, or other features not associated with the Work.

b. The Contractor shall prevent damage, movement, settlement or collapse of structures, roadways, above-grade and below-grade utilities, or other features not associated with the Work. The Contractor shall promptly repair any and all said damage, movement, settlement or collapse to the satisfaction of the Owner.

c. The Contractor shall verify the locations and depths of utilities that could be affected by the Work and shall notify the Owner immediately if unknown utilities are evidenced or encountered during execution of the Work.

d. The Contractor shall protect all permanent survey controls and wells identified on the Drawings during the Work. The Contractor shall correct any disturbance or damage through prompt repair or replacement to the satisfaction of the Owner.

e. The Contractor is responsible for following the site Health and Safety Plan. The Health and Safety Plan shall conform to all OSHA, state, and local regulations.

f. Storage and security of materials is the sole responsibility of the Contractor. It is the Contractor's responsibility to ensure an adequate supply of material to maintain steady execution of the Work within the time limit. Material will be stored at areas approved by the Owner. Copies of any agreements between the Contractor and other parties to occupy property for the Contractor's use shall be provided to the Owner.

g. The Contractor shall notify the Owner when the Contractor believes the project is substantially complete. A final inspection will be held by the Owner with the Contractor, Engineer, and others as appropriate to verify Substantial Completion. At that time, a list of unfinished and/or unacceptable Work items (i.e., "punch list") will be made available for the Contractor to correct. The punch list must be completed before the project is considered fully complete and accepted by the Owner.

h. The Contractor, at all times, shall keep the premises free from accumulation of water, materials, or rubbish caused by its operations. At the completion of the Work, the Contractor shall remove all equipment, tools and surplus materials, and shall completely clean the premises, removing and disposing of all debris and rubbish. When Work premises are turned over to the Owner, they shall be thoroughly clean and ready for immediate use.

i. The Contractor is responsible for providing any temporary utilities to the work site.

j. The Contractor shall be responsible for securing all necessary permits or agreements required for the transport and delivery of on-site and off-site borrow soils to the work locations and subsurface and surface water discharge permits.

k. The Contractor shall take measures to control dust at the site throughout the duration of work and to have such capabilities to control dust in-place before commencing the work. If the Owner determines that the level of dust is unacceptable, the Contractor shall employ measures as necessary to reduce dust to an acceptable level.

1.4 MEETINGS

a. Meetings will be held at least once every two (2) weeks to discuss progress and schedule of the project.

b. It may periodically become necessary to have special meetings to resolve Project conflicts in which all parties shall be required to attend.

c. Actions to be taken during job meetings are:

- Review project schedule.
- Review project field orders and change orders, if any.
- Coordinate construction activities with operational personnel and other contractors.
- Review personnel requirements, etc.
- Coordinate projected progress with other contractors.
- Review submittal schedules; expedite as required to maintain schedule.
- Review maintenance of quality and work standards.
- Review changes proposed by Owner for:

  a. Effect on construction schedule.
  b. Effect on completion date.
  c. Effect on project cost.

- Review project safety performance.

- Review quantities of completed work items for payment requests.
- Review the maintenance of as-built drawings relative to work progress.
- Complete other current business.
- Review Work items to be completed in upcoming 2 weeks.

END OF SECTION

SECTION 01015

GENERAL CONDUCT OF WORK

PART 1 - GENERAL

1.1 COORDINATION OF WORK

a. The Contractor shall be responsible for the coordination of labor, vendors and suppliers, and subcontractors for all construction-related work activities so that the work is completed within the time stipulated in the Contract.

1.2 HANDLING AND STORAGE

a. The Contractor shall handle, haul, and distribute all materials and all surplus materials for the different portions of the Work, as necessary. The Contractor shall provide suitable and adequate storage room for materials and equipment during the progress of the Work and be responsible for loss of, or damage to, materials and equipment furnished, until the final acceptance of the Work.

b. All excavated materials, construction equipment, materials and equipment to be incorporated in the Work shall be placed so as not to injure the Work and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

c. Storage charges and demurrage charges by transportation companies and vendors, which result from delays in handling, shall be borne by the Contractor.

1.3 PROTECTION AGAINST ELECTROLYSIS

a. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, non-metallic separators or washers, or other approved materials.

1.4 WORK ON HIGHWAYS

a. All right-of-way for construction and access will be provided by the Owner unless otherwise stated.

b. Before any work is commenced on highway right-of-ways, the Contractor shall obtain all necessary working permits from the appropriate departments including New Hampshire Department of Transportation (NHDOT) and Atkinson Highway Department. All work on highway rights-of-ways shall be performed in

conformance with the requirements of the appropriate department.

1.5 PRE-CONSTRUCTION SURVEY

a. Prior to beginning any construction activity, the Contractor will conduct a color audio/video recorded pre-construction survey. The video will record all existing conditions in areas of work and areas anticipated to be disturbed including existing defects in pavement, fencing, lawns, shrubs, guardrails, structures, signals, signs, etc.

b. Video shall be recorded in 720p resolution or better and furnished for the record on DVD-Video or Blu-Ray discs. The video system shall have the capability to transfer individual frames of video electronically into hard copy prints or photographic negatives.

c. Each disc shall be labeled with Contract Name and Number and area included on the disc. The video content shall be divided into chapters based on the area recorded and the chapters titled with a descriptive name. A written log will also be maintained and a copy furnished to the Owner with his copy of the discs.

d. Time and date shall be accurate and continuously generated.

e. Information appearing on the DVD must be continuous and run simultaneously. No editing or overlaying of information at a later date will be acceptable.

f. Audio shall be recorded at the same time as the video recording and shall have the same information as on the viewing screen. Special commentary shall be given for unusual conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery, structures, equipment, pavement, etc.

g. This record will be performed in a professional manner with means and methods to be reviewed and approved by the Owner prior to beginning the work.

1.6 PRE-BLAST SURVEY

a. Prior to the performance of any blasting, the Contractor will discuss with the Owner which properties and structures are to be surveyed by color audio/video and the extent of the survey, but generally all structures within 100 feet of the blasting area will be completely surveyed as herein defined.

b. Each property owner so affected will be contacted by the Owner and informed as to the reason for the survey and an appointment requested with every reasonable effort made to accommodate the property owner schedule. If the Contractor is refused entry, he must obtain a written statement from the property owner so indicating.

c. The format and content of the recording shall conform to the requirements for the

Pre-Construction Survey. In addition, the content of the video recording shall include the following video images:

1. Title within video showing contract title and number and name and address of filming.

2. A general view of the structure with a reference point established (i.e., right or left hand corner of the structure) audio and video recording record exterior of the structure and surrounding grounds outbuilding, pools, fences. This record will be maintained in the same direction in each case from the established reference point.

3. The interior portions of the structure will then be recorded in the same fashion from the same reference point. Every effort will be made not to record personal property. A written log will be maintained to pinpoint areas of interest such that it will not be necessary to review the entire video.

d. When the survey is complete, the Contractor will keep a copy in its files, provide a copy to the individual property owner, and provide a copy for the Owner.

1.7 RESTORATION OF DISTURBED PROPERTY

a. The Contractor will be responsible for ties to and all elevations of all property disturbed during the execution of this Contract. The Contractor will also be responsible for recording the ties to the elevations prior to disruption and for reestablishing the disturbed areas accurately and completely to its preconstruction condition or better.

1.8 DAMAGE TO THE WORK

a. Until the final acceptance of the Work by the Owner, it shall be under the care and charge of the Contractor and the Contractor shall take every precaution necessary against injury or damage to the Work by the action of the elements or any other causes whatsoever. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work before its completion and acceptance.

1.9 RECORD DRAWINGS

a. During the progress of the Work, the Contractor shall keep a careful record at the job site of all changes and corrections from the layouts shown on the Drawings, regardless of whether they are part of the construction effort. The Contractor shall enter such changes and corrections to the record drawings daily and shall submit progress drawings to the Owner on a biweekly basis. Record drawings shall include any hidden or subsurface data discovered during the construction. Such

changes, corrections, and notations shall be entered on a copy of the project Drawings.

b. The record drawings shall include all physical changes to the construction area and the actual location of any subsurface utility lines constructed or encountered. The drawings shall also show, by offset dimensions to three permanently fixed features, the end of each run, change in direction, fitting, and valve in sufficient detail that anyone may determine the location of these items after they are buried or obscured. The drawings shall also show the burial depth of these key features.

c. At the time of the final inspection, the Contractor shall submit draft versions of the record drawings to the Owner for review and comment. The Contractor shall submit one full set of paper copies with redlines indicating changes from the original Drawings. The record drawing shall show any hidden, subsurface, or corrected layout information that the Contractor discovered during construction. The drawings shall present clear and legible portrayal of the as-built construction on the marked prints. Owner comments shall be addressed with revisions and two copies of the final record drawings shall be submitted to the Owner.

d. The Owner may use the Contractor's record drawings to revise the design drawings for the project record.

END OF SECTION

SECTION 01080

CODES AND STANDARDS

PART 1 - GENERAL

1.1 CODES, STANDARDS, AND SPECIFICATIONS

a. Published standards, codes, or standard specifications referenced shall be the latest standard code, specification, or tentative specification of the technical society, organization or body referred to which is in effect on the date of printing of the Drawings, unless otherwise specified. Where specific articles, sections, paragraphs, or subsections of referenced publications are not specified, the full referenced publication shall apply.

b. Satisfactory evidence that materials and methods comply with referenced standards and codes shall be furnished when required.

1.2 ORGANIZATIONS

The following is a partial listing of organizations and their abbreviations, which publish codes and/or standards that may apply in the execution of the work:

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway & Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AHA	American Hardboard Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISE	American Iron and Steel Engineers
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AISI	American National Standards Institute
APA	American Plywood Association
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASHRAE	American Society of Heating, Refrigerating and Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
AWPB	American Wood Preservers Bureau

AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
BOCA	Building Officials and Code Administration International
CABO	Council of American Building Association
CBM	Certified Ballast Manufacturers
CMAA	Crane Manufacturers Association of America
CPSI	Consumer Products Safety Commission
CRSI	Concrete Reinforcing Steel Institute
DOC	United States Department of Commerce
DHUD	U.S. Dept. of Housing and Urban Development
EIA	Electronic Industries Association
EPA	U.S. Environmental Protection Agency
ETL	Electrical Testing Laboratories, Inc.
FM	Factory Mutual Laboratories
FmHA	Farmers Home Administration, U.S. Dept. of Agriculture
FS	Federal Specification
GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IMIAWC	International Masonry Industry All Weather Council International Masonry Institute
IPCEA	Insulated Power Cable Engineers Association
MBMA	Metal Building Manufacturers Association
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFIPA	National Fire Protection Association
NFOPA	National Forest Products Association
NHDES	New Hampshire Department of Environmental Services
NHDOT	New Hampshire Department of Transportation
OSHA	U.S. Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
RCSHSB	Red Cedar Shingle and Hand Split Shave Bureau
SCS	U.S. Soil Conservation Service
SDI	Steel Door Institute
SFES	Southeastern Forest Experiment Station
SJI	Steel Joist Institute
TFS	Texas Forest Service
TPI	Truss Plate Institute Inc.

UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USD	United States Diving, Inc.
WWPA	Western Wood Products Association

PART 2 - STANDARDS

2.1 STANDARDS/SPECIFICATIONS

a. Construction methods and materials for applicable items of work for this project shall be in accordance with the Standard Specifications for Road and Bridge Construction and "Standard Drawings" of the State of New Hampshire Department of Transportation latest edition, unless otherwise specified.

END OF SECTION

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SECTION 01090

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

a. The following is a listing of common abbreviations and symbols which may be found in the Contract Documents. Since this is a general listing, it is to be expected that not all abbreviations will appear.

b. Abbreviations for published codes, standards, and regulations of organizations and federal agencies are defined in Section 01080 "Codes and Standards".

c. Additional abbreviations and symbols can be found in Drawing Legends.

d. Abbreviations and/or symbols not specifically defined shall be industry used standard definitions. Clarification of symbols and/or abbreviations shall be forwarded to the Owner, who will furnish definitions in writing.

1.2 ABBREVIATIONS

The following is a partial listing of abbreviations and meanings which may apply in the Specifications:

A.C. or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or AMP	Amperes
Alum.	Aluminum
Asph.	Asphalt
Aux.	Auxiliary
AWG	American or Brown and Sharp Wire Gage
Bit. Conc.	Bituminous Concrete
Btu	British Thermal Unit
CB	Circuit Breaker
Cl.	Class
cm	Centimeter
C.O.	Clean Out
Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
C.F.	Cubic Feet

CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
C.Y.	Cubic Yards
CT	Current Transformer
D.C. or dc	Direct Current
D.I.	Ductile Iron
Dia.	Diameter
DWG. or dwg	Drawing
Dr.	Drive
Ea. or ea.	Each
EF	Each Face
EW	Each Way
Eff. or eff	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
Ft. or ft	Feet
ftg.	Footing
g.	Grams
Ga. or ga	Gauge
Gal. or gal.	Gallon
Galv.	Galvanized
GPD or gpd	Gallon Per Day
GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hz. or hz.	Hertz
I.D.	Inside Diameter
In. or in.	Inches
Inv.	Invert
IP	Instrument Panel
KVA or kva	Kilovolts-amperes
KW or kw	Kilowatt Hours
Lbs. or lbs	Pounds
L.F. or lf	Linear Feet
LPA	Lighting Panel "A"
L.S.	Lump Sum
m.	Meters
mA.	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
mg.	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles
Min. or min.	Minimum
mm	Millimeters
No. or no.	Number

nom.	Nominal
NPT	National Pipe Thread
N.T.S.	Not To Scale
O.D.	Outside Diameter
OS&Y	Outside Screw and Yoke
Oz. or oz.	Ounce
pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch, Gauge Pressure
PT	Potential Transformer
PVC	Polyvinyl Chloride
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-Of-Way
Sch.	Schedule
sec.	Secondary or Seconds
Sq. or sq.	Square
S.F.	Square Feet
S/S/P	Stop-Start-Pilot Station
Std. or std.	Standard
S.Y.	Square Yard
T&B	Top and Bottom
Typ.	Typical
U.O.N.	Unless Otherwise Noted
V or v	Volts
VAC or vac	Alternating Current Voltage
VDC or vdc	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume
W or w	Watts
w.c.	Water Column
WSP	Working Steam Pressure
Yd. or yd	Yard

1.3 SYMBOLS

The following is a list of commonly used symbols and meanings which may be found in the Drawings and Specifications:

ϕ	Phase, Diameter, or Round (as applicable)
°F, °C	Degrees (F. = Fahrenheit C. = Celsius)
'	Feet or Minutes
"	Inches or Seconds
#	Number or Pound
/	Per or Divided By
3:1	3 horizontal to 1 vertical (slope)
1 on 3	1 vertical on 3 horizontal (slope)

END OF SECTION

SECTION 01300

CONSTRUCTION PROGRESS AND SCHEDULES

PART 1 - GENERAL

1.1 PRE-CONSTRUCTION CONFERENCE

a. Prior to the start of construction, a conference will be held to discuss the construction schedule, to establish procedures for handling vendor drawings and other submissions, for processing applications for payment and to establish a working understanding between the parties as to the Project.

b. Present at the pre-construction conference will be the Engineer's Project Representative, the Contractor represented by the Response Manager and any key subcontractors, the Owner, and other affected parties. Duties will be defined, and notes of the meeting will be prepared and distributed by the Owner to all parties in attendance.

1.2 NOTICE TO PROCEED

a. As part of the Contract or order for the Work, the Owner will establish a date on which the Contractor shall start the work.

PART 2 - PRODUCTS

2.1 CONSTRUCTION SCHEDULE

a. At least seven (7) business days prior to the Pre-Construction Conference, the Contractor shall submit to the Owner for approval a construction schedule consisting of the activities and events which must be accomplished to complete the work within the contract completion time and shall show the planned sequence of accomplishments, interdependencies and interrelationships. In preparing the schedule, the Contractor shall allot 10 business days from Owner's receipt for the time necessary for review and approval by the Owner of all shop drawings and items requiring the approval of the Owner.

b. The construction schedule, as submitted to the Owner, shall include the following items:

1. A list of the event numbers, their description, the expected and latest allowable start and finish dates, slack or float time, schedule and actual completion date.

2. The data, as mentioned above, shall be plotted on a graph of activity versus calendar days.

c. The construction schedule, as described herein, shall be Gantt Chart format or similar approved construction scheduling.

d. The Contractor shall submit the final, agreed-upon schedule to the Owner for incorporation into the order for the Work.

PART 3 - EXECUTION

3.1 BIWEEKLY MEETINGS

a. Meetings between the Contractor and Owner will be held biweekly for the purpose of reviewing the progress of the contract and the upcoming work. The Contractor shall have the Response Manager and representatives of any key subcontractors attend these meetings. The Owner may request the Engineer to participate.

END OF SECTION

SECTION 01330

SURVEY DATA

PART 1 - GENERAL

1.1 LINES, GRADES, AND MEASUREMENTS

a. Reference marks establishing the controlling grades for the Work will be established by the Contractor and approved by the Owner. These reference marks shall be replaced by the Contractor if damaged or destroyed by construction operations.

b. The Contractor is responsible for providing all necessary surveying for the layout of the location of existing utilities and for the location of the works in such a manner that the utility separation requirements of these specifications are provided for, as approved by the Owner. It should be noted by the Contractor that the location of the works on the drawings are meant only for general layout purposes without concern for the location of existing utilities. It should be anticipated by the Contractor that the final location of the works will vary slightly from those shown on the drawings.

c. The Contractor shall make all measurements and check all dimensions necessary for the proper construction of the work called for by the drawings and specifications. During the prosecution of the work, the Contractor shall make all necessary measurements to prevent misfitting of said work and shall be responsible thereof, and for the accurate construction of the work.

1.2 DIMENSIONS

a. DIMENSIONS OF EXISTING STRUCTURES

Where the dimensions and locations of existing structures are of critical importance in the installation of connection of new work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

b. RESTORATION OF DISTURBED PROPERTY

The Contractor will be responsible for ties to and all elevations of all property disturbed during the execution of this Contract. The Contractor will also be responsible for recording the ties to and elevations prior to disruption and for reestablishing the disturbed areas accurately and completely to its preconstruction condition or better.

1.3 QUALITY CONTROL

a. The Owner will spot check lines, grades, elevations and reference points during construction. Any deviations from the Contract requirements or errors in setting out from the works shall be corrected by the Contractor to the satisfaction of the Owner. Any works provided using incorrect line, grades, elevations or reference points shall be corrected by the Contractor as directed by the Owner.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, SAMPLES, AND PROJECT DATA

PART 1 - GENERAL

1.1 MATERIALS

a. Unless otherwise indicated on the Drawings or specified, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection and approval of the Owner. No material shall be processed for, fabricated for, or delivered to the Work without prior approval of the Owner.

1.2 SUBMISSION SCHEDULE

a. At least five (5) business days prior to the Pre-Construction Conference, the Contractor shall submit to the Owner a Shop Drawing Schedule, including the names and addresses of the manufacturers and suppliers of all materials and equipment the Contractor proposes to incorporate into the Work.

b. When Shop Drawings are required as specified below, the names and addresses of the manufacturers and suppliers shall be submitted prior to the submittal of the Shop Drawings so that the Owner may consider and evaluate the manufacturer and/or the supplier as to its ability to furnish a product meeting the Specifications, subject to final approval of the particular material or equipment. As requested, the Contractor shall also submit data relating to the materials and equipment proposed for incorporation into the Work, in sufficient detail, to enable the Owner to identify the particular product in question and to form an opinion as to its conformity to the contract requirements. Such data shall be submitted in a manner similar to that specified for Shop Drawings.

c. The following is a list of the significant items requiring a shop drawing submittal:

1. Pipe
2. Valves
3. Fittings
4. Service Saddles, Corporations, Curb Stops
5. Hydrants
6. Pavement Material
7. Horizontal Direction Drilling Approach and Materials
8. Pipe Insulation
9. Aggregates
10. Loam
11. Landscape Materials

Additional shop drawings and submittals may be required as specified in individual specification sections or as ordered by the Owner.

1.3 SHOP DRAWINGS

a. The Contractor shall submit, for approval, at least one reproducible copy and five print copies of Shop Drawings of materials fabricated especially for this contract, and of equipment and materials for which such drawings are specifically requested. The reproducible and at least one print copy will be returned to the Contractor.

b. Such drawings shall show the principal dimensions, weight, structural and operating features for the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this contract.

c. When so specified, or if considered by the Owner to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for approval in place of Shop Drawings. In such cases, the requirements shall be as specified for Shop Drawings, insofar as applicable.

d. The Contractor shall be responsible for the prompt submission of all Shop Drawings in accordance with the Shop Drawing Schedule so that there shall be no delay to the Work due to the absence of such drawings.

e. No material shall be purchased or fabricated especially for this contract until the required Shop Drawings have been submitted, reviewed and approved as conforming to the Contract requirements. All materials and work involved in the construction shall then be as represented by said drawings.

f. Only Shop Drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting Shop Drawings to the Owner, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. Shop Drawings which are correct shall be marked with the date, checker's signature and certification by the Contractor that the equipment/materials meet the specified requirements, and then shall be submitted to the Owner; other drawings shall be returned for correction.

g. The Owner's review of the Shop Drawings will follow a general check made to ascertain conformance with the design concept and functional result of the Project and compliance with the information given in the Contract Documents. The Contractor shall be responsible for dimensions to be confirmed and correlated at

the job site; for information that pertains solely to the fabrication processes or to techniques of construction, and for coordination of the work of all trades.

h. The Contractor shall make any corrections required by the Owner and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved.

i. At the time of each submission or resubmission, the Contractor shall direct specific attention, in writing, to deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents or corrections required by the Owner on previous submissions or any materials, fittings or equipment necessary for a complete and operating system.

j. The Contractor's stamp of approval on the Shop Drawings and samples shall constitute a representation to the Owner that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, or assumes full responsibility for doing so, and that the Contractor has reviewed or coordinated each Shop Drawing and sample with the requirements of the Contract Documents.

k. The Owner's approval of Shop Drawings and samples shall not relieve the Contractor from its responsibility for any deviations from the requirements of the Contract Documents, unless the Owner has been notified, in writing, and has given its written approval to such deviation, nor shall any approval by the Owner relieve the Contractor from responsibility for errors and omissions in Shop Drawings.

1.4 RECORD DOCUMENTS

a. The Contractor shall maintain one record copy of all Specifications, Drawings, Addenda, Change Orders and Shop Drawings at the site. The documents shall be kept in good order and annotated to show all changes made during the construction process.

b. Within ten business days after the completion of the work, the Contractor shall submit to the Owner, one set of prints of the Drawings which have been marked "RECORD PRINTS" and shall contain marking showing all changes, additions or deviations from the original set of Drawings that have been incorporated into the Work. Record prints shall accurately reflect locations, depths, and character of all buried and covered works, and shall include three ties, to all buried valves, fittings, and other significant buried features.

END OF SECTION

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SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 SCOPE

a. The Contractor has the contractual responsibilities to control construction quality.

1.2 RELATED WORK

a. Project documents affecting the Work of this section include, but are not limited to, general conditions and all technical specifications and drawings.

1.3 SUBMITTALS

a. A letter of designation of the Project Quality Control Manager including name, qualifications, duties, and authority.

b. A Quality Control Plan which identifies:

1. Personnel in addition to Quality Control Manager.

2. Each definable phase of the Work and the method of quality control of each.

3. Test methods, which will be used to test each phase of the Work to verify achievement of quality specified including submittals.

4. Method of correction for faulty workmanship.

5. Daily report form for quality control. Daily report shall describe all personnel on-site, major equipment on-site, results of major equipment inspections, submittals reviewed, areas of work, observations and tests performed, summary of test results, defective work noted, and the Safety Plan approved for each phase of the work.

1.4 PROCEDURES

a. The Quality Control Manager shall perform sufficient inspections and testing of all Work, including that of subcontractors to ensure conformance to the Contract.

b. The Quality Control Manager shall submit to the Owner a daily report of the preceding day's quality control activity.

c. No Work shall be permitted until all submittals for that phase of the Work are approved, and the Quality Control Plan for that phase of the Work is approved.

1.5 MATERIALS CERTIFICATION

a. For certain products, assemblies and materials, in lieu of on-site sampling and testing procedures, the Owner will accept from the Contractor, the Manufacturer's certification with respect to the product(s) involved, upon the conditions set forth in the following paragraphs:

1. Certification shall state that the named product conformed to the Specifications and that representative samples have been sampled and tested as specified.

2. Certification shall be accompanied with a certified copy of the test results.

3. The certification shall give the name and address of the Manufacturer and the testing agency, the date of test, and shall set forth the means of identification, which will permit field determination of the products delivered to the project as being the product covered by the certification.

4. The certification shall be duplicated with one (1) copy sent with the shipment of the covered product to the Contractor and one (1) copy sent to the Owner.

5. The Owner will not be responsible for any additional costs for certification or for any costs of sampling and testing.

6. The Owner reserves the right to require samples and test products to assure compliance with pertinent requirements with respect to the certification of the products by the Manufacturer thereof.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 GENERAL

a. Prior to the time that the Owner accepts and assumes the right to operate the facilities, the Contractor is responsible for all water, electricity, fuel, sanitary facilities, temporary structures and other necessary utilities, services and facilities to perform the work.

1.2 PRECAUTIONS AGAINST WEATHER

a. During adverse weather conditions and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work shall be properly done and be satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelter, or other approved means.

b. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by approved means which shall result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture shall be warm throughout use.

1.3 TEMPORARY HEAT

a. If temporary heat is required for the protection of the Work, the Contractor shall provide and install approved heating apparatus, provide adequate and proper fuel, and maintain fires as required. Temporary heating apparatus shall be installed and operated in such a manner that the finished work will not be damaged thereby.

1.4 WATER SUPPLY

a. The Contractor shall provide at the points of use all water necessary for Contractor operations. The Contractor shall make all arrangements necessary to obtain water and pay all associated fees.

1.5 ELECTRICAL ENERGY

a. The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work during its entire progress, except when the specifications particularly state that the Owner shall pay for the energy used in making tests. The Contractor shall provide all temporary wiring, switches, connections, and meters.

b. There shall be sufficient electric lighting so that all work may be done in a safe and professional manner when there is not sufficient daylight.

c. The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials or supplies which it shall provide in doing the work.

1.6 SANITARY FACILITIES

a. The Contractor shall provide adequate sanitary conveniences for the use of those employed on the Work. Such conveniences shall be made available when the first employees arrive on the Work, shall be properly secluded from public observations, and shall be constructed and maintained in suitable number and at such points and in such manner as may be required or approved.

b. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on public right-of-ways, or on adjacent property.

END OF SECTION

SECTION 01560

MAINTENANCE OF WORK SITE

PART 1 - GENERAL

1.1 SAFETY AND PROTECTION

a. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. All employees on the Work and other persons who may be affected thereby.

2. All of the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.

3. Other property at the 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.

b. The Contractor shall notify owners of adjacent utilities as well as the Owner when prosecution of the Work may affect them. All damage, injury or loss to any property referred to above, directly or indirectly, in whole or in part, by the Contractor, any subcontractor or anyone, directly or indirectly, in whole or part, due to the fault or negligence of the Contractor, shall be replaced or restored to at least original condition to the satisfaction of the Owner. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and accepted by the Owner and for a warranty period as specified in the Contract.

c. The Contractor shall not load or permit any part of any structure to be loaded with a weight that would endanger its safety.

d. The Contractor shall provide protection of the Work from freezing and from other elements which would be harmful to it. The Contractor shall furnish heat or protective shelters or temporary buildings as required for the prosecution and protection of the Work.

e. The Contractor shall take all necessary precautions for the safety of employees on the Work, and shall comply with all applicable provisions of National and local safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. The Contractor

shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards and barricades for the protection of employees on the Work and the safety of others employed near the Work and the public, and shall post danger signs and warning lights cautioning against the hazards created by such features of the construction as hoists and excavations.

f. The Contractor shall designate a responsible member of its organization on the Work, whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported in writing to the Owner.

g. The Contractor shall immediately report, giving full details, to the Owner all accidents which arise out of or in connection with the performance of the Work, whether on or adjacent to the site, which cause death, serious personal injury or substantial property damage. The accident shall be reported immediately by telephone or messenger to the Owner and a detailed written report shall follow within 24 hours. If a claim is made or suit is filed by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.

h. The Contractor shall take all precautions to prevent damage to the Work by the elements, storms or by water entering the site of the Work directly or through the ground. In case of damage by the elements, storm or water, the Contractor shall make such repairs or replacements or rebuild such parts of the Work as the Owner may require, in order that the Work may be completed as required by the Contract Documents.

i. The Contractor shall post illuminated warning and danger signs so as to apprise all persons against any hazards created by the Work being done under this Contract.

1.2 PROTECTION OF PUBLIC

a. The Contractor shall conduct its work so as to interfere as little as possible with the private, personal activities of residents, private and public business and travel. Wherever necessary or required, he shall maintain fences, furnish full-time or part-time watchmen, guards, flaggers, and/or like protective personnel, maintain lights, and take such additional precautions as may be necessary to protect life and property.

1.3 MAINTENANCE OF TRAFFIC

a. The Contractor shall so carry on the Work that traffic will be maintained as far as is reasonably possible in streets in which pipelines and/or other structures are to be built. Sidewalks and crossings shall be kept open for the passage of pedestrians, unless otherwise specifically authorized. Driveways to properties shall be kept open at all times except when pipe lying beneath them is in actual

progress. Streets shall not be closed to traffic, unless the Owner authorizes the complete closing of a street in writing. At least seven (7) business days prior to the Pre-Construction Conference, the Contractor shall provide to the Owner a listing of each and any instance where a complete street closure will be desired to enable review by the Owner and responsible agencies.

b. When open-cut excavation is conducted in the roadway, the Contractor shall maintain one lane open for vehicular traffic during work hours, unless a detour has been approved. At all other times, full use of the roadways shall be restored.

c. At all times when work is not being conducted in roadways, trenches shall be backfilled and, if permanent pavement is not placed, a satisfactory wearing surface shall be maintained. Trenches left open overnight for work to continue the following day shall be adequately covered and barricaded to ensure the safety of pedestrians and vehicles.

d. The Contractor shall construct and maintain such adequate and proper bridges over excavations as may be necessary or directed for the purpose of accommodating pedestrians or vehicles.

e. Provide signs, barricades, warning lights, and flaggers as required during the progress of the work to protect persons from injury and to avoid property damage.

f. The Contractor shall prepare and submit for approval a Traffic Control Plan detailing provisions of traffic control for the project.

g. In addition to the pre-authorization of intended street closures, the Contractor shall notify the Owner at least 48 hours in advance of the actual closing of any street. The Owner will coordinate such closure with Police and Fire Authorities.

h. The Contractor is solely responsible for any consequential damages arising from not providing traffic control in accordance with the "Manual of Uniform Traffic Control Devices" as published by the U.S. Department of Transportation, in maintaining traffic for the construction of the project.

i. Disturbance and obstruction of private driveways shall be minimized and coordinated with the respective property owner through the Owner.

1.4 PROTECTION OF NATURAL WATERCOURSES

a. The Contractor must use all care possible to prevent siltation and other pollution of waters during and after construction until this site has stabilized and pavement/growth re-established. Prohibited practices include, but are not limited to:

1. Dumping of spoil material into streams or on stream banks where it may

wash or slide into the stream.

2. Operating of equipment in the stream.

3. Pumping of silt-laden water from trenches or other excavations into the stream.

4. Disposing of trees, brush, and other debris in the stream.

5. Altering of the stream flow line.

b. The Contractor must take sufficient precautions to minimize run-off due to construction of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish or other life, into the water supplies and surface waters. Unless otherwise permitted in writing, control measures must be adequate to assure that turbidity in the receiving water shall not be increased to more than 10 Jackson Turbidity Units (JTU) in waters used for public water supply or fishing, unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 JTU unless otherwise permitted in writing. Special precautions shall be taken in the use of construction equipment to avoid operations which promote erosion. Refer to Section 01566.

c. In addition, the work area must be cleaned up and graded as the Work proceeds.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

a. Furnish all labor, material, tools, and equipment to apply water or calcium chloride on roads or traveled surfaces within the construction site when directed by the Owner and/or as necessary to control dust.

b. When dust control is not included as a separate item in the Contract, the Work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS

2.1 WATER

a. Water for sprinkling shall be clean, free of salt, oil, and other injurious materials.

PART 3 - EXECUTION

3.1 WATER APPLICATION

a. Water shall be applied by equipment approved by the Owner. As a minimum, it shall consist of a tank, a spray bar, and a gauge equipped pump. Water shall be dispersed through nozzles at a minimum pressure of 20 psi.

END OF SECTION

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SECTION 01566

EROSION CONTROL

PART 1 - GENERAL

1.1 SCOPE

a. Furnish all labor, materials, tools and equipment, and perform all operations necessary for erosion control work indicated on the Drawings, as specified or as directed by the Owner.

b. Erosion control provisions shall also be consistent with applicable stormwater pollution prevention permit requirements and compliance plans. In the event of differing requirements, the more protective requirement shall govern, subject to Owner's approval.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. General Conduct of Work specified in Section 01015.
b. Excavation and Backfill specified in Section 02200.
c. Maintenance of Work Site specified in Section 01560.

1.3 PROJECT CONDITIONS

a. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and the resulting sedimentation.

b. The Contractor shall design, implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.

1.4 EROSION AND SEDIMENTATION CONTROL PLAN

a. The Contractor shall submit an Erosion and Sedimentation Control Plan, prepared by a person trained and experienced in erosion and sedimentation control methods and techniques, to the Owner for approval.

1.5 GENERAL METHODOLOGY

a. Erosion and sedimentation control methods shall consider all factors which contribute to erosion and sedimentation including, but not limited to, the following:

1. Topographic features of the project area.

2. Types, depth, slope and areal extent of the soils.

3. Amount of run-off from the project area and the upstream watershed area.

4. Staging of earthmoving activities.

5. Temporary control measures and facilities for use during earthmoving and pumping.

6. Maintenance program for the control facilities including disposal of materials removed from the control facilities or Project area.

PART 2 - PRODUCTS

2.1 SEDIMENT BARRIERS

a. Sediment barriers shall be hay or straw bales, geotextile fabric, stone or other approved materials that will prevent sedimentation.

2.2 MULCH AND SEEDING

a. Mulch and seeding shall be in accordance with the requirements of Tables 01566-1 thru -4 attached to this section.

2.3 CATCH BASIN INLET PROTECTION

a. Sediment barrier of reinforced geotextile, designed for installation in catch basins under grates for the collection and filtration of sediment. Barriers shall be Dandy Sack by TenCate Mirafi, or approved equal.

PART 3 - EXECUTION

3.1 DIVERSION TERRACES

a. Diversion terraces shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the project area.

b. Recommended Minimum Dimensions:

Height	1.5 feet
Top Width	2.0 feet
Side Slopes	2:1 or flatter
Material	Soil

3.2 INTERCEPTOR CHANNELS

a. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.

b. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.

c. Recommended Dimensions and Materials:

Depth	0.5 feet
Width	2.0 - 4.0 feet
Side Slopes	2:1 or flatter
Spacing	As required
Material	Stable on-site material

3.3 TRENCH BARRIERS

a. Trench barriers shall be used where the disturbed area is sloped in the direction of the pipeline, when the slope exceeds 15 percent or when the Owner deems necessary.

b. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of the pipeline and prior to backfill, if backfill is delayed.

c. Trench barriers shall act as an erosion check by preventing the washout of the trench.

d. Recommended Dimensions and Materials:

Height	To top of trench
Spacing	Approximately every 150 ft.
Material	Earth-filled sacks or piled stones

3.4 SEDIMENT BARRIERS

a. Sediment barriers shall be used at storm drain inlets, across minor swales and ditches and at other applications where the structure is of a temporary nature and structural strength is not required. Sediment barriers are temporary berms, diversions or other barriers that are constructed to retain sediment on-site by retarding and filtering storm runoff.

b. Recommended Materials and Dimensions

1. Stone:

Height	1.5 to 2.0 feet (uniform top elevation)
Top Width	3.0 to 5.0 feet
Side Slope	3:1 or flatter
Cross-Sectional Area Required	20 SF/Tributary Acre
Material:	Coarse rock or stone

2. Geotextile Fabrics

   a. Supported by stakes/posts as required and further supported by a netting of industrial polypropylene, if required.

   b. Height: As required to restrain sediment.

   c. Fabric: Mirafi 100 or equal.

   d. Toe of fabric to be buried six inches in native soil.

3. Hay or Straw Bales:

   a. Bales should be bound with twine.

   b. Bales should be anchored to the ground with fence posts, wood pickets or any naturally decomposable material. Two anchors per bale are required.

   c. Bales shall be installed so that runoff cannot escape freely under bales.

   d.

Height	1.5 feet
Width	1.5 - 3.0 feet
Cross Sectional Area	50 SF/Tributary Acre

4. Catch Basin Inlet Protection:

   a. Applied to all catch basin inlets in the work area with approval of the catch basin owner.

   b. Inlet filter materials and installation shall be per the manufacturer's requirements.

   c. The inlet filter shall be inspected at least once per week and within 24 hours of the end of a storm with a rainfall of 0.5 inch or greater. When the filter has collected about 6 inches of sediment or as recommended by the manufacturer, whichever is sooner, it shall be cleaned and restored to like new condition or replaced. The filter

shall be replaced if free oil can be seen floating in its sediment storage area.

3.5 MULCH

a. Used alone or in conjunction with other structural or vegetative erosion control measure, mulch is applied on any disturbed area which is subject to erosion, for protection of disturbed soil or newly reseeded areas.

b. Recommended Methods and Materials:

Material	Hay, straw, woodchips
Methods	Spread by hand tools on small plots and by mechanical blower on larger areas. Tacked by passing a tracked construction vehicle over the mulched area.
Rates	See Table 1

3.6 VEGETATION

a. Temporary Vegetation:

1. The planting of temporary cover shall be performed on disturbed areas where the earthmoving activities will be ceased for a period of more than 45 calendar days. The vegetation shall provide short-term rapid cover for the control of surface runoff and erosion, until permanent vegetation can be established or earth moving activities can resume.

2. Table 2 gives recommended types of temporary vegetation, corresponding rates of applications, and planting seasons. In situations where other cover is desired, the recommendations of the County Conservation District or New Hampshire Department of Transportation (NHDOT) Standard Specifications, Section 644, shall be followed.

b. Permanent Vegetation:

1. Planting of various permanent vegetation covers shall be performed on disturbed areas where the earthmoving activities have ceased. The vegetation shall reestablish ground cover for the control of surface runoff and erosion.

2. The seed bed for permanent vegetative cover shall be prepared by using lime and fertilizer. If the time of the seeding occurs during a dry period, mulch will be applied to conserve soil moisture.

3. Tables 3 and 4 give recommended procedures for establishing various types of permanent vegetation. The tables are differentiated by the drainage of the disturbed area. In situations where other cover is desired, the recommendations of the County Conservation District or NHDOT Specifications, Section 644, shall be followed.

TABLE 01566-1

MULCH MATERIALS, RATES AND USES

Mulch Material	Quality Standards	Application Rates per 1,000 sq. ft.	Application Rates per acre	Depth of Application	Remarks
Straw or Hay	Air-dried. Free from coarse materials	75-100 lbs. 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75 to 90% of surface	Use straw where mulch effect is to be maintained for more than 3 months. Subject to wind blowing unless kept moist or tied down. Most common and widely used mulching material. Good for erosion control in critical areas.
Wood Chips	Green or air-dried.	500-900 lbs.	10-20 tons	2"-7"	If intensive foot or vehicle traffic is anticipated, the application rate may be increased. Resistant to wind blowing. Decomposes slowly.

TABLE 01566-2

TEMPORARY SEEDING FOR EROSION CONTROL ON CONSTRUCTION SITES

Species or Mixture for Temporary Cover	Percent by Weight	Seeding Rates in Lbs. Per 1,000 Sq. Ft.	Per Acre	Recommended Seeding Dates
Temporary Cover				
Annual Ryegrass	100%	1	20 to 40	1 April to 1 June 15 August to 15 October
Field Bromegrass	100%	1	20 to 40	1 March to 15 June 15 August to 15 September
Sudan Grass	100%	1	30 to 40	15 May to 15 August

TABLE 01566-3

PERMANENT SEEDINGS FOR WELL DRAINED AREAS

Species or Mixture for Permanent Cover	Percent by Weight	Seeding Rates in Lbs. Per 1,000 Sq. Ft.	Seeding Rates in Lbs. Per Acre	Recommended Seeding Dates
Ryegrass	100%	1	30	1 April to 15 October
Tall Fescue	100%	1 to 2	45	1 April to 15 October 15 October to 1 April
Timothy	100%	1	30	1 April to 15 October
Tall Fescue or Ryegrass and Crownvetch [1]	66% 34%	1 to 2	20 10	1 April to 15 July [2]
Creeping Red Fescue and Crownvetch [1]	67% 33%	1 to 2	20 10	1 April to 24 May [2]
Flat Pea [1] and Tall Fescue or Ryegrass	66 (80) % 34 (20) %	1 to 2	40 20 (10)	1 April to July [2]

Notes:

[1] - Inoculate legume seeds - use four times the normal rate when hydroseeding.

[2] - When seedings are mulched, seeding dates may be extended from 15 October to 1 April for dormant seedings and 1 April to 15 September for regular seedings.

TABLE 01566-4

PERMANENT SEEDINGS FOR AREAS OF VARIABLE DRAINAGE

Species or Mixture for Temporary Cover	Percent by Weight	Seeding Rates in Lbs. Per 1,000 Sq. Ft.	Per Acre	Recommended Seeding Dates
Tall Fescue Birdsfoot Trefoil [1]	67% 33%	1 to 2	20 10	1 April to 15 June [2]
Tall Fescue Birdsfoot Trefoil [1] Crownvetch [1]	55% 25% 20%	1 to 2	20 6 4	1 April to 15 June [2]

Notes:

[1] - Inoculate legume seeds - use four times the normal rate when hydroseeding.
[2] - When seedings are mulched, seeding dates may be extended from 15 October to 1 April for dormant seedings and 1 April to 15 September for regular seedings.

END OF SECTION

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.1 GENERAL

a. During the progress of the Work, the project area and adjacent affected areas shall be kept clean. All rubbish, surplus material, and unneeded construction equipment shall be removed and all damage shall be repaired so that the public and property owners will be inconvenienced as little as possible.

1.2 REMOVAL OF DEBRIS

a. Where material or debris has washed or flowed into or been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be entirely removed and disposed of during progress of the Work, and the ditches, channels, drains, etc., kept in a neat, clean and functioning condition.

1.3 PROJECT CLOSEOUT

a. On or before the completion of the Work, the Contractor shall, unless otherwise specifically directed or permitted in writing, tear down and remove all temporary buildings and structures; remove all temporary works, tools, and machinery or other construction equipment furnished; remove all rubbish from any grounds which have been occupied; and leave the roads and all parts of the premises and adjacent property affected by Contractor operations in a neat and satisfactory condition.

1.4 RESTORATION/REPLACEMENT

a. The Contractor shall restore or replace, when and as directed, any public or private property damaged by the Contractor's work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do, as required, all highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration as approved by the Owner, or as required elsewhere in these specifications.

1.5 ROADWAY CLEANUP

a. The Contractor shall promptly clean roadways, driveways, and other service areas on pace with the trenching and pipelaying operation. Not more than 20 feet of uncleaned area will be permitted at any one time in each area of work. All sections will be

cleaned before completing each workday.

b. Contractor shall keep traveled public and private ways, used during construction, clear of debris and rocks. Sweeping shall be done at the close of each day's work, at a minimum, and more often, if necessary.

END OF SECTION

SECTION 02005

UNIFORMED OFFICERS AND FLAGGERS

PART 1 - GENERAL

1.1 DESCRIPTION

a. This work shall consist of furnishing qualified uniformed officers and flaggers when needed for traffic control in accordance with the approved Traffic Control Plan. Obstruction of public ways shall be coordinated with the local police department. Traffic control personnel shall be flaggers, except when and where uniformed officers are required by the Traffic Control Plan or local police department.

PART 2 – PRODUCT

2.1 UNIFORMED OFFICERS

a. Uniformed officers shall be retained from the local police department of the respective municipality. The Contractor shall provide the local police department a minimum of 48-hours notice prior to need for services.

b. Uniformed officers shall have police powers granted by the authorities having legal jurisdiction in the work area.

c. In the event a Police Officer is not available, the Contractor may procure uniformed officers and flaggers from another law enforcement agency or a commercial security company, provided the officer is acceptable to the local police department for the purpose of traffic control.

d. Uniformed officers provided by the Contractor shall have had formal traffic control training, as provided by the Police Standards and Training Council.

2.2 TRAFFIC CONTROL FLAGGERS

a. Flaggers shall possess the following qualifications: at least average intelligence and alertness, good sight and hearing, courteous but firm manner, neat and presentable appearance, an understanding of construction practices and traffic control, and a sense of responsibility.

b. Contractors or subcontractors supplying flaggers shall have an employee that has been certified as a Trainer of Flaggers. Individuals doing the flagging shall have been trained by that trainer or have taken an approved flagging course.

2.2 GENERAL PERSONNEL REQUIREMENTS

a. Uniformed officers and flaggers shall be clothed in a suitable and characteristic manner that will readily distinguish them from all other employees.

1. Uniformed officers shall be attired with regulation duty uniforms, headgear, high visibility vests, and shall wear an exposed badge.

2. Flaggers shall be attired with high visibility vests or garments. Inappropriate attire shall not be allowed.

b. Authorities providing uniformed officers or subcontractors supplying flaggers will designate a person as the responsible party to coordinate the traffic control procedures with both the Contractor's Field Representative and the Owner. This person will be responsible to collect and report the time of actual traffic control to all interested parties.

c. Officers and flaggers shall have been given specific instructions from the Contractor as to their duties and responsibilities, both to the public and to their fellow workers on the job. They shall handle the movement of the traveling public and shall do all that is reasonable to expedite that movement. They shall have authority to direct the actions of the construction vehicles as well.

d. Uniformed personnel from commercial security firms shall be regarded as flaggers.

e. For night operations, high-intensity reflectorized clothing and the use of lighting shall be required, as stated in the Manual of Uniform Traffic Control Devices (MUTCD).

2.3 EQUIPMENT

a. Traffic paddles and flagger equipment shall conform to those described in the MUTCD, USDOT, latest edition.

b. High visibility vests and garments shall conform with ANSI 107-2010, Standard for High-Visibility Safety Apparel of appropriate class for the conditions/use.

END OF SECTION

SECTION 02010

SOILS INVESTIGATION

PART 1 - GENERAL

1.1 GENERAL

a. Subsurface explorations were conducted along the proposed route of the water line by the Owner. These subsurface explorations were conducted for guidance in the engineering design and consisted of probes using air driven rock drills to determine the apparent depth to bedrock surface from the ground surface.

b. The attached data is presented so that the Contractor may have access to the identical information available to Owner for independent interpretation and planning. This information is presented in good faith, but is not intended as a substitute for personal investigations, interpretations or judgement of the Contractor.

END OF SECTION

ATTACHMENTS FOLLOW:

Table 1 - Ledge Probing Summary (2 pages)

Table 1
Ledge Probing Summary

Probe ID	Street	Estimated* Station	Sheet No.	Probe Date	Depth to Bedrock (ft)	Advanced in Bedrock (ft)	Bottom of Exploration (ft BGS)	Comments
IPR-01	Island Pond Rd	21+95	102	1/28/2013	--	--	8	
IPR-02	Island Pond Rd	20+95	102	1/28/2013	--	--	8	
IPR-03	Island Pond Rd	19+86	102	1/28/2013	--	--	8	
IPR-04	Island Pond Rd	18+66	102	1/28/2013	--	--	8	
IPR-05	Island Pond Rd	17+35	102	1/28/2013	--	--	8.5	
IPR-06	Island Pond Rd	16+06	102	1/28/2013	--	--	8	
IPR-07	Island Pond Rd	15+07	102	1/28/2013	6	3.5	9.5	
IPR-08	Island Pond Rd	14+05	102	1/28/2013	--	--	8	
IPR-09	Island Pond Rd	12+92	102	1/28/2013	--	--	8	
IPR-10	Island Pond Rd	12+00	101	1/28/2013	--	--	8	
IPR-11	Island Pond Rd	10+83	101	1/28/2013	--	--	8	
IPR-12	Island Pond Rd	9+46	101	1/28/2013	--	--	8	
IPR13	Island Pond Rd	8+52	101	1/28/2013	--	--	8	
IPR-14	Island Pond Rd	7+53	101	1/28/2013	2	6	8	
IPR-15	Island Pond Rd	6+55	101	1/28/2013	2.5	5.5	8	
IPR-16	Island Pond Rd	5+50	101	1/28/2013	6	4	10	
IPR-17	Island Pond Rd	4+40	101	1/28/2013	3	3	8	
IPR-18	Island Pond Rd	3+28	101	1/28/2013	--	--	9.5	
IPR-19	Island Pond Rd	2+10	101	1/28/2013	--	--	8	
DRR-01	Deer Run Dr	2+27	111	1/28/2013	--	--	8	(5.5-8)[1] Blasted rock/fill.
DRR-02	Deer Run Dr	4+65	111	1/28/2013	--	--	8	
DRR-03	Deer Run Dr	6+90	111	1/28/2013	--	--	8	
DRR-04	Deer Run Dr	9+57	111	1/28/2013	--	--	8	
ORD-01	Oak Ridge Dr	28+37	110	1/28/2013	6.5	2.5	10	
ORD-02	Oak Ridge Dr	27+55	110	1/28/2013	--	--	9	
ORD-03	Oak Ridge Dr	25+20	110	1/28/2013	4	4	8	
ORD-04	Oak Ridge Dr	23+72	110	1/29/2013	--	--	20	
ORD-05	Oak Ridge Dr	23+27	110	1/29/2013	--	--	20	
ORD-06	Oak Ridge Dr	22+84	110	1/29/2013	11	9	20	
ORD-07	Oak Ridge Dr	22+38	110	1/29/2013	12	8	20	
ORD-08	Oak Ridge Dr	21+58	110	1/29/2013	--	--	8	
ORD-09	Oak Ridge Dr	19+45	110	1/29/2013	6	4	10	
ORD-10	Oak Ridge Dr	17+42	109	1/29/2013	6	4	10	
ORD-11	Oak Ridge Dr	15+23	109	1/29/2013	--	--	20	
ORD-12	Oak Ridge Dr	14+45	109	1/29/2013	--	--	20	
ORD-13	Oak Ridge Dr	13+96	109	1/29/2013	14	6	20	
ORD-14	Oak Ridge Dr	13+11	109	1/29/2013	--	--	20	
ORD-15	Oak Ridge Dr	10+70	109	1/29/2013	--	--	8	
ORD-16	Oak Ridge Dr	7+95	108	1/29/2013	5	5	10	
ORD-17	Oak Ridge Dr	5+00	108	1/29/2013	--	--	8	
ORD-18	Oak Ridge Dr	2+63	108	1/29/2013	--	--	8	
ORD-19	Oak Ridge Dr	0+42	108	1/29/2013	--	--	8	

Table 1
Ledge Probing Summary

Probe ID	Street	Estimated* Station	Sheet No.	Probe Date	Depth to Bedrock (ft)	Advanced in Bedrock (ft)	Bottom of Exploration (ft BGS)	Comments
ED-01	Emery Dr	5+05N	107	1/29/2013	--	--	8	
ED-02	Emery Dr	2+57N	107	1/29/2013	--	--	8	
ED-03	Emery Dr	0+10S	107	1/29/2013	--	--	8	
ED-04	Emery Dr	2+70S	107	1/29/2013	--	--	8	
ED-05	Emery Dr	6+00S	106	1/30/2012	3	7	10	
ED-06	Emery Dr	7+60S	106	1/30/2012	--	--	8	
ED-07	Emery Dr	10+25S	106	1/30/2012	--	--	8	
BD-01	Belknap Dr	16+57	106	1/30/2012	--	--	8	
BD-02	Belknap Dr	14+72	106	1/30/2012	--	--	8	
BD-03	Belknap Dr	13+62	106	1/30/2012	--	--	8	
BD-04	Belknap Dr	11+25	105	1/30/2012	--	--	8	
BD-05	Belknap Dr	8+40	105	1/30/2012	5	5	10	
BD-06	Belknap Dr	5+78	105	1/30/2012	--	--	8	
BD-07	Belknap Dr	4+12	105	1/30/2012	--	--	8	
BD-08	Belknap Dr	2+20	103	1/30/2012	--	--	8	
BT-01	Brookside Ter	20+62	104	1/30/2012	--	--	8	
BT-02	Brookside Ter	19+48	104	1/30/2012	--	--	8	
BT-03	Brookside Ter	18+50	104	1/30/2012	2	6	8	
BT-04	Brookside Ter	16+70	104	1/30/2012	--	--	8	
BT-05	Brookside Ter	14+55	104	1/30/2012	2.5	6	8.5	
BT-06	Brookside Ter	13+05	104	1/30/2012	6	4	10	
BT-07	Brookside Ter	10+30	103	1/30/2012	--	--	8	
BT-08	Brookside Ter	7+60	103	1/30/2012	4	6	10	
BT-09	Brookside Ter	4+75	103	1/30/2012	--	--	8	
BT-10	Brookside Ter	2+65	103	1/30/2012	--	--	8	
BT-11	Brookside Ter	0+30	102	1/30/2012	--	--	8	

* = Station Values are estimated, not surveyed in field.

-- = No bedrock encountered

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SECTION 02200

EARTHWORK - GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

a. The Contractor shall furnish all labor, materials, tools, and equipment necessary for the satisfactory performance of the trenching and backfill as shown on the Drawings and/or as specified herein.

b. Work specified under this section shall be satisfactorily executed, regardless of subsurface materials encountered, as shown on the Drawings or as otherwise directed by the Owner.

c. Although it is the intention to adhere to the Drawings, the Contractor is informed that the locations of utilities, piping and structures shown on the Drawings are approximate. The Owner reserves the right to make changes in locations, lines, and grades when such adjustments may be necessary or advantageous.

d. When working within the right-of-way of a state or city highway, the Contractor shall be bound by the conditions, restrictions and regulations made by the appropriate governing agency. All such regulations shall be in addition to those set down in the Specifications.

e. Excavation, dewatering, sheeting, and bracing shall be carried out by the Contractor in such manner as to eliminate any possibility of undermining or disturbing the foundations of any existing structure or any work previously completed under this Contract.

f. All ordinary fill shall be compacted by the Contractor to at least 92% of the maximum dry density as determined by the modified proctor compaction test (ASTM D-1557) or to 95% of AASHTO-T-99D or a relative density of 75%, unless otherwise called for on the Drawings.

g. Structural fill shall be compacted by the Contractor to 95% of the maximum dry density, as determined by the modified proctor compaction test (ASTM D-1557) or a relative density of 90%.

h. Sand bedding materials shall be compacted by the Contractor to 92% of ASTM D-1557 or a relative density of 75% except under structures or piping, unless indicated otherwise on the Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. General Conduct of the Work - Section 01015.
b. Schedules - Section 01300.
c. Shop Drawings, Samples, and Project Data - Section 01340.
d. Temporary Facilities - Section 01500
e. Maintenance of Work Site - Section 01560.
f. Horizontal Direction Drilling for Utilities – Section 02446.
g. Water Mains and Appurtenances – Section 02580.
h. Pavement Removal and Replacement – Section 02610.
i. Landscaping – Section 02800.

1.3 QUALITY ASSURANCE

a. Placement and compaction of site grading and structural fill materials, along with performance of associated earthworks, shall be subject to continuous inspection by the Contractor.

b. As the approved backfill and fill materials are placed and compacted, the Contractor shall continuously monitor the lift thickness and compacted conditions of said materials to verify compliance with the requirements specified herein. The Contractor shall perform in-place field density and moisture tests of each compacted lift in accordance with the following approved method:

- ASTM D2922 (Density of Soil and Soil-Aggregate In-Place by Nuclear Methods) in combination with ASTM D3017 (Moisture Content of Soil and Soil-Aggregate In-Place by Nuclear Methods).

c. Following the placement and compaction of each lift of trench backfill, site grading fill, or structural fill, said lift shall be tested by the Contractor to determine the in-place compacted dry density and moisture content, and to determine conformance of this data with the specifications, before subsequent lifts are placed. For each compacted lift, one field moisture-density test shall be performed by the Contractor for each 300 lineal feet of trench backfill (and narrow fills) and for every 8,000 square-feet of area fills. At least one field moisture-density test shall be performed for each lift of trench backfill and site grading/structural fill which is placed and compacted. The field moisture-density testing frequency shall increase if deemed necessary by the Owner.

PART 2 - MATERIALS

2.1 SOIL MATERIAL TESTING

a. The Contractor shall arrange for an inspection by the Owner of each proposed common and foreign borrow source(s) for backfill and fill materials prior to the commencement of earthwork operations. During said inspection, the Contractor

shall provide any equipment necessary to excavate test pits throughout the limits of the proposed source so as to provide the Owner with a thorough inspection of type(s) and uniformity of material(s) throughout the proposed source. The Owner may waive this inspection requirement. Upon Owner's visual inspection and preliminary acceptance of a proposed borrow source (or waiver), but prior to final approval and delivery of said materials, the Contractor is required to submit two analyses of each material, certified it meets the specification for its intended use. During delivery of approval backfill/fill material to the work site, construction frequency tests shall be performed as also outlined in Table 02200-1.

b. The assigned quantity of pre-construction or construction frequency tests may be increased by the Owner should the visual uniformity (regarding color and composition) of the fill materials appear to significantly change throughout the limits of each borrow source or during delivery of material. Additional geotechnical testing required by the Owner, based on the visual inspection of the proposed source or delivered material shall be performed.

c. The coarse-grained, cohesionless soils (i.e., minimal to zero fines) selected by the Contractor for backfill or fill operations, may not exhibit the characteristic "bell-shaped" behavior typical of more moisture-sensitive soils when tested according to ASTM D-1557. In this instance, "relative density" (D_R) shall be used to control the compaction of these soils. In this regard, the following laboratory tests shall be completed on the proposed fill soils:

   - ASTM D-4253: Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
   - ASTM D-4254: Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

d. Subsequent to completion of these tests, the definition of "relative density" presented below shall be used to determine the minimum-required field dry density (γ_d) of the soil necessary to achieve a D_R value of 75% for grading fill and trench backfill and 90% for structural fill, unless otherwise approved by the Owner:

$$D_R = \frac{\gamma_d - \gamma_{d_{min}}}{\gamma_{d_{max}} - \gamma_{d_{min}}} \times \frac{\gamma_{d_{max}}}{\gamma_d}$$

e. All clean, coarse-grained cohesionless soil shall then be compacted by the Contractor to at least the respective minimum-required field dry density values. The minimum and maximum index density tests shall be performed, in lieu of and, at the frequency specified for the Modified Proctor compaction test (ASTM D-1557), as required on Table 02200-1 at end of this Section.

f. The Contractor shall submit certified reports, containing results of the required pre-construction laboratory testing program for each proposed backfill and fill borrow source material. Only upon receiving approval from the Owner of each proposed borrow material, based upon results of the certified test reports, shall the Contractor commence the delivery of the approved material to the site for its intended purpose.

g. Upon visual inspection and/or results of construction frequency testing of backfill and fill materials delivered to the site from an approved borrow source, the Contractor shall remove from the site any such materials which are deemed unacceptable by the Owner.

2.2 SUBMITTALS

a. Certified Test Reports

The Contractor shall submit 2 copies of reports of certified results of pre-construction and construction frequency laboratory testing for review and approval before delivery or use of proposed borrow materials. Test reports shall be submitted at least 2 weeks before initial material delivery. For commercial foreign borrow sources, the Contractor shall submit Certificate(s) of Compliance from the supplier(s) stating that proposed material(s) are environmentally-clean as determined by appropriate analytical testing.

b. Delivery Tickets

When requested by the Owner, the Contractor shall submit delivery tickets showing the following information for each load of foreign borrow backfill and fill material:

- Name and location of supplier.
- Type and amount of material delivered.

2.3 ORDINARY FILL

a. Ordinary fill shall be materials suitable for filling as defined herein:

1. Ordinary fill shall be obtained or produced from approved sources and shall consist of mineral soil having durable (non-calcareous) natural material or granular aggregates as combined with sand, stone, dust, or other filler materials to provide a uniform mixture. Included as common earth are such soils as silty sands, glacial till and sand.

2. Ordinary fill shall be substantially free of organic materials, loam, wood, trash, or other objectionable materials which may be decomposable, compressible or which cannot be properly compacted.

a. Material shall classify as SC, SM, SW, GC, GM, or GW according to the Unified Soil Classification System (USCS) and no more than 35% may pass a No. 200 sieve, unless otherwise approved by the Owner for use to construct a specific work element.

b. Liquid limit shall not exceed 40 and plasticity index shall not exceed 10.

c. Material shall not contain stones larger than the following as measured in the greatest dimension:

- 8 inches for trench backfill.
- 3 inches for structural and site grading fill for area fills.

d. Maximum clod size shall not exceed 4 inches.

e. Material shall have a maximum dry density not less than 100 pounds per cubic foot as determined by ASTM D-1557.

3. Ordinary fill used as embankment fill shall contain no rocks, ledge fragments larger than 2/3 of the compacted thickness of the lift in which the material is placed (except as noted in 2.c. above) and shall be such that no voids are left in the fill as constructed.

4. Ordinary fill shall have physical properties which permit its ready spreading and compacting.

b. To the maximum extent practicable, ordinary fill shall be obtained from natural materials excavated and stockpiled at the work site during the construction.

c. Snow, ice, and frozen soil shall be strictly excluded from ordinary fill materials.

d. The moisture content of ordinary fill being placed as fill shall be sufficient to provide the specified compaction and ensure a stable embankment.

2.4 SELECT GRANULAR FILL

a. Select granular fill shall be natural mineral soil consisting of durable (non-calcareous) granular aggregates. The gradation of the soil shall conform to the limits specified below. The material shall be obtained by the Contractor from sources approved by the Owner.

1. Gravel

Sieve Size	Percent Finer by Weight
6 inch	100
#4	25 - 70
#200	0 - 12*

*Fraction passing the #4 sieve

2. Select Granular Backfill

Sieve Size	Percent Finer by Weight
3 inch	100
#4	30 - 65
#100	0 - 12
#200	0 - 6

3. Sand Backfill (Sand Bedding)

Sieve Size	Percent Finer by Weight
1 inch	100
#4	70 - 100
#200	0 - 12*

*Fraction passing the #4 sieve

b. The maximum size of any stone or fragment shall not exceed 2/3 of the compacted thickness of the layer being placed in any of the materials in above.

2.5 PROCESSED AGGREGATES

a. Processed aggregates shall be obtained or produced from sources approved by the Owner, and shall consist of granular mineral soils having gradations as specified below:

1. Crushed Gravel

Sieve Size	Percent Finer by Weight
3 inch	100
2 inch	95 - 100
1 inch	55 - 85
#4	27 - 52
#200	0 - 12*

*Fraction passing the #4 sieve

For crushed gravel, at least 50% of the materials retained on the 1-inch sieve shall have a fractured face.

2. Crushed Stone

Sieve Size	Percent Finer by Weight		
	3/8-inch	¾-inch	1½-inch
1¾ inch			100
1½ inch			90 - 100
1 inch		100	20 - 55
¾ inch		90 - 100	0 - 15
½ inch	100		0 - 5
3/8 inch	85 - 100	0 - 55	
#4	10 - 30	0 - 10	
#8	0 - 10	0 - 5	
#16	0 - 5		

Stone shall consist of clean, durable fragments of either ledge rock or boulders, or both, of uniform quality, reasonable free from thin or elongated pieces. The stone shall be made from rock which is free from topsoil and other organic material.

3. Broken Stone

Sieve Size	Percent Finer by Weight
6 inch	100
4 inch	85 - 100
1½ inch	25 - 55
¾ inch	0 - 25

4. Gravel for shoulder leveling shall be crushed gravel mixed with at least 25% by volume of loam. The required grading of crushed gravel used for shoulder leveling (before mixing with loam) shall be as follows:

Sieve Size	Percent Finer by Weight
1½ inch	100
1 inch	90 - 100
#4	30 - 65
#200	0 - 10

2.6 ORGANIC SOILS

a. Loam

1. Loam shall consist of loose friable topsoil with no admixture of refuse or material toxic to plant growth. Loam shall be free of stones, lumps, stumps, or similar objects larger than 2 inches in greatest diameter, subsoil, roots, and weeds.

2. The minimum and maximum pH value shall be from 5.5 to 7.6. It shall contain a minimum of 3 percent and a maximum of 20 percent of organic matter as determined by loss by ignition. Not more than 65 percent shall pass a Number 200 sieve.

3. Prior to stripping, the loam shall be demonstrated, by the occurrence upon it of healthy crops, grass, or other plant growth, that it is of good quality and reasonably free draining.

4. Loam shall not be delivered to the site in a frozen or muddy condition.

b. Screened Loam for all established lawns and as noted.

1. Screened loam shall consist of loose friable topsoil with no admixture of refuse or material toxic to plant growth. Screened loam shall be free of stones, lumps, stumps, or similar object larger than 1/2 inch in greatest diameter, subsoil, roots, and weeds.

2. The minimum and maximum pH value shall be from 5.5 to 7.6. It shall contain a minimum of 3 percent and a maximum of 20 percent of organic matter as determined by loss by ignition as defined by ASTM. Not more than 65 percent shall pass a Number 200 sieve.

3. Prior to stripping, the screened loam shall be demonstrated, by the occurrence upon it of healthy crops, grass, or other plant growth, that it is of good quality and reasonably free draining.

4. Screened loam shall not be delivered to the site in a frozen or muddy condition.

c. Humus

Humus shall be the surface layer of natural workable soil containing organic matter, or material of a generally humus nature capable of sustaining the growth of vegetation, with no admixture of refuse or material toxic to plant growth. It shall be relatively free from stones, lumps, stumps or similar objects larger than 2 inches in greatest diameter, sterile soil, roots, and brush. Ordinary sods of herbaceous growth such as grass and non-noxious weeds will be permitted. Wet organic soils, dry enough to be properly measured and spread may be used if it meets the above requirements, but the Owner reserves the right to prohibit the use of muck which may be considered or may become a fire hazard. If muck is accepted, extra limestone, sand, or humus material shall be added as ordered by the Owner.

PART 3 - EXECUTION

3.1 GENERAL

a. The Contractor shall make excavations in such manner and to such widths as will give suitable room for performing the work; shall furnish and place all sheeting, bracing, and supports; shall do all pumping, and draining; and shall render the bottom of the excavation firm and dry and in all respects acceptable.

b. In no case shall the earth be plowed, scraped, or dug by machinery so near to the finished grade at the bottom of the excavation as to result in disturbance of material below said grade. All loose material shall be removed from the bottom of the excavation so that the bottom shall be in an undisturbed condition. If removal of the loose material results in excavation beyond the limits shown on the Drawings, the excavation shall be restored to proper grade.

c. The Contractor shall not perform trenching, backfilling or compaction when weather conditions or the condition of materials are such that, in the opinion of the Owner, work cannot be performed satisfactorily.

d. The Contractor shall not use frozen materials as backfill nor wet materials containing moisture in excess of the amount necessary for satisfactory placement or compaction.

e. Prior to use, the Contractor shall moisten dry backfill materials not having sufficient moisture to obtain satisfactory placement or compaction.

f. The Contractor shall provide effective dust control by sprinkling water, use of calcium chloride or other dust suppressants, or other method approved by the Owner. Dust control shall be employed when, where and in a manner required by the Owner.

g. The Contractor shall not dispose of water in trenches by draining through completed portions of piping.

h. The Contractor shall keep gutters, sewers, drains and ditches open for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted, except where channel crossings are necessary and then only to an extent which the Owner shall consider necessary. Water flows shall not be directed across or over pavements except through approved pipes or properly constructed troughs. When so required, pipes or troughs shall be provided by the Contractor of such sizes and lengths as required, and placed as required. The Contractor shall perform grading in the vicinity of trenches so that the ground surface is properly pitched to prevent water running into the trenches.

i. The Contractor shall keep excavations free from water during the performance of the work under this Contract. The Contractor shall build dams and other devices necessary for this purpose, and provide and operate pumps of sufficient capacity for dewatering the excavations. The Contractor shall provide for the disposal of the water removed from excavations in such manner as not to cause injury to the public health, to public or private property, to the work of others, to the portion of work completed or in progress, or produce an impediment to the use of streets, roads and highways.

j. When it is necessary to haul soft or wet soil material over roadways, the Contractor shall use suitably tight vehicles to prevent spillage. Spillage of materials on roadways caused by hauling shall be cleared away to the satisfaction of the Owner.

k. During cold weather, all exposed earth at the bottom of excavations shall be protected against freezing by covering with tarpaulins or straw or by use of heating devices where necessary.

l. All water pumped or drained from the Work shall be disposed of by the Contractor in a manner satisfactory to the Owner, without undue interference with other work or damage to pavements, other surfaces, or property. Drainage water shall meet the standards appropriate to the receiving water.

m. Where the bottom of the excavation, by error of the Contractor has been taken to a depth greater than the depth specified, shown on the Drawings, or directed by the Owner, said condition shall be corrected by the Contractor by refilling to the proper grade with select granular fill or crushed stone, or the design shall be altered in a fashion acceptable to the Owner to compensate for said error. All measures taken to rectify conditions caused by overexcavation shall be as approved by the Owner.

n. If the surface of the subgrade is in an unsuitable condition for proceeding with construction, the Contractor shall remove the unsuitable material and replace it so that the condition of the subgrade meets with the approval of the Owner before any work is placed thereon.

o. The Contractor shall recognize the risks regarding the presence or proximity of overhead or underground public utility and private lines, pipes, conduits, existing structures and property of whatever nature and shall protect the same from damage. Repair, restoration, or replacement of such structures due to damage by the work of this Contract, whether such structures are or are not shown on the Drawings, are the responsibility of the Contractor.

p. The Contractor shall take necessary precautions to protect trees, shrubs, lawns, stone walls, fences, and such other landscaping from damage, unless their removal is required by the Work.

q. The Contractor shall adequately support any existing underground pipes or conduits exposed as a result of excavations. Adequate support shall be provided along their entire exposed length by timber, planking or other suitable means. Such supports shall be installed in such manner that backfilling may be performed without dislodging such pipes or conduits. The Contractor shall place and carefully compact clean soil or aggregate backfill, as required, around the supports, and leave such supports in place as a guard against breakage due to backfill settlement.

r. No right-of-property of excavated materials is granted the Contractor prior to backfilling. This provision does not relieve the Contractor of his responsibility to remove and dispose of excess (surplus) and unsuitable excavated materials.

3.2 SEPARATION OF SURFACE MATERIALS

a. From areas within which excavations are made, loam and topsoil shall be carefully removed by the Contractor and separately stored to be used again as directed. Stockpiled loam and topsoil shall be supplemented with clean, imported loam and topsoil. When excavations are made in paved surfaces, the pavement shall be removed so as to provide a clean uniform edge with a minimum disturbance of remaining pavement.

b. Pavement shall be pulverized or sawcut prior to any trenching operation. Pavement removed shall not be mixed with other excavated materials, but shall be stockpiled to be reused as a stabilized base, temporary wearing course, shoulder material or removed from the site for recycling.

3.3 SHEETING AND BRACING

a. The Contractor shall furnish, place, and maintain such sheeting and bracing as may be required to support the sides of excavation, to prevent any movement which might in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures from undermining or other damage. If the Owner feels that, at any point, sufficient or proper supports have not been provided, he may order additional supports placed by the Contractor. Compliance with such orders will not relieve or release the Contractor from his responsibility for the sufficiency of such supports.

b. Wherever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If it is necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting shall be driven. Care shall be taken to prevent voids outside the sheeting; but, if voids are formed, they shall be filled immediately with sand and compacted.

c. All sheeting and bracing not left in place shall be removed carefully so as not to endanger the work or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall immediately be backfilled with sand and compacted by ramming with tools especially adapted to that purpose, or by other means as may be directed.

d. The right of the Owner to order sheeting and bracing left in place shall not be construed as creating any obligation on the Owner to issue such orders, and failure to exercise this right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work as a result of negligence or other causes growing out of the Contractor's failure to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

e. Method, design, construction, and adequacy of any required sheeting, shoring, and bracing shall meet the OSHA requirements of 29 CFR Part 1926 and are the responsibility of the Contractor. All damage related to or caused by the excavation shall be repaired at the expense of the Contractor. The design and construction of the sheeting, shoring, and bracing system shall provide means for its removal as backfill progresses.

f. Provide sheeting and shoring, as required, to ensure safe working conditions, maintain required excavation dimensions for proper construction, and to prevent accidents, cave-ins, and damage to adjacent structures, facilities, and surfaces. Sheeting, shoring, and bracing shall be placed so as not to interfere with the construction work and shall be entirely independent of all footings and structures.

3.4 ROCK AND BOULDER EXCAVATION

a. Rock excavation shall be understood to mean solid mass (ledge) rock which, in the opinion of the Owner, requires, for its removal, drilling and blasting, sledging, barring, or wedging. Rock excavation shall be made to the widths and depths directed by the Owner in the field or as shown on the plans or specified.

b. Boulder excavation shall be understood to mean only boulders one cubic yards or more in volume which can be excavated without resorting to blasting. Excavation of boulders less than one cubic yard is considered earth excavation.

c. The Contractor shall conduct all blasting operations in full compliance with all the laws of the state, all local ordinances and with all possible care so as to avoid injury to persons and property. The rock shall be well covered, and sufficient warning shall be given to all persons in the vicinity of the Work before blasting. Care shall be taken to avoid injury to all water pipes, gas pipes, or other structures and to private property. The Contractor, in addition to observing all municipal and other ordinances relating to the storage and hauling of explosives, shall keep standard blasting logs and shall also conform to any further regulations which the Owner shall deem necessary.

d. If rock below the required depth of excavation is shattered as a result of holes having been drilled too deeply, excessive charges of explosives having been used, or for any other causes related to the Contractor's activities, and if, in the opinion of the Owner, said shattered rock is unsuitable for foundations, the shattered rock shall be removed and the excavation refilled as required by the Owner.

e. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Owner, unless other methods of determining quantities have been approved in writing by the Owner.

f. The finished rock faces shall be drilled and presplit before blasting or removal.

3.5 EXCAVATION NEAR EXISTING STRUCTURES

a. Excavation near an existing structure shall not be allowed closer to the structure than two feet plus the depth of the excavation below the bottom of the foundation or a greater distance depending on soil conditions without shoring the excavation with sheeting. The exceptions are catch basins which will be close to the installed line.

b. The Contractor's attention is directed to the fact that storm drains and other underground utilities exist within or immediately adjacent to the areas of proposed construction. Some of these utilities are indicated on the Drawings; however, no attempt has been made to show all of the services, and the completeness and accuracy of the information presented are unverified and without guarantee. This information is supplied for the purpose of providing the Contractor with an indication as to the approximate locations of utilities at the work areas so that he will be made aware of probable obstructions and the extent to which construction may be affected by these.

c. All utility lines shall be located on the ground with pipe location equipment well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or by marked stakes in the ground. Such locations shall be established at least 500 feet in advance of all excavation. All such location work shall be provided by the Contractor, to the satisfaction of the Owner.

d. As the excavation approaches pipes, conduits, or other underground structures, digging by conventional trenching machine methods shall be discontinued. Only manual or "soft" methods of excavating shall be employed around buried utilities.

3.6 PROTECTION OF EXISTING STRUCTURES

a. All existing pipes, poles, wires, fences, curbing, property-line markers, and other structures which, in the opinion of the Owner, must be preserved in place without

being temporarily or permanently relocated, shall be protected by the Contractor. In case of damage, the Contractor shall notify the property owner so that proper steps may be taken to repair any and all damage done. When the property owners do not wish to make the repairs themselves, all damage shall be repaired by the Contractor.

b. All utility services shall be supported by suitable means so that the services do not fail when tamping and settling occurs.

c. The Contractor shall notify the appropriate utility of any excavation in close proximity to utility poles and shall arrange for the utility or a contractor authorized by the utility to hold, brace, or otherwise support utility poles where the work may diminish the pole stability.

3.7 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

a. If, in the course of construction, the Contractor encounters utility services and/or structures of any kind not indicated on the Drawings, or otherwise provided for, which encroach upon or are encountered near and substantially parallel to the edge of the excavation and which, in the opinion of the Owner, will impede progress to such an extent that satisfactory construction cannot proceed, they shall be relocated, removed (later to be restored), or replaced as follows:

   1. Whenever the Contractor encounters any of the conditions as described above and is so ordered in writing by the Owner, he shall do the whole of or such portions of the work as directed; change the location of, remove and later restore, or replace such structures; or assist the Owner thereof in so doing.

   2. In removing existing pipes or structures as described above, the Contractor shall use care to avoid damage to materials, such that replacement is made for only those materials which are unavoidably damaged.

b. When fences or walls interfere with the Contractor's operations, the Contractor shall remove and, unless otherwise specified, later restore them to a condition at least as good as that in which they were found immediately before the work was begun. The restoration of fences or walls shall be done as promptly as possible and not left until the end of the construction period.

3.8 MOISTURE CONTROL

a. Moisture in fill materials shall be at optimum moisture content. If the Owner determines that the fill material to be used is excessively wet, the Contractor shall dry the material.

b. If, in the opinion of the Owner, additional moisture is required, water shall be applied by sprinkler tanks or other sprinkling devices in such a way as to provide uniform distribution over the area to be treated with accurate control of the rate and quantity of water applied. If excessive amounts of water are added or if rain should cause excessive wetness, the area shall be allowed to dry as provided above.

3.9 COMPACTION

a. Each spread layer of material shall be compacted by the Contractor by the use of rollers, rubber-tired equipment, or other approved means so as to secure a dense, stable, and thoroughly compacted mass.

b. Areas adjacent to structures and other areas inaccessible to mobile compaction equipment shall be compacted with suitable approved devices. Compaction by the latter method shall be done in 8 inch layers, or lifts sufficient to achieve the compaction specified.

c. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compaction shall be done when the material is too wet. If the compacted surface of the fill layer is determined to be too smooth to provide an adequate bond with the succeeding layer, the surface shall be loosened by harrowing or by some other approved method before placement of the succeeding layer.

d. Compaction in roadways and shoulders shall be not less than 95 percent of the maximum dry density as determined by laboratory compaction test ASTM D1557. Moisture content shall normally be within the range of +1 to -3 percent of optimum by the same test. This standard shall apply to all compacted fill regardless of the method of compaction used.

e. If at any time the degree of compaction being obtained is judged by the Owner as insufficient, operations shall be halted and compaction tests performed at the Owner's discretion. If such tests are required, a maximum of three tests in each area shall be performed. Areas found deficient in degree of compaction shall be recompacted and regraded, if required.

f. In cross-country excavation and backfill, unless otherwise specified or directed by the Owner, compaction to the density of the original natural materials before excavation shall be sufficient.

3.10 GRADING

a. The Contractor shall grade filled and unfilled areas to the lines and grades indicated on the Drawings., Final grades shall be accurate to ±0.1 vertical feet in 10 linear feet and/or as specified by the Owner. Grading shall be performed in

conjunction with all the necessary clearing, grubbing, stripping, filling, and compacting operations to the satisfaction of the Owner. Grading shall be performed to such lines and grades as may be necessary to allow for the addition of loam or other surfaces, if required, to the proposed finished grade.

b. Areas adjacent to structures and other areas inaccessible to heavy grading equipment shall be graded by manual methods. Embankments will be graded at all times to ensure the runoff of water.

c. Final grading shall be performed in such manner as to provide proper drainage from the project site. Finished grades shall be pitched to drain away from structures completed under this Contract as indicated on the Drawings or as directed by the Owner. In no case shall drainage from the project site be so altered or controlled as to result in damage, or the potential for damage, to adjacent property or to any portion of the work executed under this Contract from erosion or flooding.

3.11 EXCAVATED MATERIAL

a. General

1. Excavated material shall be placed by the Contractor so as to minimize the inconvenience to occupants traveling on streets and driveways or adjoining properties. Excavated material shall not be deposited on private property unless written content of the owner(s) thereof has been filed with the Owner.

2. It is expressly understood that no excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or approved by the Owner, or as noted below.

3. Suitable excavated material shall be used as backfill for normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fill, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted.

4. Surplus excavated materials not needed as specified above, shall be hauled away and disposed of by the Contractor at appropriate locations arranged by the Contractor and in accordance with all local, State and Federal regulations.

b. Disposal and Replacement of Rock

1. The Contractor shall remove and dispose of all pieces of ledge and boulders which are not suitable for use in the work. Rock disposed of by hauling to designated spoil areas is to be replaced by approved surplus excavated material obtained elsewhere on the work site, whenever available. When materials are not available on the work site, the Contractor will supply suitable materials. Any deficiency in backfill material shall be made up with material approved by the Owner.

c. Clean-up and Restoration of Work Site

1. Upon completion of the backfilling, the streets or property shall be cleaned, surplus material removed, and the surfaces restored to the condition existing before ground was broken. All surplus materials from the work in public highways shall become the property of the Contractor.

2. Material excavated from private property shall be disposed of by the Contractor.

3.12 TRENCH EXCAVATION - GENERAL

a. The extent of excavation open at any one time will be controlled by the conditions, but shall always be confined to the limits prescribed by the Owner. The Contractor shall not have more than 300 feet of trench open at any one time for each working crew.

b. The Contractor shall utilize sheeting and shoring as necessary for protection of the work, adjacent property and for safety of the personnel as defined by 29 CFR 1926/1910 OSHA.

c. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins (a minimum of 2 feet). All excavated materials not required or not suitable for backfill shall be removed and disposed of as directed by the Owner.

d. The Contractor shall perform such grading as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulations therein shall be removed by pumping or by other approved method. Pumping of water to any receiving water will require compliance with NHDES regulations and coordination of any permitting through the Owner.

3.13 TRENCH EXCAVATION FOR PIPELINES

a. In general, trenches for pipelines are calculated to give such depth as will provide adequate cover over the pipe. In the event adequate cover is lacking, the

Contractor shall advise the Owner of such condition. The Owner will determine what means shall be used to remedy the situation.

b. The width of the trench at and below the top of the pipe shall be as indicated on the Drawings. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work.

c. Elevations of pipes shown on the Drawings are invert elevations unless specifically designated otherwise. The bottom of the trench shall be excavated to a minimum overdepth of 6 inches below the invert elevations indicated on the Drawings. If, in the opinion of the Owner, material at this minimum depth of excavation is unsuitable for foundation, the Contractor shall remove said material to the required depth and backfill with crushed gravel or screened gravel. When, in the opinion of the Owner, it is necessary to lay a concrete foundation, the excavation shall be as specified, or as ordered by the Owner.

d. The Contractor shall at all times exercise care not to excavate outside the trench limiting lines as shown on the Drawings unless otherwise authorized by the Owner.

e. Excavation in ledge for pipe trenches shall be to 6 inches below the bottom of the pipe invert to the limits shown on the drawings and/or as specified.

3.14 BACKFILLING AND COMPACTION OF PIPELINE TRENCHES

a. As soon as practicable after the pipe has been placed and the pipe joints made in accordance with the appropriate section(s) of the Specifications, and the pipe has been inspected by the Owner, backfilling shall be performed by the Contractor without delay. Whereas backfilling shall begin only at the order of the Owner, the Contractor shall be held responsible for the satisfactory execution of pipeline construction. If subsequent testing shows defects in materials or workmanship, the necessary repairs and replacements shall be made by the Contractor to the satisfaction of the Owner.

b. Bedding shall be as specified for the particular type of pipe installation. Backfill shall be placed simultaneously on either side of the pipe in such a manner as to avoid displacement of the pipe alignment. In placing the material, care shall be taken that stones do not strike the pipe.

c. For applications requiring crushed stone bedding, the bedding shall be placed to the springline of the pipe and so shaped that the pipe shall be firmly supported across its diameter for the full length of the barrel. Particular care shall be taken to provide recesses in the bedding or trench bottom, as required, to relieve each bell of any load.

d. Placement of bedding by the Contractor shall be done by persons skilled in this operation and shall precede the laying of pipe by no more than a few feet.

e. From the bottom of the trench to a minimum of 6 inches above the pipe crown, except where concrete encasement is required, the trench shall be backfilled by placing and compacting the specified materials by approved methods. The filling shall be carried up evenly on both sides of the pipe, care being taken not to raise or otherwise dislodge the pipe. Backfill to this depth shall be thoroughly compacted with approved hand-operated devices. Placement and compaction shall be performed in layers of six inches or less and shall be done in the dry.

f. Backfill in the remainder of the excavation shall be selected backfill placed and compacted in layers 12 inches or less in depth, except as otherwise specified. In roadways, shoulders, and walkways, suitable backfill materials shall be placed and compacted in layers twelve inches or less in depth for the top three feet of depth below grade by approved tamping devices. Tamping of trenches with excavating machines is prohibited. Backfill to be compacted by the Contractor to 95% of AASHTO T-99D modified proctor unless otherwise specified.

g. No stone or rock fragment shall be placed into the trench nor shall large masses of backfilling material be dropped into the tamped layers of backfill until one foot of backfill has been placed over the top of the pipe.

h. For construction in roads, road shoulders, walk-ways and other paved areas, the appropriate base course and surface course materials shall be provided as specified in Section 02610, PAVEMENT REMOVAL AND REPLACEMENT.

i. All backfilled trenches shall be thoroughly surface tamped by the Contractor with a tamping machine approved by the Owner.

j. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material.

k. Any trench areas improperly backfilled or having excessive settlement, as determined by the Owner, shall be reopened by the Contractor to the depth required, then refilled, compacted, restored to the required grade, mounded over and smoothed or repaved as necessary.

l. Those portions of the pipeline running through undeveloped areas ("cross-country") shall be properly backfilled as required by this paragraph, except that backfill material at elevations above 12 inches over the pipe crown may be the native soil. This material may be placed in lifts of 24 inch depths and be compacted to the density of the in-situ soils. All trench backfill in undeveloped areas shall be surcharged six inches and graded to permit vehicle access to all manholes and structures installed under this Contract.

m. All trenches crossing or infringing on landscaped areas or lawns shall be backfilled and compacted in a manner similar to that required under pavement. All landscaping materials, plants, grass and fences shall be restored or replaced so as to restore the area to its original condition. This work shall be accomplished in a timely manner as the trench work progresses, and shall not be delayed or deferred.

3.15 STRUCTURAL EXCAVATION

a. Excavation shall be made by the Contractor to such widths as will give suitable room for building the structures, for bracing and supporting, pumping and draining; and the bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the Owner.

b. Dewatering by the Contractor shall be such as to prevent boiling or detrimental underseepage at the base of the excavation. The Contractor shall install a well point system, if required, to preserve the stability of the base of the excavation.

c. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. In no case shall the earth be ploughed, scraped, or dug with machinery so near to the finished subgrade as to result in excavation or disturbance of material below subgrade level. The Owner shall be the sole judge as to whether the work has been accomplished satisfactorily.

d. The Contractor shall excavate to the exact elevations shown on the Drawings, or as may otherwise be directed by the Owner. When excavation for foundations has reached prescribed depths, the Owner shall be notified and he will inspect conditions. If materials and conditions are not satisfactory to the Owner, the Owner will issue instructions as to the procedure to be followed.

3.16 STRUCTURAL BACKFILL AND COMPACTION

a. Placing and Compacting Structural Fill

Structural fill shall be placed by the Contractor in layers having maximum thickness of eight inches as measured before compaction. Each layer of fill shall be compacted by methods approved by the Owner to at least 95 percent of maximum dry density as determined by the ASTM Compaction Test, Designation D1557 (Modified Proctor). The Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from all areas which are to receive placement of fill.

b. Backfilling and Compaction around Structures

1. Backfill material around structures shall be selected granular backfill unless otherwise specified or directed by the Owner.

2. No backfill shall be deposited against concrete until the concrete has obtained sufficient strength to withstand the earth pressure which will be placed upon it.

3. Backfill around any liquid containment structures shall not be carried out prior to satisfactory completion of tests for watertight structures.

4. Selected backfill shall be placed in layers approximately eight inches deep and compacted promptly with approved tamping devices. Tamping with excavating machinery shall not be permitted.

5. Suitable excavated materials shall be used in backfilling within 2 feet of the structure, and the fill shall be carried up evenly to avoid unequal soil pressures. No stones or rock fragments shall be placed without the Owner's permission nor until select backfill free from such stones and rock fragments has been placed to a minimum depth of eight inches and compacted by approved means.

6. Where pipe is connected to a structure being backfilled, the backfilling procedure shall also conform to the requirements of Structural Backfill and Compaction.

7. During compaction, the Contractor shall exercise care so that stones and lumps shall not become nested and that all voids shall be completely filled with fine material.

8. All backfilled excavations shall be thoroughly surface tamped with a hydraulic tamping machine approved by the Owner.

Table 02200-1
Borrow Material Testing Program

Laboratory Test	ASTM Test Method	No. of Pre-Construction Tests Per Proposed Borrow Material	Frequency of One (1) Test per Volume Delivered to Site (cubic yards) for each Approved Borrow Material
Natural Moisture Content	D-2216	2	1,500
Particle Size Analysis (sieve and hydrometer)	D-421, 422	2	1,500
Atterberg Limits	D-423, 424	2	1,500
Modified Proctor Compaction	D-1557	2	1500

END OF SECTION

SECTION 02446

HORIZONTAL DIRECTIONAL DRILLING FOR UTILITIES

PART 1 - GENERAL

1.1 SCOPE

a. The Contractor shall furnish all labor, materials, tools, and equipment required to install a new water main using the horizontal directional drilling (HDD) method to the sizes and limits as shown on the plans, and as specified by these technical specifications herein. Work includes, but is not limited to, proper installation, testing, restoration of underground utilities and environmental protection and restoration.

b. The directional drilling method involves first drilling a pilot hole as shown on the approved pilot bore plan, and then enlarging the pilot hole no larger than 1.5 times the outer diameter of the pull-in pipe, pipe joint or coupling, and pulling back the pipe through the enlarged hole.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. Earthwork - General Provisions - specified in Section 02200.
b. Water Mains and Appurtenances – specified in Section 02580.

1.3 QUALITY ASSURANCE

a. Lines and Grades

1. Pipes shall be laid true to the lines and grades shown on the Drawings or as directed by the Owner. Minimum depth of bury shall be 4.5 feet. Unless otherwise noted, clearance shall be at least 2 feet from any closed utility and 4.5 feet from any open utility or surface that is exposed to ambient air.

2. The Contractor shall furnish all labor, materials, and tools to establish and maintain all lines and grades. Bench marks and reference points as required for control of the work have been located along the job site. Transferring line and grade from these references shall be the responsibility of the Contractor.

b. Reference Standard

1. The HDD work shall be performed in general conformance with ASTM Standard F1962, current revision, "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or

Conduit under Obstacles, Including River Crossings."

c. Warranty

1. A one-year warranty for the pipe shall be included from the Contractor. It shall cover the cost of replacement pipe and freight to project site should the pipe have any defects in material or workmanship.

2. In addition to the standard pipe warranty, the Contractor shall provide in writing a warranty for a period of one year for all the fusion joints, including formation, installation, and pressure testing, if applicable.

1.4 SUBMITTALS

a. Material - The Contractor shall submit shop drawings showing the pipe lengths, design details, joint details, etc. for the Owner's review. Submittals shall also include, but are not limited to, all welding or fusion procedures to be used in fabrication of the different pipe materials and installation methods and certified records for hydrostatic testing of all pipe materials to be used.

b. Work Plan - Prior to beginning work, the Contractor shall submit to the Owner a work plan detailing the procedure and schedule to be used to execute the HDD project. The Work Plan shall include a description of all equipment to be used, down-hole tools, a list of personnel, list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), an environmental protection plan, and contingency plans for possible problems. The Work Plan shall be comprehensive, realistic and based on actual working conditions for this particular HDD project. The plan shall document the thoughtful planning required to successfully complete the project.

c. Bore Plan - Prior to beginning work, the Contractor shall submit to the Owner a signed and sealed, scaled drawing of the pilot bore plan for review and approval (Max. Vertical Scale 1" = 2' and Max. Horizontal Scale 1" = 20'). The plan shall show finished grade, deflection and radiuses of the pilot bore, and all existing utilities with minimum vertical and horizontal clearances. The Contractor shall address the location of the drill rig setups and for multiple bores, the lengths of each bore based on soil condition, equipment used, topography, etc. The proposed vertical and horizontal clearances between the bored pipe and any existing/proposed conflicting pipes, conduits or obstructions cannot exceed the guidance system accuracy tolerance by a minimum of 100%.

d. Equipment - The Contractor shall submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project. The equipment list shall include but not be limited to: drilling rig, mud system, mud motors (if applicable), down-hole tools, guidance system, and rig safety systems. Calibration records for guidance equipment shall be submitted

to the Owner as well as specifications for any drilling fluid additives that might be used.

1.4 PROFILES AND TOPOGRAPHY

a. Contours, topography and profiles of the ground as may be shown on the Drawings are believed to be reasonably correct, but are not guaranteed to be absolutely so and are presented only as an approximation. It is the Contractor's responsibility to verify all elevations required to successfully complete the crossing, and shall excavate test pits or perform other exploration as necessary.

PART 2 - PRODUCTS

2.1 PIPE

Unless otherwise specified in the Contract Documents, pipe installed by horizontal directional drilling shall be high density polyethylene pipe (HDPE) pipe specifically designed for directional drilling. Unless otherwise specified in the Contract Documents, the water main pipe (carrier pipe) shall be installed without a casing pipe.

a. Polyethylene Pipe

1. High Density Polyethylene (HDPE) Pipe, AWWA C-906 compliant, NSF 61 Standard Listed, and furnished in fifty (50) foot lengths.

2. Polyethylene pipe shall be furnished with an outside diameter conforming to ductile iron pipe sizes. Minimum thickness of HDPE pipe shall be DR 9 when measured in accordance with ASTM D2122.

3. All polyethylene pipe and fittings shall be made of a high-density polyethylene pipe compound with extra high molecular weight that meets the requirements for Type III, Grade P34 Polyethylene material as defined in ASTM D1248, latest revision.

4. Pipes shall be jointed to one another and to polyethylene fittings by thermal butt-fusion or by socket fusion in accordance with ASTM D3261.

5. Joining of pipe sections shall be performed in accordance with the procedures recommended by the pipe manufacturer. Joints between pipe sections shall be smooth on the inside and internal projection beads shall not be greater than 3/16-inch.

6. The tensile strength at yield of the butt-fusion joints shall not be less than the pipe. A specimen of pipe cut across the butt-fusion joint shall be tested in accordance with ASTM D638.

7. Polyethylene pipe shall be joined to PVCO pipe by the use of

bell/mechanical joint adapter kits. Adapters shall be butt fused to the polyethylene carrier pipe. Adapter kits shall be Independent Pipe Products HDPE DIPS Bell MJ adapter kit or approved equal.

2.2 DIRECTIONAL DRILLING EQUIPMENT

a. General - The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pull back the pipe; a drilling, fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the installation; a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused (if required); a Magnetic Guidance System (MGS) or "walkover" system to accurately guide boring operations; a vacuum truck of sufficient capacity to handle the drilling fluid volume; and trained and competent personnel to operate the system. All equipment must be in good, safe condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this HDD project.

b. Drilling Rig - The drilling rig shall consist of a hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground sufficiently to withstand the pulling, pushing and rotating pressure required to complete the installation. The hydraulic power system must be self-contained with sufficient pressure and volume to power drilling operations. The hydraulic system must be free of leaks. The rig is to have a system to monitor and record maximum pullback pressure during pull-back operations. A system to detect electrical current from the drill string must be in place with an audible alarm that automatically sounds when an electrical current is detected.

c. Drill Head - The drill head shall be steerable by changing its rotation with the necessary cutting surfaces and drilling fluid jets.

d. Mud Motors (if required) - The mud motor shall have adequate power to turn the required drilling tools.

e. Drill Pipe - The drill pipe shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tools joints should be hardened to 32-36 RC.

2.3 GUIDANCE SYSTEM

a. The Contractor shall use an electronic "walkover" tracking system or a Magnetic Guidance System (MGS) probe or proven (non-experimental) gyroscopic probe and interface for a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance system shall be capable of tracking at all depths up to fifty feet and in any soil condition, including hard rock. It should enable the driller to guide the drill head by providing immediate

information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system has to be accurate and calibrated to manufacturer's specifications of the vertical depth of the borehole at sensing position at depths up to fifty feet and accurate to 2-feet horizontally.

b. The Contractor shall supply all components and materials to install, operate, and maintain the guidance system.

c. The Contractor shall set up and operate the Magnetic Guidance System (MGS) with personnel trained and experienced with the system. The Contractor shall be aware of any geo-magnetic anomalies and consider such influences in the operation of the guidance system.

2.4 DRILLING FLUID (MUD) SYSTEM

a. Mixing System - A self-contained, closed, drilling fluid mixing system of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water, and appropriate additives shall be used. The mixing system must be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank must be a minimum of 1,000 gallons. The unit must be able to agitate the drilling fluid during drilling operations.

b. Drilling Fluids - The Contractor shall use drilling fluid composed of potable water and bentonite clay. Supply water from an authorized source with a pH of 8.5-10 shall be used. Any water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. No additional material may be used in drilling fluid without prior approval from the Owner. The bentonite mixture used must have the minimum viscosities as measured by a March funnel:

Rocky Clay	60 seconds
Hard Clay	40 seconds
Soft Clay	45 seconds
Sandy Clay	90 seconds
Stable Sand	80 seconds
Loose Sand	110 seconds
Wet Sand	110 seconds

These viscosities may be varied to best fit the soil conditions encountered, or as determined by the operator. No additional fluid shall be used without prior approval from the Owner.

c. Delivery System - The Contractor shall use a fluid pumping system with a minimum capacity of 35-500 GPM and it shall capable of delivering drilling fluid at a constant minimum pressure of 1200 psi. The contractor shall employ filters on the delivery system in-line to prevent solids from being pumped into the drill

pipe. The Contractor shall contain all used drilling fluid, including spilled fluid, during operations and convey it to the drilling fluid recycling system or remove it by vacuum truck or another method approved by the Owner. The driller shall maintain a berm, a minimum of 12-inches high, around drill rigs, drilling fluid mixing systems, entry and exit pits and drilling fluid recycling systems to prevent spills into the surrounding environment. The Contractor shall furnish pumping equipment and/or vacuum truck(s) of sufficient size to convey drilling fluid from containment areas to storage and recycling facilities or disposal.

2.5 OTHER EQUIPMENT

a. The Contractor shall use pipe rollers for pipe assembly during final product pull back.

b. The Contractor shall not use other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections unless approved by the Owner prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated by the Owner without undue delay and maintain line and grade within the tolerances prescribed by the particular conditions of the project.

PART 3 - EXECUTION

3.1 GENERAL

a. The Contractor shall notify the Owner a minimum of ten (10) business days in advance of starting HDD work. All necessary permits and approvals must be in place prior to commencement of HDD work. The Contractor shall not begin the directional drilling until the Owner is present at the job site and agrees that proper preparations for the operation have been made. The Owner's approval for beginning the installation does not in any way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

b. All equipment used on the project may be inspected by the Owner or his representatives and removed if considered unsatisfactory.

3.2 DIRECTIONAL DRILLING OPERATION

a. The Contractor shall provide all material, equipment, and facilities required for directional drilling. It shall maintain proper alignment and elevation of the borehole throughout the directional drilling operation. The method used to complete the directional drill must conform to the requirements of all applicable permits.

b. The Contractor shall survey the entire drill path with entry and exit stakes placed

in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, the Contractor is responsible for surveying the drill path for any surface geo-magnetic variations or anomalies. It may become necessary, if so determined by the Owner, for the Contractor to open excavate, "pothole" or "daylight" other areas to determine the location of existing facilities and utilities.

c. The Contractor shall be responsible for all erosion control associated with the drilling operations and shall comply with Section 01566 of these Specifications.

d. The Contractor shall record readings after advancement of each successive drill pipe (no more than 10 feet), and plot their readings on a scaled drawing. The driller must make all recorded readings and plan and profile information available at all times. At no time can the deflection radius of the drill pipe exceed the deflection limits of the carrier pipe as specified herein.

e. A complete list of all drilling fluid additives and mixtures to be used in the directional operation, along with their respective Material Safety Data Sheets shall be submitted to the Owner. All drilling fluids and loose cuttings shall be contained in pits or holding tanks for recycling or disposal. No fluids shall be allowed to enter any unapproved areas or natural waterways. Disposal of all the drilling mud and cuttings after job completion must be performed by the driller at an approved dumpsite.

f. The Contractor shall drill the pilot hole on the bore path with no deviations greater than 5% of depth over the length of the bore unless previously agreed to by the Owner. In the event that the pilot does deviate from the bore path more than 5% of depth over the length of the bore, the pilot must be pulled back and re-drilled from the location along the bore path before the deviation. In the event of a drilling fluid fracture, inadvertent returns, or returns loss during pilot hole drilling operations, the driller shall stop drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and wait another 30 minutes. If mud fracture or returns loss continues, the Owner shall be notified immediately.

g. Upon completion of pilot hole phase of the operation, the Contractor shall submit a complete set of "as-built" records. Included in these records must be copies of the pilot bore path plan and profile record drawing, as well as directional survey reports as recorded during the drilling operation.

h. Upon approval of the pilot hole location, the Contractor shall begin the hole opening or enlarging phase. The driller shall increase the bore hole diameter to accommodate the pullback operation of the required size of pipe. The type of hole opener or back reamer to be utilized in this phase is to be determined by the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation.

i. The Contractor shall stabilize the open bore hole by means of bentonite drilling slurry pumped through the inside diameter of the drill rod and through openings in the reamer. The drilling slurry must be in a homogenous/flowable state serving as an agent to carry the loose cuttings to the surface through the annulus of the borehole.

j. The Contractor shall haul, string, and assemble the carrier pipe and then fuse or join all pipe sections together according to manufacturer's specifications as applicable. The Contractor shall joint air test the section prior to installation and hydrostatically test the assembled pipeline section, unless otherwise approved by Owner. All assembled pipe sections shall be securely plugged at the end of each work day. The pipe interior is to be protected at all times against dirt, dust, drilling mud, pipe cuttings, debris, animal access, and other sources of contamination

k. The Contractor shall provide adequate support rollers for the pipeline during pullback of the pipe string into the pre-drilled hole. The rollers and cradles shall be of a type that will prevent damage to the pipe and will be of sufficient quantity, as recommended by pipe manufacturer, to prevent over stressing due to sag bends during the pullback procedure. The pipe shall be supported at all times, including pullback, to maintain a free stress arc which limits pipe bending and internal hoop stresses to within manufacturer's limits.

l. Pipe which is not properly protected and supported and shows indications of excessive stressing, gouges, cuts, abrasions or other damage which may affect the operational performance intended for the pipe, as recommended by pipe manufacturer, shall be removed from the site by the Contractor and replaced.

m. The Contractor shall pull back the carrier pipe in one continuous section. The Contractor shall use a swivel to minimize the rotation of the product pipe during pullback. Swivel shall utilize lubricated internal bearings which are fully protected from external contamination and over lubrication. Demonstrate the swivel operation prior to pullback.

n. All piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 8 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer:

    1. The wires must be installed along the entire length of the pipe. Tracer wire shall be installed simultaneously with pullback of the HDPE pipe. Wire shall either be wrapped around the pipe or taped to the pipe at 10 foot minimum intervals before installation.

    2. The insulation color shall match the color of the pipe being installed.

    3. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.

3.3 HANDLING PIPE

a. The Contractor shall be responsible for the handling and storage of the piping so that it is not damaged or made defective in any way. Any pipe that is found to be defective must be marked as such, removed from the jobsite, and replaced with piping that contains no defects or deformities.

3.4 PERSONNEL REQUIREMENTS

a. All personnel must be fully trained in their respective duties as part of the directional drilling crew and in safety.

b. A competent and experienced supervisor of the Contractor shall be present at all times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type of work to be performed shall be in direct charge and control of the operation at all times. In all cases, the supervisor must be continually present at the job site during the actual directional drilling operation. The Contractor is responsible to furnish a sufficient number of competent workers on the job at all times to insure the directional drilling is made in a timely and satisfactory manner.

c. If HDPE is specified for the carrier pipe, HDPE pipe thermal butt fusion welding is to be completed by a welder certified by the manufacturer of the pipe or pipe welding equipment, in accordance with the Plastic Pipe Institute "Handbook of Polyethylene Pipe," Polyethylene Joining Procedures, and 49 CFR 192, Subpart F, latest edition.

3.5 TESTING

a. Prior to pullback, perform an allowable leakage test on the full length of pipe after all sections have been welded or fused in accordance with AWWA C605, latest revision and as described in Section 02580. A hydrostatic pressure test shall also be performed on the installed pipe in accordance with AWWA C605, latest revision and as described in Section 02580

b. In-place hydrostatic testing, leakage testing, flushing and disinfection shall be in accordance Specification Section 02580.

3.6 SITE RESTORATION

a. Following drilling operations, the Contractor shall de-mobilize equipment and restore the work site to a minimum of the conditions of the site immediately prior to the beginning of the Work. The Contractor shall backfill and compact all excavations according to Section 02200.

3.7 RECORD KEEPING

a. The Contractor shall maintain a daily project log of drilling operations and a

guidance system log with a copy available to the Owner at the completion of project.

b. The Contractor shall record the guidance system data during the actual crossing operation and shall furnish "as-built" plan and profile drawings based on these recordings showing the actual location horizontally and vertically of the installation, and all utility facilities found during the installation. The Contractor shall certify the guidance data to the capability of the Guidance System.

END OF SECTION

SECTION 02580

WATER MAINS AND APPURTENANCES

PART 1 - GENERAL

1.1 SCOPE

a. The Contractor shall furnish all materials, labor, tools, and equipment, and perform all operations necessary for the installation, pressure testing, flushing, disinfection and re-flushing, and bacterial testing of the water main and appurtenances (pipe, tees, bends, hydrants and gates) as indicated on the Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. Earthwork - General Provisions - specified in Section 02200.

1.3 QUALITY ASSURANCE

a. Lines and Grades

1. Pipes shall be laid true to the lines and grades shown on the Drawings or as directed by the Owner. Minimum depth of bury shall be 4.5 feet.

2. The Contractor shall furnish all labor, materials, and tools to establish and maintain all lines and grades. Bench marks and reference points as required for control of the work have been located along the job site. Transferring line and grade from these references shall be the responsibility of the Contractor.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

a. Inspection of Material at Delivery Point.

1. Upon delivery to the site, the Contractor shall inspect all pipe and accessories for loss, damage, or lack of identification and markings.

2. Any defective or improper material shall be immediately marked and removed from the site.

b. Handling - In storing and installing, pipe and accessories shall be kept in a sound, undamaged condition. They shall, at all times, be handled with care and shall not be dropped, dumped or bumped against any other object. Any material(s) damaged shall be marked and immediately removed from the job site and

replaced by the Contractor to the satisfaction of the Owner.

c. Storing - Pipe shall be stored off the ground on sticking or pallets. Pipe shall be stacked with spigot ends projecting from the stack in opposite directions for alternate rows.

d. Defective Materials - All materials found at any time during the progress of the work to have cracks, flaws or other defects will be rejected, marked and the Contractor shall notify the Owner of such defects.

1.5 SEQUENCING AND SCHEDULING

a. Very close coordination and cooperation with all affected utilities is required. Contractor shall consult with officials of all such utilities before scheduling construction operations, particularly those involving cutting into and/or suspending flow in existing water mains. The Fire Department and Water Utility must be notified any time flow is shut off to any hydrants, other than when flow can be restored immediately. All hydrants installed under this contact will be "bagged" or otherwise identified as inoperative until such time as the water main is placed in service.

b. The Water Utility shall be notified at least 3 business days prior to performing any wet tap to a water main.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

a. Pipe and fittings shall be of the material indicated on the Drawings or specified herein. Pipe and fittings shall be supplied by the Contractor; detection of defects and storage will be the responsibility of the Contractor.

b. Fittings shall be of the same size, type, class and/or pressure rating as the pipe with which they are used.

PIPE

Pipe four (4) inches and greater in nominal diameter shall be molecularly oriented polyvinyl chloride (PVCO) pipe and shall meet the requirements of AWWA C909 (IPEX Bionax PVCO CIOD or approved equal). Maximum length shall be twenty feet. Push-on joints conforming to ASTM D3139. Pipe shall be furnished complete with ASTM F477 gaskets and lubricant.

FITTINGS

Fittings shall be ductile iron in conformance with or exceeding AWWA C110 or C153. Mechanical joints (MJ) and accessories

shall meet AWWA C111. Double cement lining, inside seal coating and bituminous outside coating shall meet or exceed AWWA C104. Connections between MJ fittings and PVC pipe shall have transition gaskets and be fully restrained. The restraining system shall be Star Pipe Products PVC Stargrip Series 4000 Restrainer or approved equal. Tees for hydrant connections shall be mechanical joint anchoring tees (unless otherwise shown).

NUTS & BOLTS

Shall be KOR-10 (AWWA C111).

RESILIENT WEDGE VALVES

200 psi, mechanical joint with retainers, resilient wedge, valve body should be AWWA C153 (Ductile Iron), DI disk rubber encapsulated, AWWA C550 epoxy coated inside and out, double "O" ring seal, "O" rings replaceable under pressure, non-rising stem, valve box and cover, 2" square nut, AWWA C509. Valves to open-counterclockwise (left). Mueller 2360 series, EJ Prescott F Series, or equal.

VALVE BOXES

Valve boxes shall be cast iron, two piece, sliding type 5 1/4 inch inside diameter shaft, with extension pieces sufficient to allow 6 foot cover (min.). Cover shall be QWP heavy duty with the word "WATER" plainly cast thereon. Gate valve boxes shall be EJ Prescott, or approved equal. Provide two valve wrenches of sufficient length to operate all valves in the project

FIRE HYDRANTS, 5-1/4-INCH

250 psi working pressure, 3-way fire hydrant with auxiliary resilient wedge gate valve and valve box. Hydrant to be in accordance with AWWA C502. Hydrant to be Meuller, Super Centurion 250, 5.25-inch main valve opening, drain plugs in place (non-draining), open left. Hydrant tee shall be Ductile Iron (unless otherwise shown).

POST HYDRANTS, 2-INCH

150 psi working pressure, post hydrant with auxiliary resilient wedge gate valve and valve box. Hydrant to be Eclipse No. 2 Post Hydrant by The Kupferle Foundry Company, or approved equal,

with, 2-3/16-inch valve opening, 2-inch MJ inlet, single 2.5-inch NST outlet nozzle, non-draining, open left.

GASKETS

Push-on rubber, ANSI A21.11, Mechanical joint, rubber, ASTM C425 ANSI A21.11, 1/8" thick.

TAPPING SADDLES

Tapping saddles shall be Ford Meter Box Company, S90 Style A, brass saddle for C900/C909 PCS pipe with CTS compression outlet.

TUBING

Water tubing shall be high density polyethylene CTS tubing, complying with AWWAC901, ASTM D3350 and ASTM D2737, rated to 200 psi.

CURB STOPS

Curb stops shall be a ball curb type (brass ball with Teflon coating), non-draining, AWWA C800 both ends for copper pipe pack joint (CPPJ), Ford, EJ Prescott, or approved equal. Stainless steel stiffeners shall be used with HDPE tubing.

Water Curb Stop Boxes (Erie Style) are made up of three components: the cover, the service box, and the rod. The plug type cover must have a brass pentagon plug with coarse "rope" thread to enable quick and easy removal. Rod shall be stainless steel, The service box shall be adjusted to 1'-0" within its height range.

PIPE INSULATION

Pre-formed polyisocyanurate cellular plastic rigid insulation, 2-inch thick, with 50-mil sheet membrane outer jacket comprised of rubber modified asphalt laminated to polyethylene film, Trymer 2000 XP by ITW Insulation Systems with Foster C.I. Wrap 50 or approved equal.

WARNING TAPE

Metallic traceable warning tape, (Terra-Tape or equal), placed 12 inches below finished grade.

PART 3 - EXECUTION

3.1 GENERAL

a. All pipe, appurtenances and accessories shall be installed by the Contractor true to lines, grades and locations indicated on the plans. Any deviations must be approved by the Owner before installation.

3.2 EXCAVATION, BACKFILL, AND COMPACTION

a. Excavation, backfill and compaction shall be as specified in Section 02200 of the Specifications.

3.3 PIPE BEDDING CONDITIONS

a. All pipes and fittings laid in open trench excavations shall be bedded in and uniformly supported over their full length on beddings of the types specified herein and shown on the Drawings. Flat-bottomed trenches shall be excavated and dewatered in accordance with the Specifications for excavation and backfill in Section 02200, prior to preparing the specified foundation. All work except as noted shall be performed in a dry trench.

3.4 BEDDING

a. Unless otherwise noted, all water lines will be constructed with sand backfill.

b. The trench shall be excavated to a depth of six inches below the bottom of the pipe. Bedding shall be placed in the trench for its full width to support the pipe uniformly at the required line and grade.

c. Suitable recesses shall be provided in the bedding to permit adequate clearance for bells, couplings, or similar projections. The bedding shall extend upward around the pipe barrel to form a positive cradle fitting the bottom quadrant (90 degrees) of the pipe barrel providing uniform support along the length of the pipe section at the required line and grade.

d. Bedding material shall be spread in six-inch layers, and each layer shall be compacted with approved compaction equipment or pneumatic tampers until the required total depth of bedding has been built up.

e. Where a suitable supporting soil or rock stratum occurs at a depth greater than six inches, but less than two feet below the pipe, and where ordered by the Owner, this foundation shall be modified as follows. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Selected backfill, screened gravel or crushed gravel bedding shall then be spread in four-inch layers, and each layer shall be completed with approved compaction equipment

such as 20 pound hand or pneumatic tampers. The bedding shall carry vertically from the supporting stratum up to an elevation six inches below the bottom of the pipe. Typical foundation shall then be installed as specified above.

3.5 INSPECTION OF PIPE BEFORE INSTALLATION

a. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round or otherwise defective pipe, fittings or specials, as determined by the Contractor or the Owner, shall be clearly tagged in such manner as not to deface or damage it and the pipe shall then be removed from the job site by the Contractor.

3.6 TEMPORARY PLUGS

a. At all times when pipe laying is not actually in progress, the open ends of 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.

3.7 BLOCKING AND RESTRAINTS

a. All plugs, caps, and fittings at which a change in direction occurs shall be backed with a block of 3000 psi concrete of at least the dimensions indicated on the Drawings and placed against undisturbed earth. When the bearing value of the earth is insufficient to prevent movement, bridle rods/restraints may be used. Plastic sheeting shall be used between the fitting or pipe and any concrete thrust block.

b. When placing thrust blocks, the Contractor shall leave nuts and bolts accessible for future removal.

c. All exposed steel rods, bolts and nuts should be given a liberal coat of bituminous paint. Paint shall be allowed to "set" before backfill is placed.

3.8 BURIED PIPING INSTALLATION

a. Unsuitable soil conditions encountered beneath major piping shall be excavated and backfilled by the Contractor as directed by the Owner. The limit of excavation and backfill is defined by a line beginning at the centerline of the pipe at mid-diameter and sloping downward and outward (1 horizontal to 1 vertical) to the bottom of the unsuitable soils. For further definition of the extent of excavation and specification for structural fill, see Section 02200.

b. Where it is necessary to join pipes of different types, the Contractor shall furnish and install the necessary adapter. Adapters shall have ends conforming to specifications for the appropriate type of joint to receive the adjoining pipe.

c. The Contractor shall furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner at the lines and grades indicated on the Drawings or as directed by the Owner.

3.9 FINAL INSPECTION

a. Each portion of installed water main will be visually inspected by the Owner prior to final testing. The pipe shall be true to both line and grade, shall contain no broken pipe, shall show no leaks, shall show neither obstructions nor the projection of connecting pipes into the main pipe, and shall contain no debris or other deposits which shall in any way reduce the full cross-sectional area of the pipe.

b. Any portion of water pipe which does not comply with these inspection criteria, as determined by the Owner, shall be promptly corrected, replaced or repaired by the Contractor to the satisfaction of the Owner. Such methods as are employed for the correction shall be approved by the Owner.

3.10 HYDROSTATIC TESTING

a. The Contractor shall perform all water main testing in accordance with AWWA/ANSI C605.

b. After the pipe has been installed, it shall be subjected to a hydrostatic pressure of at least 150 psi at the low point in the system.

c. The test shall be conducted for a minimum of two hours.

d. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Owner.

3.11 LEAKAGE TEST

a. A leakage test shall be conducted concurrently with the pressure test in accordance with AWWA/ANSI C605 as follows.

b. Allowable leakage shall be in accordance with AWWA C605

c. When hydrants are in the test section, the test shall be made against the closed hydrant. All testing shall be made against closed curb stops.

d. Acceptance of the installation shall be determined on the basis of allowable

leakage. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall locate and repair the defective material until the leakage is within the specified allowance.

3.12 FLUSHING AND DISINFECTING

a. General

1. All new water systems or extensions shall be thoroughly flushed and disinfected by the Contractor in accordance with AWWA C651 before being placed in service.

b. Flushing

1. Before using water from any water supply system for flushing, approval must be obtained from the Owner. The Contractor shall be responsible for all costs of such water and/or the supply and disposal of same.

2. Flushing rate shall be at least 2.5 fps.

3. Flushing shall continue until discharge is clean and colorless.

4. In no case shall flushing be conducted in such a manner as to contaminate existing water systems or create a nuisance or flooding. Direct flushing discharge to a stabilized area or use a diffuser to minimize erosion.

5. Final flushing shall be in accordance with AWWA C651.

c. Disinfection

1. System shall be disinfected by injection and circulating a chlorine solution of not less than 50 ppm of available chlorine. Liquid chlorine or sodium hypochlorite solutions are acceptable disinfectants. Care must be taken in accordance with safety procedures for handling chlorine.

2. Chlorine residual samples shall be taken to ensure a 50 ppm chlorine level throughout the system prior to disinfection period.

3. Chlorine solution shall remain in system for at least 24 hours, at the end of which period, the residual chlorine concentration shall be at least 10 ppm.

4. If this is achieved, final flushing chlorine residuals shall be taken to ensure that heavily chlorinated water has been removed from system as soon as possible after completion of the disinfection and no later than 36 hrs.

d. Bacteriological Testing

1. After final flushing and residual chlorine check, the Contractor shall take a minimum of two grab samples of water from the downstream section of the system and submit them to a certified public or private laboratory for bacteriological testing in accordance with state and local regulations. Care shall be taken not to contaminate the sample during collection and transportation. Sampling shall be in accordance with AWWA C651.

2. If certified results indicate no coliform bacteria, disinfection will be acceptable.

3. Flushing and disinfecting procedure shall be repeated until no harmful contamination is present and is so certified.

END OF SECTION

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SECTION 02610

PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.1 SCOPE

a. The Contractor shall furnish all labor, materials, tools, and equipment and perform all operations necessary to remove and replace bituminous concrete pavement, sub-bases, binder courses, and wearing courses including temporary pavement (as necessary) within the areas indicated on the Drawings and as directed by the Owner.

b. The pavement shall be placed, after backfilling and compacting in accordance with Section 02200. Permanent pavement shall be placed within one week of pipe installation and in accordance with any applicable road opening permit. Until pavement is placed, traffic shall be maintained on gravel for low volume roads and on temporary pavement for high volume roads.

c. The paving is to be accomplished in two phases. The binder course shall be placed within the one week period and the wearing course placed within 30 days after the binder course.

d. Pavement which settles, cracks, rides poorly, or otherwise fails within the one year warrantee period shall be replaced or cold planed and resurfaced, minimum of 1 inch in depth, as directed by the Owner.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. Maintenance of Work Site - Section 01560.
b. Earthwork – General Provisions - Section 02200.

1.3 REFERENCE STANDARDS

a. All pavement restoration materials and workmanship, except as otherwise specified, shall conform to the NH Department of Transportation (NHDOT) Standard Specifications for Roads and Bridges, latest edition (NHDOT Standard Specifications), and shall be guaranteed for a period of one year from date of acceptance of the project.

PART 2 - MATERIALS

2.1 AGGREGATE BASE AND BITUMINOUS CONCRETE

a. All aggregate base and bituminous concrete materials shall conform to NHDOT Standard Specifications, in accordance with Table 02610-1.

Table 02610-1: Bituminous Concrete and Base Specifications

	NHDOT Section	Material & Thickness (min.)		
		Main Street (Rt 121)	Island Pond Road	Other Collector Roads
Wearing Course	401	1 ½" Wearing Mix		1" Wearing Mix
Binder Course	401	2 ½" Binder Mix		2" Binder Mix
Crushed Gravel Base	304	6" Crushed Gravel (304.3)		
Gravel Base	304	12" Gravel (304.2)		

PART 3 - EXECUTION

3.1 GRAVEL BASES COURSES

a. All pipe trenches shall be reclaimed or saw cut and the materials left in place or replaced with crushed gravel for short term traffic surface (less than 1 week) or as gravel backfill for the trench.

b. The Contractor shall remove sufficient backfill material to allow placing of gravel course(s) as shown or specified and thoroughly compacted, and a pavement depth as required.

c. The depth of the gravel and crushed gravel base shall be as specified or as shown. The gravel shall be thoroughly compacted to the proper distance below and parallel to the prescribed level of the base course. The base shall be compacted by means of approved mechanical tampers to 95 percent density at optimum moisture content by the AASHTO T99-D.

d. No material shall be laid upon a frozen base course or when wind conditions are such that rapid cooling will prevent satisfactory compaction.

3.2 TRENCH BITUMINOUS PAVING

a. Prior to the installation of the bituminous concrete binder course, all adjacent or abutting wearing or binder surfaces shall be saw-cut to a straight line see plans for details of trench restoration. The trimmed edges shall be stable and unyielding.

All edges shall be thoroughly swept and coated with an approved asphalt tack coat before the finish coat is spread.

b. Bituminous concrete shall be covered during transit with canvas, or other material, which shall retain the desired temperature. Temperatures for bituminous concrete shall be not less than 250°F and no greater than 375°F.

c. Bituminous concrete mixtures shall be placed only when the underlying surface is dry, frost-free and the surface temperature is above 40°F for courses greater than 1-1/4 inches in compacted depth and above 50°F for courses less than 1-1/4 inches in compacted depth. The permanent pavement shall be placed only when the weather is not rainy or foggy, provided, however, that the Owner may permit, in case of sudden rain, the placing of the mixture in transit from the plant, if laid at the proper temperature and if the roadbed is free of pools of water. Such permission shall in no way relax the requirements for quality of the pavement and smoothness of the surface.

d. The Contractor shall thoroughly clean surfaces of existing pavement which will be bonded to new pavement. The edges of the existing pavement must be sawn to provide a straight bonding edge before laying the new pavement. Edges of existing pavement shall be coated with an asphalt emulsion prior to paving.

e. Hot bituminous concrete paving to be applied in two courses: one binder course and one wearing course. The surface of paving shall be at grade with the existing paving. Thicknesses of courses vary with location.

f. Where the base course contains irregularities of more than 1 inch, such irregularities shall be eliminated by the use of a leveling course. Accumulation of dirt, leaves, or foreign matter shall be completely removed. The maximum length a mechanical paver may travel before setting back and applying an adjacent strip shall be determined by the Owner to ensure a proper bond on all longitudinal joints. All transverse joints shall be made with a paper joint, or with a 1-inch piece of strapping. All longitudinal and transverse joints shall be bonded and sealed.

g. Along curbs, manholes, catch basins, and similar structures, and at all places not accessible to the roller, compaction must be secured by means of hot tampers. If a windrow is left next to the curb after rolling, the excess pavement shall be cut out by the Contractor. Rolling shall start longitudinally at the sides and proceed toward the center of the pavement overlapping on successive strips by at least one half the width of the rear wheel.

h. All paving shall be performed in accordance with NHDOT Standard Specifications, Section 401.

END OF SECTION

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SECTION 02800

LANDSCAPING

PART 1 - GENERAL

1.1 DESCRIPTION

a. The Contractor shall furnish all labor, materials, equipment and appurtenances required to perform completely and satisfactorily the fine grading, fertilizing, seeding of all graded, cleared and disturbed areas and preparation, planting and maintenance of all landscape planting as shown on the Drawings and to restore locations disturbed by construction work.

b. Planting work for all trees and shrubs shall be performed by a qualified Landscape Contractor Nurseryman whose major business operations are in the above classification; written approval of the Owner shall be obtained.

c. Landscaping work shall be of the various types and at the locations indicated on the Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

a. Erosion Control - Section 01566.
b. Earthwork - General Provisions - Section 02200.

1.3. CERTIFICATES, INSPECTION AND TESTS

a. The Contractor shall be responsible for all certificates of inspection of plant materials required by Federal, State or other authorities.

b. Inspection may be required before digging plant material if the Owner direct, but no plant material shall be planted until inspected by the Owner at the site.

c. If required by the Owner, plants shall be inspected at the source before digging.

d. The Contractor, if required, shall furnish an affidavit from the manufacturer or producer certifying that the materials or products delivered to the project meet the requirements specified. However, such certification shall not relieve the Contractor from the responsibility of complying with added requirements specified herein.

e. Fertilizer and Lime:

1. Provide duplicate copies of delivery documentation for all fertilizer and lime used on the Project. Delivery documentation for fertilizer shall show the grade furnished. Delivery documentation for lime shall show a total minimum carbonates and minimum percentages of the material furnished that pass 100 and 20-mesh sieve.

2. Upon completion of the Project, a final check of the total quantities of fertilizer and lime used will be made against the total area topsoiled and seeded, and if minimum rates of application have not been met, the Owner may require distribution of additional quantities of these materials to make up the minimum application specified.

f. Seed

Provide duplicate signed copies of a statement from the supplier certifying that each container of seed delivered is fully labeled in accordance with the Federal Seed Act and is at least equal to the requirements specified herein. This certification shall appear on or with all copies of invoices for seed.

g. The Contractor shall take two one-pint samples from each sources of loam proposed for use and shall forward them to the local agricultural agent for his recommendations as to types and quantities of soil conditioners, and fertilizers, to be applied for a dense, vigorous growth of perennial lawn-quality grass. The Contract shall furnish and apply soil conditioners, and fertilizers, as recommended by the agricultural agent and approved by the Owner.

1.4 DELIVERY, STORAGE, HANDLING, AND PROTECTION OF WORK

a. The Contractor shall deliver fertilizer materials in original, unopened, undamaged containers showing weight, analysis, and name of manufacturer. All fertilizer materials shall be stored in a manner to prevent wetting and deterioration.

b. The Contractor shall take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Spray deciduous plants in foliage with an approved "Anti-desiccant" immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Owner. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

c. All planted areas shall be protected against trespassing and damage at all times. All damaged plants or other landscaping work shall be replaced.

1.5 INSPECTION AND ACCEPTANCE

a. All landscaping work shall be maintained until the end of the planting season following the season during which the areas were planted. No trees, shrubs or ground cover plants will be accepted unless they show healthy growth and satisfactory foliage conditions.

b. Maintenance of all plantings shall include watering, pruning, weeding, edging, cleaning, replacement of mulch, and other work necessary to maintain landscaping work in a thriving condition.

c. At the beginning of the next planting season after that in which the permanent grass crop is sown, the seeded areas shall be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The lawns shall be watered, weeded, cut, and otherwise maintained by the Contractor until the end of that planting season, when they will be accepted.

1.6 REPLACEMENTS

a. During a period of one year after acceptance of the Work, the Contractor shall replace promptly all shrubs and trees which, in the opinion of the Owner, have not survived and grown in a healthy condition. They shall be replaced during the immediate growing season and as soon as the weather permits. The replacement planting of all trees and shrubs shall be completed in the normal planting season of the locality of the Project.

b. Plant replacements shall be the same kind and size as originally specified. All plant replacements shall be furnished, planted and mulched in full accord with these Specifications.

c. All sidewalks and other paved areas shall be kept clean during replacement operation.

1.7 CLEAN-UP

a. The Contractor shall clean paved areas thoroughly by sweeping and/or washing and shall remove any defacement or stains caused by the work of this Section.

b. All construction equipment, tools, debris, and rubbish shall be removed from the Project site.

c. All excess soil materials shall be disposed of on the Project site where directed by the Owner.

PART 2 - PRODUCTS

2.1 SEED

a. Grass seed shall be of the previous year's crop and in no case shall the weed content exceed 1 percent by weight.

b. The grass seed for lawns shall conform to the following requirements:

Kentucky Blue Grass	20%
Redtop	20%
Creeping Red Fescue	60%

c. The grass seed for slopes shall conform to the following requirements:

Creeping Red Fescue	10%
Redtop	15%
Alta Fescue	35%
Dutch White Clover	10%
Manhattan Ryegrass	30%

d. The seed mixture specified for slopes consists of a tough, hardy type for use on slopes graded at the rate of 4:1 and steeper and on shoulders adjacent to roadway pavements or as directed. The mixture for lawns is of a finer type which will produce a finer turf.

e. The seed shall be purchased separately and mixed at the preceding proportions at the project site. Seed which has become wet, moldy, or otherwise damaged in transit or storage shall not be used.

2.2 LOAM

a. For cross country, loam shall be as specified in Section 02200.

2.3 SCREENED LOAM

a. For existing and new lawn areas, screened loam shall be as specified in Section 02200.

2.4 FERTILIZER

a. The fertilizer shall be furnished in containers plainly marked with the chemical analysis of the product. All fertilizer used shall be approved by the Owner.

b. Sod and seed fertilizer shall contain the following minimum percentages of plant food by weight:

Available Nitrogen	10%
Available Phosphoric Acid	10%
Available Potash	10%

c. Plant fertilizer Type "A": Commercial type approved by the Owner, containing 12% nitrogen, 12% phosphoric acid, and 12% potash by weight. 1/4 of nitrogen in the form of nitrates, 1/4 in form of ammonia salt, and 1/2 in form of organic nitrogen.

d. Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces; permeable to permit transpiration. Mixed and applied by the Contractor in accordance with manufacturer's instructions.

e. Mulch: 6 month old well rotted shredded native softwood bark mulch not larger than 4" in length and 1/2" in width, free of woodchips, sawdust, and other foreign matter.

f. Water: free of substances harmful to plant growth. Hoses or other methods of transportation furnished by Contractor.

2.5 LIME

a. Lime shall be calcic or dolomitic ground agricultural limestone containing not less than 85 percent of total carbonate and of such fineness that 90 percent will pass a Number 20 sieve and at least 50 percent will pass a Number 100 sieve.

b. Caked or otherwise damaged lime may be rejected.

c. Lime shall be furnished in new, clean, sealed, and properly labeled bags of not more than 100 pounds each, with the following information clearly marked thereon:

Manufacturer's name
Type
Weight
Guaranteed Analysis

2.6 TREES AND SHRUBS

a. Plants shall be typical of their species and variety, have normal growth habits, well developed branches, densely foliated, vigorous, and fibrous root systems.

b. Plants shall be free from defects and injuries and certified by the Federal and State Authorities to be free from plant diseases and insect infestations.

c. Plants shall be freshly dug and nursery grown. Nursery grown plants shall have been transplanted or root pruned at least once in the past three years. Plants shall have been grown under climatic conditions similar to those in locality of the project or acclimated to conditions of locality of project.

d. The species or varieties, specified herein by botanical or common name, shall be provided as specified. Substitutions will be permitted only upon written application by the Contractor to the Owner and when approved by the Owner in writing. Request for permission to substitute will not be entertained unless adequate evidence substantiating the non-availability of the specified item accompanies the request for substitution.

2.7 PLANT LIST

a. Supply and locate plants to replace those disturbed by the construction and as ordered by the Owner.

b. Major Trees:

1. All trees shall have straight trucks with a single leader intact. Bark shall be free of abrasion; all fresh cuts over 1-1/4 inch shall have calloused over.

2. Trees will not be accepted which have had their leaders cut or which have leaders damaged so that cutting is necessary.

3. Unless otherwise specified, major deciduous trees shall be free of branches up to 7 feet from top of ball, well branched, and reasonably straight stems.

4. Evergreen trees shall conform to (1) and (2) above, but lower branches shall be no less than 12 inches from top of ball. Sheared trees are not required, but branches shall be compact and regularly spaced.

5. Plant names indicated, comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. The Contractor shall provide stock true to botanical name and legibly tagged.

6. The Contractor shall comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be dimensioned as it stands in its natural position.

7. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of 2 years.

8. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size indicated and 75% are of the maximum size indicated.

9. The Contractor shall provide "specimen" plants with a special height, shape, or character of growth. Tag specimen trees or shrubs at the source of supply. The Owner will inspect specimen selections at the source of supply for suitability and adaptability to selected location. When specimen plants cannot be purchased locally, the Contractor shall provide sufficient photographs of the proposed specimen plants for approval.

10. Plants may be inspected and approved at the place of growth, for compliance with specification requirements for quality, size, and variety.

    a. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

    b. Plants: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces.

11. The Contractor shall dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock". Cracked or mushroomed balls are not acceptable.

12. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.

    a. No plants shall be loose in the container.
    b. Container stock shall not be pot bound.

13. Tree species that mature at heights over 25'-0" shall be provided with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable.

14. Plants planted in rows shall be matched in form.

15. Plants larger than those specified in the plant list may be used when acceptable to the Owner.

    a. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

16. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list.

17. No pruning wounds shall be present with a diameter of more than 1" and such wounds must show vigorous bark on all edges.

18. Evergreen trees shall be branched to the ground.

19. Shrubs and small plants shall meet the requirements for spread and height indicated in the plant list.

    a. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.

    b. Thinly branched plants will not be accepted.

    c. Side branches shall be generous, well-twigged, and the plant as a whole well-brushed to the ground.

    d. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.

c. Minor Deciduous or Flowering Trees:

    1. Flowering trees, whether single or multi-stemmed, shall have lower branches no more than 12 inches from top to ball. Branching shall be regular, with ample twigs.

d. Shrubs shall be well-shaped, compact and bushy. No old, cut-back shrubs are permitted.

e. Digging and Handling:

    1. Handle all plants so that roots are adequately protected at all times.

2. No plant shall be bound with rope or wire at any time so as to damage the bark, break branches, or destroy its natural shape.

3. Minimum ball diameter for size of plant shall be:

Size	Diameter of Ball
2-3' high	12"
3-4' high	13"
6-8' high	18"
8-10' high	21"
2-2-1/2" Caliper	26"
3-1/2-4" Caliper	36"

4. During shipment, all plants shall be properly protected by a tarpaulin or other suitable covering against excessive drying from sun and wind or strain and breakage from wind and storm.

5. Until planted, all balled and burlapped plants shall be heeled in and well protected with wood chips or bark shavings or other acceptable moisture holding material, or as directed otherwise by the Owner.

2.8 PLANT STAKING MATERIALS

a. Stakes for staking: Hardwood, 2"x2" x 8'-0" long.

b. Stakes for guying: Hardwood, 2"x2"x30" long.

c. Guying/Staking Wire: No. 10 or 12 gage galvanized wire.

d. Staking and Guying Hose: Two-ply, reinforced garden hose not less than 1/2" inside diameter.

e. Twine: Two-ply jute material.

2.9 PLANT MULCH

a. Mulch shall be a native type 6 month old well rotted and shall consist of wood chips free from stones, or other foreign matter.

b. Only natural domestic wood chips suitable for soil mulch shall be used, of composition furnishing ample water holding capacity and retention of plant food.

c. Wood chips shall be as normally run through a mechanized chipper, with chips averaging 1/4 inch in thickness by 1 inch by 2 inches in width and length.

2.10 PLANT MIX

a. Plant mix shall be made up of 4 parts topsoil, 1 part peat and 1 part manure, thoroughly mixed by mechanical means. This mixture, when added to an equal volume of excavated and screened soil from pits, shall compose the Plant Mix for backfilling all tree and shrub pits.

1. Topsoil shall be as specified in Paragraph 2.2.

2. Peat shall be decomposed reed peat as specified in ASTM D2607 Sphagnum Peat Moss with a pH below 6 for ericaceous plant with a water absorption capacity of not less than 300% of its weight when oven dried at 110 degrees Centigrade.

3. 1/2 pound of plant fertilizer Type A for each 1/2 CY of plant mix.

4. Manure shall be well rotted manure, more than 1 year old, with an analysis of not less than 0.5 percent potassium.

5. Excavated soil forming one-half of Plant Mix shall be passed through a screen of 1-1/2 inch square openings.

6. Frozen or muddy plant mix is unacceptable.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

a. The subgrade shall be scarified to a depth of 2 inches to assure the bonding of the loam to the topsoil.

3.2 LOAM PLACEMENT

a. The loam shall be spread upon the previously prepared surface and shall be raked carefully to remove all objectionable materials. A minimum of 6 inches of loam shall be applied.

b. Areas shall be graded in accordance with Drawings or as directed by the Owner.

3.3 LIME PLACEMENT

a. Lime, where necessary, shall be uniformly spread and thoroughly incorporated to a depth of at least 3 inches by discing, harrowing, or other method acceptable to the Owner.

b. Rate of application will vary up to a maximum of one pound per square yard, depending upon the results of soil testing of the loam.

3.4 APPLICATION OF FERTILIZER (Sod & Seeded Areas)

a. Fertilizer shall be uniformly applied to the loam at a minimum rate of application of 20.0 pounds per 1,000 square feet or as recommended by the Agricultural Agent.

b. It shall be thoroughly incorporated to a depth of at least 3 inches by discing, harrowing, or other method acceptable to the Owner.

3.5 ROLLING

a. Once the lime and fertilizer has been placed, and raked until the surface is smooth and finely pulverized, the surface shall then be compacted with rollers, weighing not over 100 lbs. per linear foot of tread to an even surface conforming to the prescribed lines and grades.

b. All depressions exposed during rolling shall be filled with additional loam and recompacted.

3.6 SEEDING

a. Seeding shall be done when weather conditions are approved as suitable in the periods between April 1 and June 1 or August 15 and October 15, unless otherwise approved.

b. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding begins, the soil shall be lightly raked.

c. Seed shall be sown at a rate of 4 pounds per 1,000 square feet, on a calm day and preferably by machine, but if by hand, only by experienced workmen. Water seeding will not be permitted.

d. One half the seed shall be sown in one direction and other half at right angles. Seed shall be raked lightly into the soil to a depth of 1/4 inch and rolled with a roller weighing not more than 100 lbs. per linear foot of tread.

e. The surface shall be kept moist by a fine spray until the grass shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than three square feet, the Contractor shall reseed, roll, and water as necessary to obtain proper germination.

f. The Contractor shall water, weed, cut, and otherwise maintain and protect seeded areas as necessary to produce a dense, healthy growth of perennial grass.

3.7 TEMPORARY COVER CROP

a. If there is insufficient time in the plating season to complete the seeding, fertilizing and permanent seeding may be left until the following planting season, at the option of the Contractor or on order of the Owner. In this event, a temporary cover crop of buckwheat, domestic rye grass, or other approved seed shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

3.8 MAINTENANCE OF SEEDED AREAS

a. The Contractor shall water, cut, reseed and maintain all areas seeded by him until the end of the planting season following the season during which the areas were seeded.

b. All seeded areas that do not produce a uniform, healthy stand of grass shall be reseeded.

c. During the planting season, following the season during which the areas were planted, the Contractor shall refertilize all areas planted by him.

3.9 TREE PROTECTION AND REMOVAL

a. Removal of Trees:

1. All trees and stumps shall be removed from the area to be occupied by new buildings, roads and surfaced areas; removal of trees outside these areas shall only be done as noted, marked and approved by the Owner.

2. No other trees may be cut except by permission of the Owner. All stumps within 36 inches of final grade shall be removed.

b. Protection of Trees:

1. General Protection: The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees on the site that are to remain. Existing trees subject to construction damage shall be boxed, fenced or otherwise protected before any work is started; remove boxing when directed. Do not permit heavy equipment or stockpiles within branch spread. Remove interfering branches without injury to trunks and cover scars with tree paint.

2. Grading around Tree: Where excavation, fill or grading is required within the branch spread of trees that are to remain, the work shall be performed as follows:

a. Trenching: When trenching occurs around trees to remain, the tree roots shall not be cut but the trench shall be tunneled under or around the roots by careful hand digging and without injury to the roots.

b. Raising Grades: When the existing grade at tree is below the new finished grade, and fill not exceeding 16 inches is required, clean washed gravel graded from 1 inch to 2 inch size shall be placed directly around the tree trunk. The gravel shall extend out from trunk on all sides a minimum of 18 inches and finish approximately 2 inches above the finished grade at tree. Install gravel before any earth fill is placed. New earth fill shall not be left in contact with the trunks of any trees requiring fill. Trees marked for preservation that are buried in fills over 12" deep shall have an open dry well of durable masonry (without mortar) situated at least 12" from the tree truck. All wells are to be properly drained. Before fills of over 12" are made upon the tree root areas, it is advisable to spread at least a 6" layer of broken stone or coarse gravel covered by inverted sods to facilitate proper drainage and aeration.

c. Lowering Grades: Existing trees in areas where the new finished grade is to be lowered, shall have regrading work done by hand to elevation as indicated. Roots as required shall be cut cleanly 3 inches below finished grade and scars covered with tree paint. Trees marked for preservation that are located more than 6" above proposed grades shall stand on broad rounded mounds and be graded smoothly into the lower level. Exposed or broken roots shall be cut clean and covered with topsoil.

3.10 PLANTING TREES AND SHRUBS

a. General

When conditions are such, by reason of extreme cold, drought, high winds, excessive moisture, or other similar factors, that satisfactory results are not likely to be obtained, landscaping work shall be stopped. It shall not be resumed until desired results can be obtained or until approved alternate or corrective measures and procedures are adopted.

b. Preparation

1. The Contractor shall take precautions to protect and avoid all underground existing utilities.

2. Plant pits shall be located where shown on the drawings unless otherwise directed by the Owner.

3. The Contractor shall stake out on the ground proposed locations of all plant pits and shrub beds prior to excavation. Pits shall not be dug until locations have been approved by the Owner. Adjustments in locations shall be made as directed.

4. In the event utilities are uncovered during excavation for planting, the Owner shall be promptly notified.

c. Pits

1. All pits for plants shall be dug of sufficient size and depth so that the roots may be set in them without crowding or unnatural placing, and so that the plant in question may be set to the same finished grade at which it was formerly growing.

2. Each tree pit shall be 2 feet wider than diameter of plant ball.

3. Each shrub pit shall be 2 foot wider than diameter of plant ball.

4. The depth of all plant pits shall be the depth below finished grade required to accommodate beneath the ball supporting the platform or leveling bed of Plant Mix. The ball shall rest on this platform or bed when the plant is properly set to finished grade.

5. Pits shall have vertical sides.

6. Shrubs shall be planted in pits as specified, with bed treatment as herein specified, provided to shape and size shown on Drawings.

7. Shrub ground cover beds shall be thoroughly loosened by roto-tiller, or other approved method, to minimum 4 inch depth.

8. Plant pits and shrub beds shall not be backfilled until approved by the Owner.

9. Extent of pits and plant beds shall be marked for ease of location, later if they are backfilled with Plant Mix to grade prior to commencement of placing plants.

d. Planting

1. All planting shall be done in the normal planting season of the locality as recommended by the agricultural agent, unless otherwise authorized in writing by the Owner. Planting shall not be permitted if either plants or topsoil is frozen, excessively wet, dry, or otherwise unsuitable.

2. All plants shall be planted in Plant Mix which is thoroughly watered and tamped as backfilling progresses.

   a. After the plant is placed in the excavation prepared for it, the excavation shall be half backfilled with loam, which then shall be puddled thoroughly to bond the roots completely with the new soil.

   b. Plant Mix shall be placed in not more than 6-inch increments of depth. Water thoroughly at each level.

   c. After having been puddled, the backfilling shall be completed and packed thoroughly by tamping.

3. All plants shall be set plumb and straight, and at such a level that, after settlement, a normal or natural relationship of the crown of the plant with the ground surface will be established. Plants shall be located in the center of the pit. The surface about the plant shall be smooth and formed to a cup-shaped depression about the stem or truck so as to hold water. Upon completion of the planting, all surplus subsoil and waste material shall be removed.

4. For plants on level ground or slight slopes, the Contractor shall form and leave shallow basin a little larger than the diameter of the plant around each plant.

5. For plants on steep slopes, the soil on the lower side of plants shall be graded in such manner that it will catch and hold water.

3.11 MULCHING FOR PLANTS

a. Mulch shall be placed at all plants in the area within the square (for each plant). Placing shall be as follows:

1. After planting operations have been completed, tree pits and all shrub and ground cover beds shall be covered entirely with 4 inches of wood bark mulch.

2. The mulch shall be maintained in a moist friable condition, and shall be thoroughly soaked with a fine spray of water as often as necessary to keep the plants from wilting.

3.12 TREE STAKING AND WRAPPING

a. All shade trees and evergreen trees shall be staked immediately after planting. The staking shall be done with a double strand of 12 gage, galvanized wire run through a two ply rubber hose collar placed around the tree trunk at the lower branches to a wood stake driven into the ground outside the planting pit. There shall be three stakes to each tree spaced equidistant around the tree. The wires shall be tightened to obtain even tension on all wires, leaving the tree trunk in a vertical position.

b. The trunks of all deciduous trees shall be wrapped with clean, new 8 oz. burlap or waterproof sisal paper from the ground to the first branch. The wrapping shall be secured with binder tape.

3.13 PRUNING

a. Pruning shall be done only after initial inspection and approval by the Owner. The work shall be done in accordance with the standard practice of American Association of Nurserymen.

b. Pruning shall be done in a manner to preserve the natural character of the plant and in a manner appropriate to its particular requirements in the landscape design.

3.14 MAINTENANCE

a. The Contractor shall maintain planting for a period of at least 90 days after completion of planting operations or until all plants are sufficiently recovered from transplanting and in a healthy growing condition acceptable to the Owner. Maintain plantings installed in the fall after September 15 until May 30 of the following year.

b. Maintenance shall include pruning, cultivating, weeding, watering, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease, and healthy, vigorous growing condition.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

2. Tighten and repair guy wires and stakes as required.

3. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.

4. Water trees, plants, and ground cover beds within the first 24 hours of initial planting, and not less than twice per week until final acceptance.

c. In general, at least one third of wood on deciduous plants should be pruned by thinning or shortening branches, but without cutting any leaders.

1. Pruning on evergreen plants shall be limited to that required for correcting irregularities or inducing compactness.

2. Soft wood or sucker growth, and broken or badly bruised branches shall be removed.

d. Sharp tools, shall be used with cuts made flush and clean.

e. Tree-wound dressing compound shall be painted completely over cuts exceeding 3/4 inch in diameter, overexposed cambium layer, and over other exposed living tissues.

END OF SECTION

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Plans for:

REMOVAL ACTION
WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE
ATKINSON, NH

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1

CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

JULY 2013

SOURCE:
TOPO! - 2011 NATIONAL GEOGRAPHIC

GRAPHIC SCALE

LOCUS

REV. 0 ISSUED FOR PHASE 1 CONSTRUCTION

ENG. NO.	DATE	REV. NO.
001	JULY 2013	0

SITE LOCATION MAP

INDEX OF DRAWINGS

0 ISSUED FOR PHASE 1 CONSTRUCTION

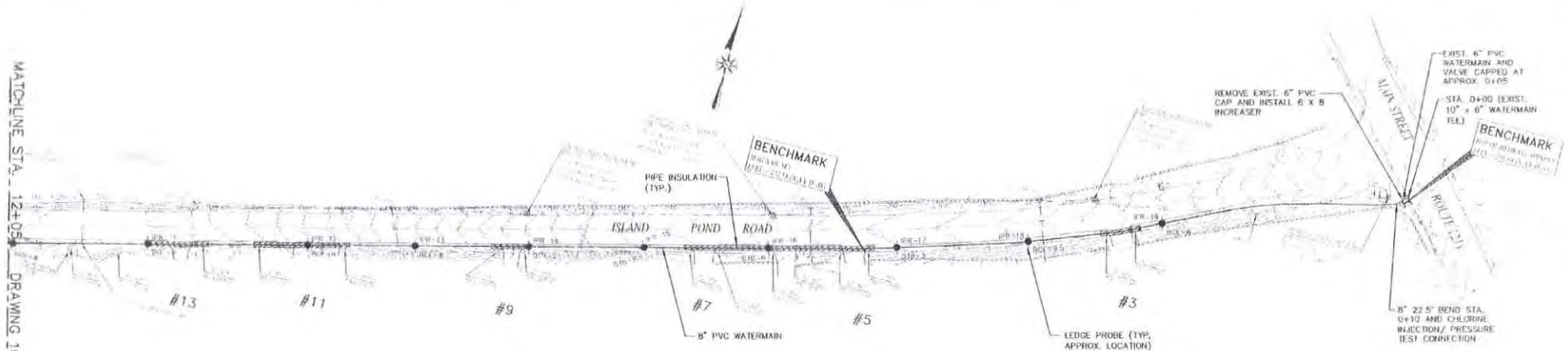
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXIN CONTAMINATION SITE - ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	LJD	AUG 2013
DRAWN	TAC	AUG 2013
CHECKED	PJW	AUG 2013
APPROVED	EBA	AUG 2013

SITE LOCATION MAP AND INDEX TO DRAWINGS

DRAWN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	W.O. NO.	20114.082.008
DRAWING NO.	002	REV.	0



GENERAL NOTES:

1. TOPOGRAPHIC AND DETAIL SURVEY PERFORMED BY THOMPSON FARLAND, PEC IN AUGUST AND OCTOBER 2012.

2. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) IN FEET.

3. HORIZONTAL COORDINATES REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83) IN FEET.

4. THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE.

5. UTILITY COMPANIES within the work area are known to be at this time until for power, Comcast for cable, and Fairpoint for telephone. Fairpoint is the utility pole owner. The contractor shall verify this information prior to construction.

6. THERE ARE NO KNOWN SANITARY SEWERS PRESENT IN THE PROJECT AREA.

7. THE WATERMAIN SHALL BE LAID IN THE LOCATION AS INDICATED ON THE DRAWINGS MEETING THE REQUIREMENTS SHOWN IN THE TYPICAL WATERMAIN LOCATION DETAIL ON THE DRAWINGS. LOCATION CHANGES IN THE FIELD REQUIRED BY SITE CONDITIONS SHALL BE AS APPROVED BY THE OWNER.

8. THE MINIMUM VERTICAL SEPARATION DISTANCE BETWEEN THE WATERMAIN AND OTHER UTILITIES SHALL BE 6" UNLESS OTHERWISE SHOWN. IN THE CASE OF INSULATED PIPE, SEPARATION DISTANCES SHALL BE MEASURED FROM THE OUTSIDE FACE OF INSULATION.

9. WATERMAIN PIPE

9.1 WHERE HORIZONTAL DIRECTIONAL DRILLING (HDD) IS DESIGNATED ON THE DRAWINGS, THE WATERMAIN SHALL BE WELDED DR 9 3408/3608 HDPE DIPS AND CONFORM TO AWWA C906.

9.2 ALL WATERMAINS NOT DESIGNATED AS HDD SHALL BE PVC PIPE AND CONFORM TO AWWA C909 PIPE STANDARDS (SPEC BRIVAK PVCO 6240 PIPE OR APPROVED EQUAL).

10. ALL FITTINGS AND VALVES SHALL BE DUCTILE IRON MECHANICAL JOINT AND BE FULLY RESTRAINED. RESTRAINING SYSTEM SHALL BE STAR PIPE PRODUCTS PVC STARGRIP SERIES 4000 RESTRAINER.

11. ALL VALVES SHALL BE RESILIENT WEDGE GATE TYPE OPEN LEFT (MUELLER 2360 SERIES, EJ PRESCOTT F SERIES OR APPROVED EQUAL).

12. ALL PIPE COUPLINGS (STRAIGHT, TRANSITION OR REPAIR) SHALL BE DUCTILE IRON PIPE COUPLINGS UNLESS OTHERWISE SHOWN (EJ PRESCOTT OR APPROVED EQUAL).

13. ALL WATERMAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF 4'-6" UNLESS OTHERWISE SHOWN. WATERMAINS WITH LESS THAN 4'-0" COVER SHALL BE INSULATED.

14. THRUST BLOCKS SHALL BE USED AT CHANGES IN DIRECTION, BRANCHES, AND DEAD ENDS. ALLOW SUFFICIENT UNDISTURBED TRENCH WALL FOR CAST IN-PLACE CONCRETE FILLING THE SPACE BETWEEN THE UNDISTURBED SIDE AND DR FITTING.

15. WHERE NOTED ON THE DRAWINGS OR AS DIRECTED BY THE OWNER IN THE FIELD PROVIDE INSULATION FOR THE WATERMAIN FOR PROTECTION AGAINST FREEZING NEAR OPEN STRUCTURES AND CULVERTS ACCORDING TO THE DETAIL ON THE DRAWING 302.

16. REFER TO DRAWINGS 301 AND 302 FOR WATERMAIN DETAILS.

17. PROBES WERE PERFORMED BY WESTON SUBCONTRACTOR TO DETERMINE DEPTH TO APPARENT BEDROCK SURFACE. LOCATIONS ARE APPROXIMATE AND NOT SURVEYED. DEPTH TO BEDROCK (DTB) IN FEET BELOW GROUND SURFACE IS NOTED ON THE PLANS. IF BEDROCK WAS NOT ENCOUNTERED, THE BOTTOM OF EXPLORATION (BOE) IS NOTED.

18. REFER TO PROJECT TECHNICAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

EXISTING	DESCRIPTION
	EDGE OF PAVEMENT
	OVERHEAD WIRES
	DRAIN LINE
	STONE WALL
	HYDRANT
	WATER GATE
	SIGN
	LIGHT
	UTILITY POLE
	CATCH BASIN
	DRAIN MANHOLE
	GUARDRAIL
	CONTOUR LINE
	FENCE
	LEDGE PROBE (SEE NOTE 17)

PROBE NUMBER
DEPTH TO BEDROCK
BOTTOM OF EXPLORATION

0	MMP/AR	ISSUED FOR PHASE I CONSTRUCTION			
NO.	BY	DATE	REVISION	CK	APP

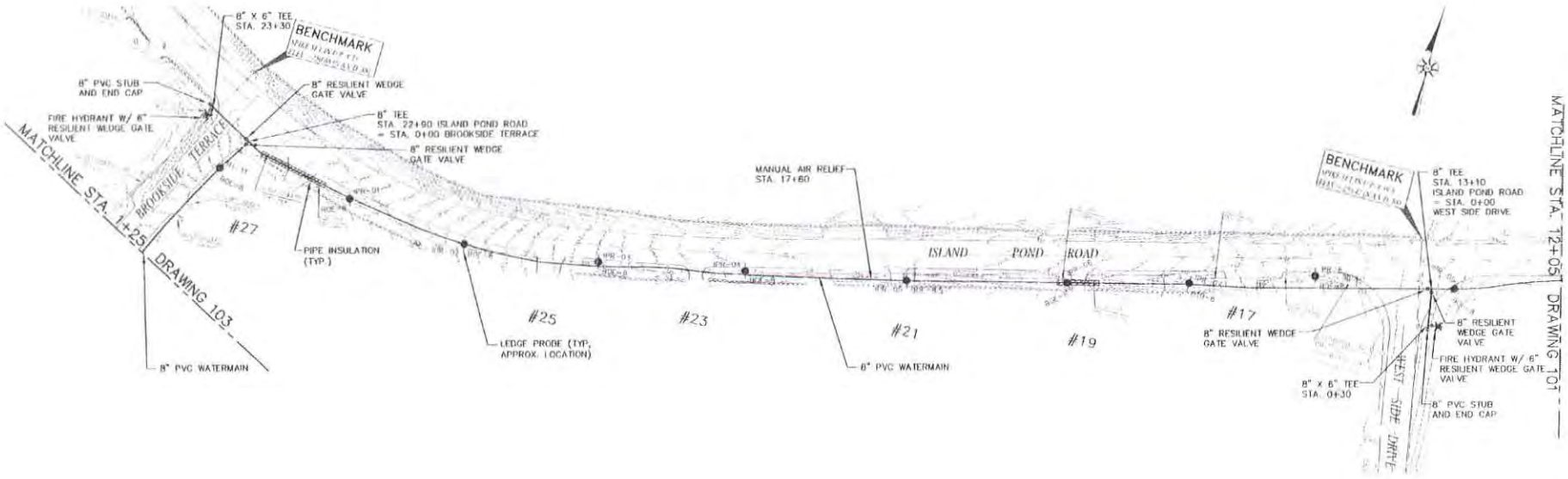
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE, ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	LJD	AUG 2013
DES. CHK.	TAC	AUG 2013
DRAWN	PAW	AUG 2013
PROJ. MGR.	EBA	AUG 2013
APPROVED		
DRAWING		

PLAN OF WATERMAIN
STA. 0+00 TO 12+05
ISLAND POND ROAD

DRAWN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	W.O. NO.	20114.082.008
DRAWING NO.	101	REV.	0



0	08/07/13	ISSUED FOR PHASE 1 CONSTRUCTION	

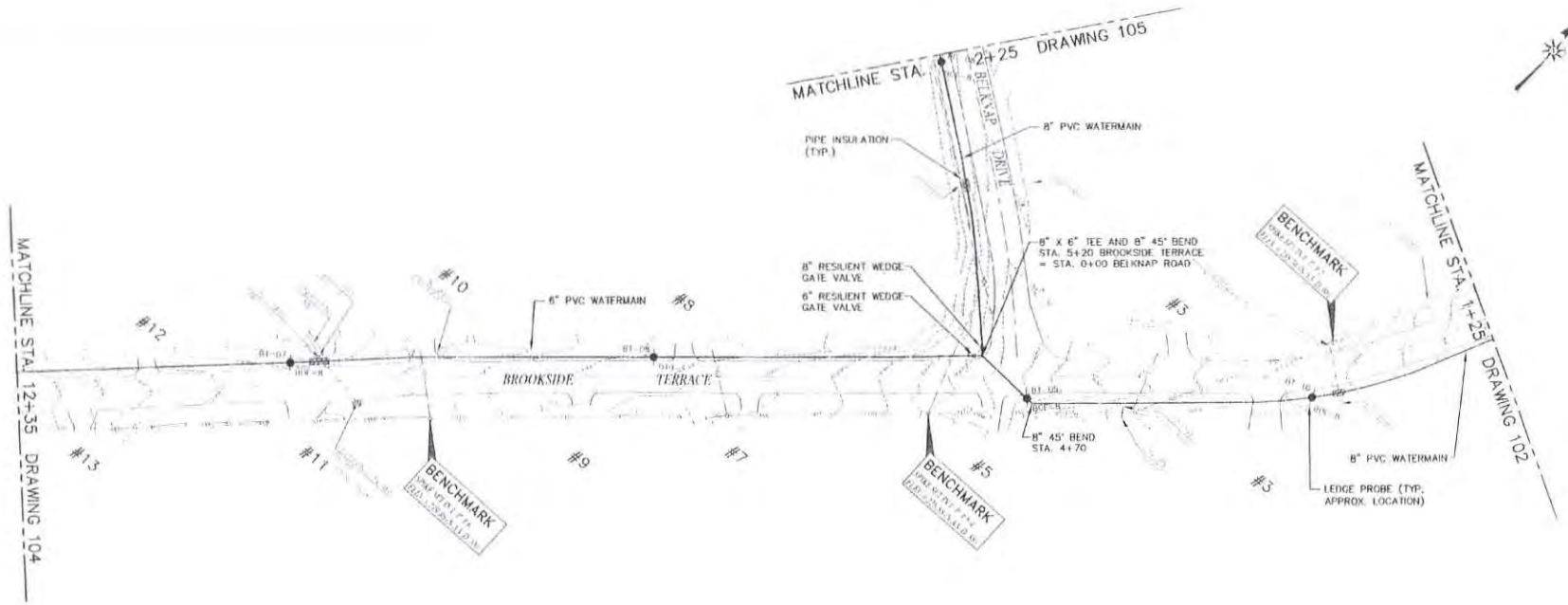
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
SILVER DIOXANE CONTAMINATION SITE – ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

CHECKED	LJB	AUG 2013
QA/QC	TAC	AUG 2013
DESIGNED	PJW	AUG 2013
PROJECT MGR	EBA	AUG 2013
APPROVED		
APPROVED		

PLAN OF WATERMAIN
STA. 12+05 TO 22+90 ISLAND POND ROAD
STA. 0+00 TO 1+25 BROOKSIDE TERRACE

DRAWN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	PROJECT NO.	20114.082.008
DRAWING NO.	102	REV. NO.	0



0	ISSUED FOR PHASE 1 CONSTRUCTION						
NO.	DESCRIPTION	BY	DATE	APP'D			

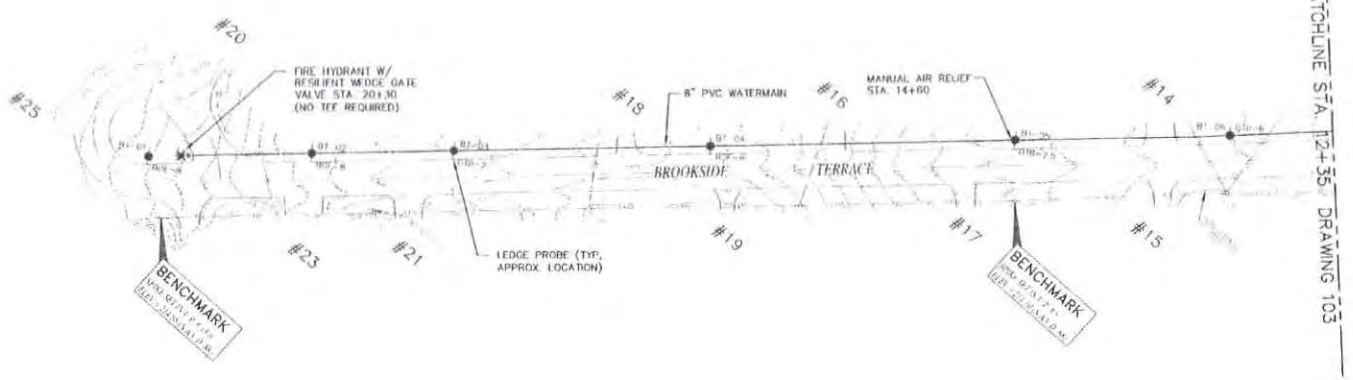
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH ESKIMO CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP W 05 042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	EJR	AUG 2013
DRAWN	TAC	AUG 2013
CHECKED	PJW	AUG 2013
APPROVED	EDA	AUG 2013
APPROVED		

PLAN OF WATERMAIN
STA. 1+25 TO 12+35 BROOKSIDE TERRACE
STA. 0+00 TO 2+25 BELKNAP DRIVE

DRAWN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	W.O.	20114.082.008
DRAWING NO.	103	REV.	0



0	8/16/13	ISSUED FOR PHASE 1 CONSTRUCTION	

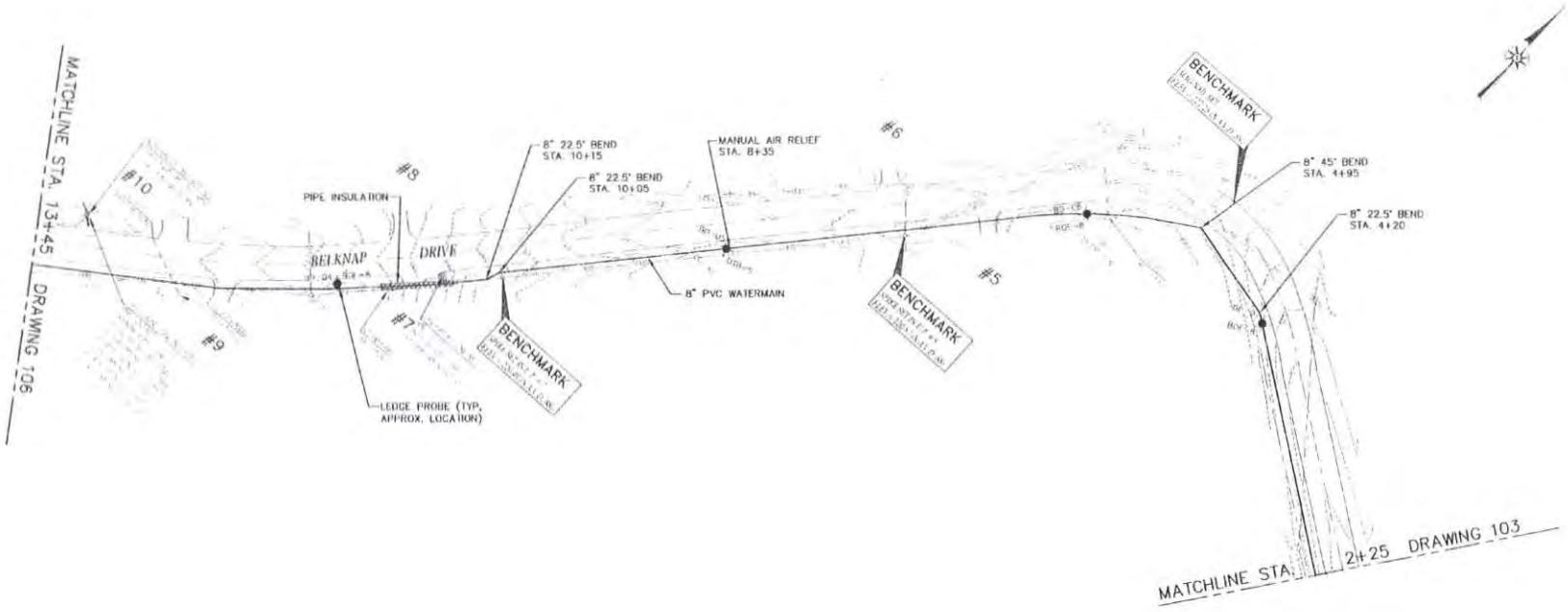
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE - ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

L.J.B.	AUG 2013	
T.A.C.	AUG 2013	
P.J.P.	AUG 2013	
E.D.A.	AUG 2013	

PLAN OF WATERMAIN
STA. 12+35 TO 20+65
BROOKSIDE TERRACE

T.A.C.	JULY 2013	104	0
AS SHOWN	20114.082.008		



0	ISSUED FOR PHASE 1 CONSTRUCTION				

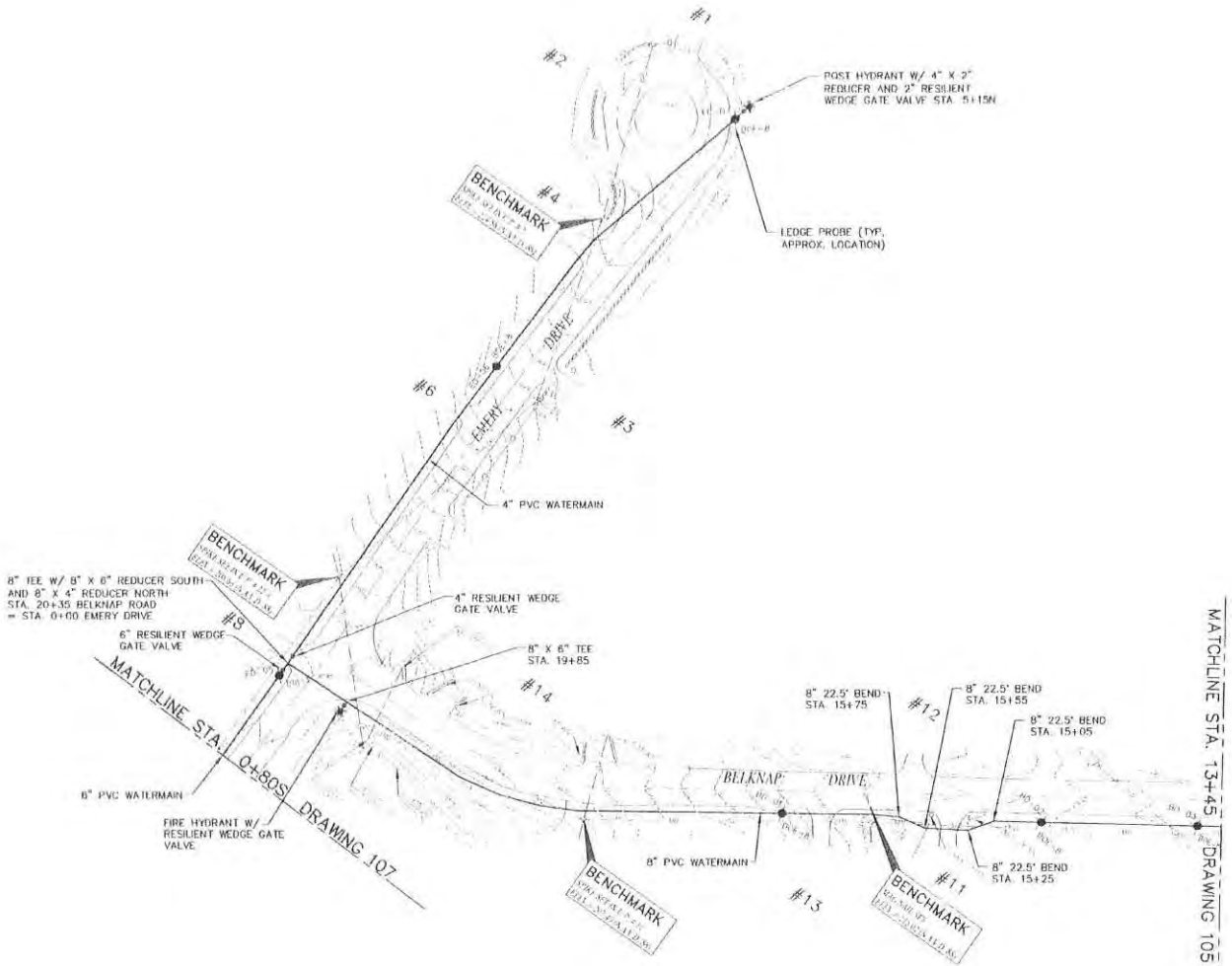
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE, ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	LJB	AUG 2013
DES. CHK.	TAC	AUG 2013
PROJ. CHK.	PJB	AUG 2013
PROJ. MGR.	EBA	AUG 2013
APPROVED		

PLAN OF WATERMAIN
STA. 2+25 TO 13+45
BELKNAP DRIVE

TAC	JULY 2013	105	0
AS SHOWN	20114.062.008		



0	8/23/13	ISSUED FOR PHASE 1 CONSTRUCTION	

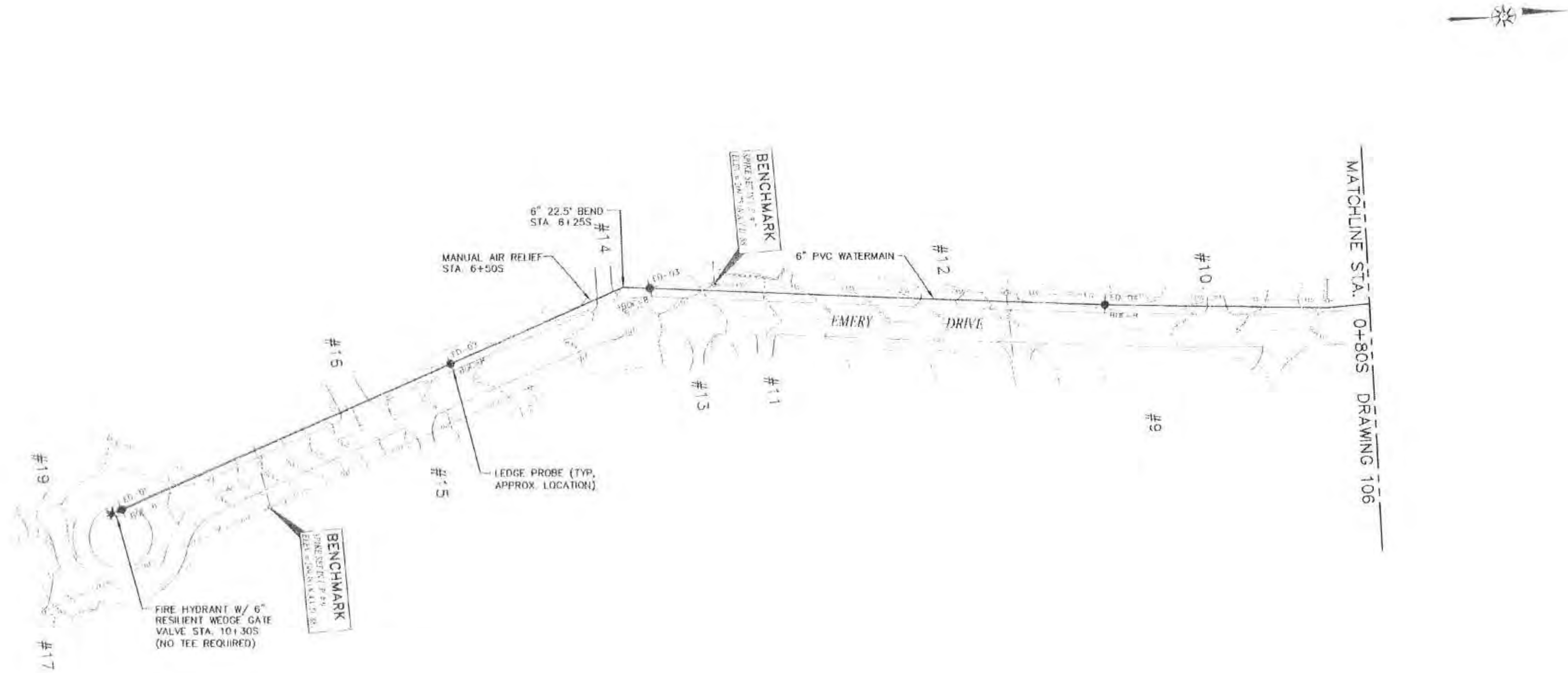
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE– ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP–W–05–042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	L.J.B.	AUG 2013
DRAWN	T.A.C.	AUG 2013
CHECKED	P.J.W.	AUG 2013
APPROVED	E.D.A.	AUG 2013

PLAN OF WATERMAIN
STA. 13+45 TO 20+35 BELKNAP DRIVE
STA. 0+00 TO 5+15N AND 0+80S EMERY DRIVE

DESIGN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	JOB NO.	20114.082.008
DRAWING NO.	106	REV. NO.	0



0 ISSUED FOR PHASE 1 CONSTRUCTION

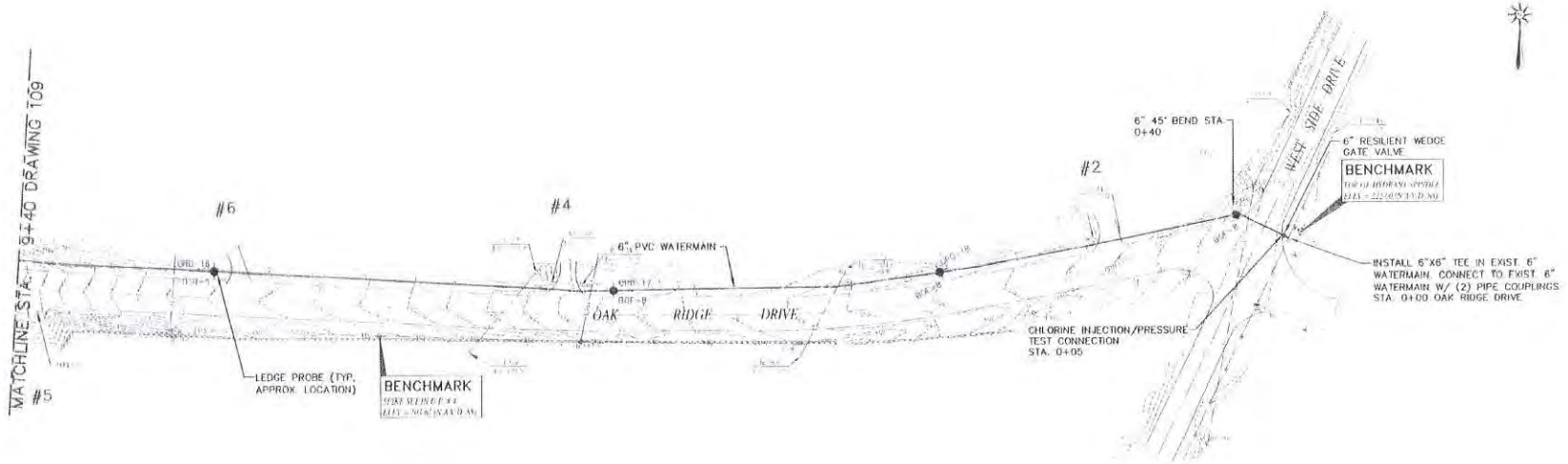
REMOVAL ACTION—WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE, ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

	LJB	AUG 2013
	TAC	AUG 2013
	PJW	AUG 2013
	EDA	AUG 2013

PLAN OF WATERMAIN
STA. 0+80S TO 10+30S
EMERY DRIVE

TAC | JULY 2013 | 107 | 0
AS SHOWN | 20114.082.008



0	9/9/13	LW	ISSUED FOR PHASE 1 CONSTRUCTION				
NO.	DATE	APP'D	REVISION				

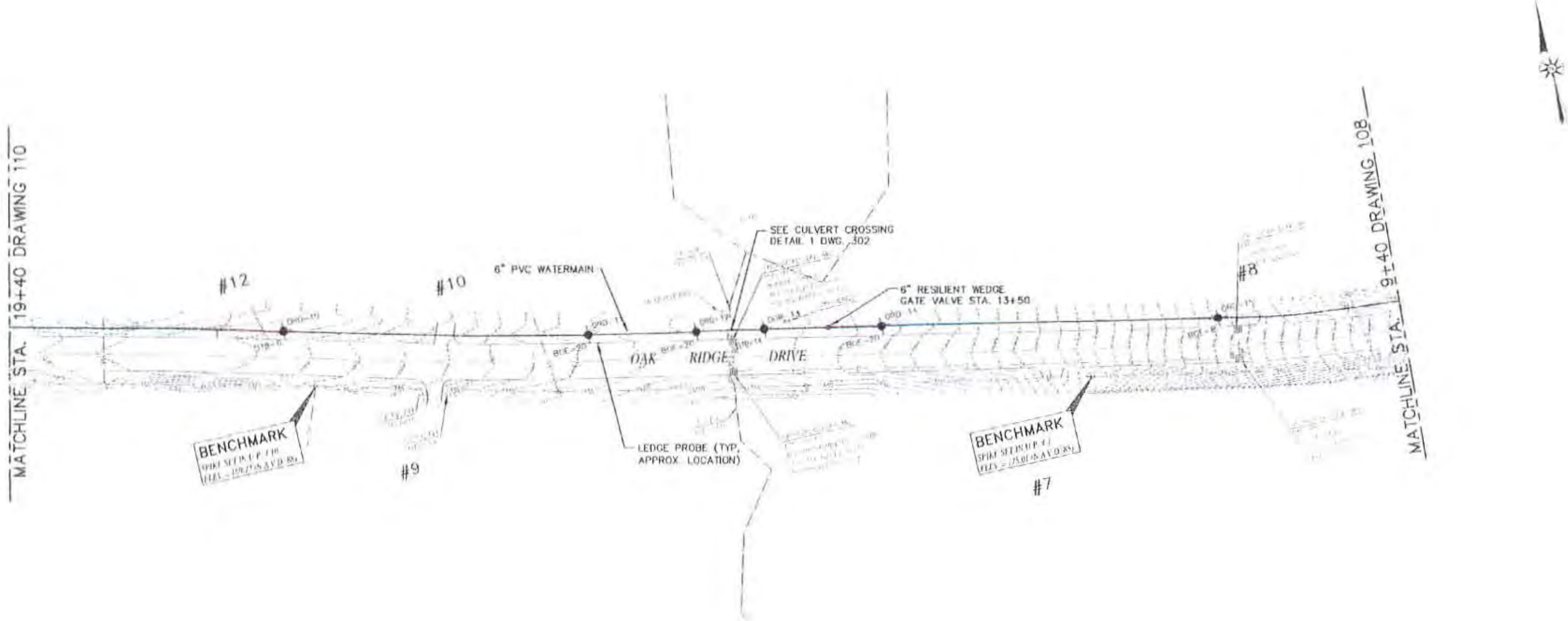
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	L.J.B.	AUG 2013
DRAWN	T.A.C.	AUG 2013
CHECKED	P.J.W.	AUG 2013
APPROVED	E.D.A.	AUG 2013
APPROVED		

PLAN OF WATERMAIN
STA. 0+00 TO 9+40
OAK RIDGE DRIVE

SCALE: AS SHOWN	DRAWN: TAC	DATE: JULY 2013	DRAWING NO.: 108
	CHKD:	W.O. NO.: 20114.082.008	REV.: 0



0 ISSUED FOR PHASE 1 CONSTRUCTION

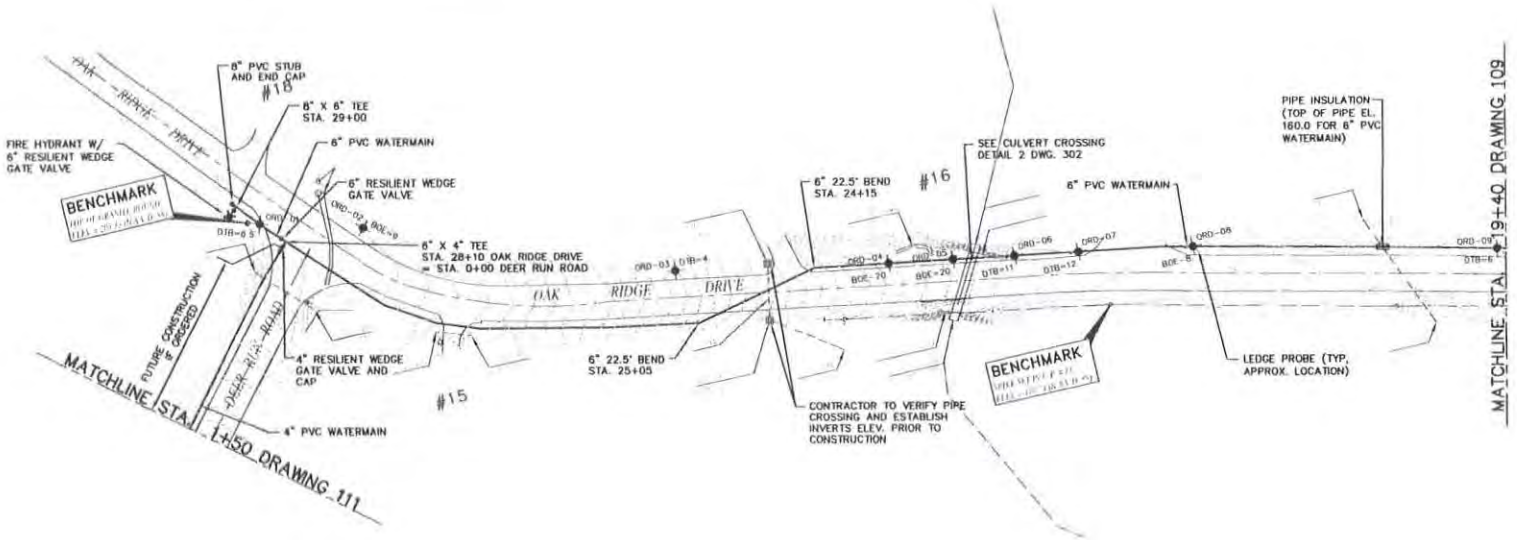
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP W 05 042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

	L.J.B.	AUG 2013
	T.A.C.	AUG 2013
	P.J.R.	AUG 2013
	E.S.A.	AUG 2013

PLAN OF WATERMAIN
STA. 9+40 TO 19+40
OAK RIDGE DRIVE

TAC	JULY 2013	109	0
AS SHOWN	20114.082.008		



0	MMP-JW	ISSUED FOR PHASE 1 CONSTRUCTION			

REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE - ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

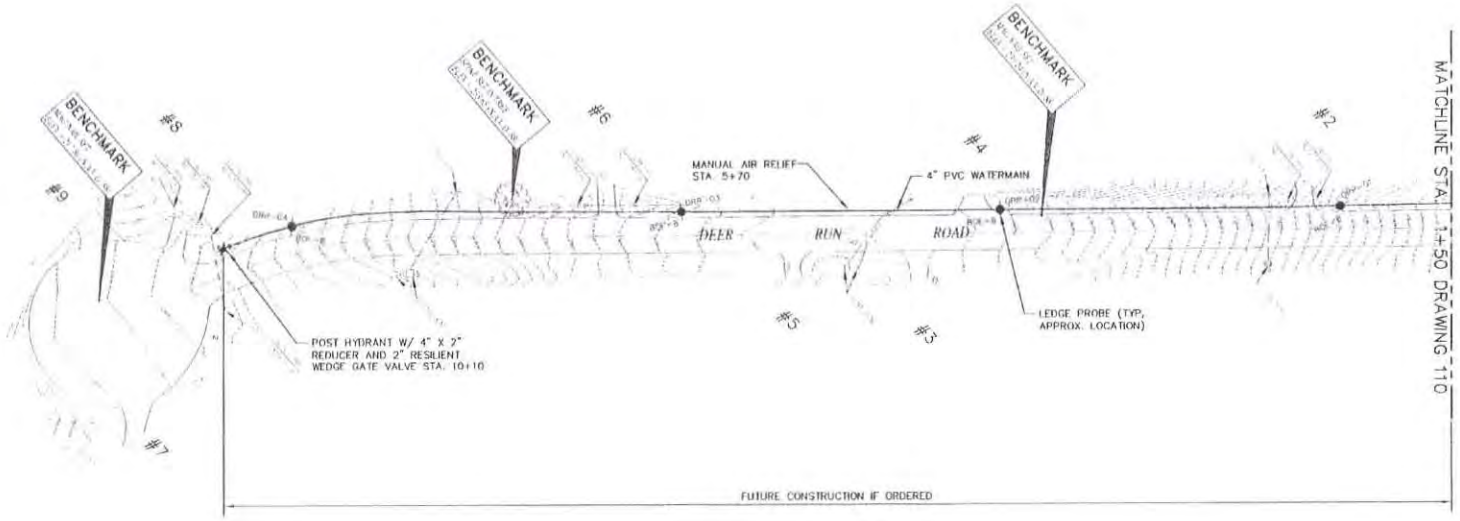
WESTON SOLUTIONS

DESIGNED	L.J.B.	AUG 2013
DES. ENG.	T.A.C.	AUG 2013
PROJ. ENG.	P.J.W.	AUG 2013
PROJ. MGR.	E.D.A.	AUG 2013
APPROVED		
APPROVED		

CLIENT APPROVALS — DATE
ISSUED FOR — DATE

PLAN OF WATERMAIN
STA. 19+40 TO 29+00 OAK RIDGE DRIVE
STA. 0+00 TO 1+50 DEER RUN ROAD

DRAWN	TAC	DATE	JULY 2013
SCALE	AS SHOWN	W.O. NO.	20114.082.008
DRAWING NO.	110	REV. NO.	0



0	8/8/13	P.J.W.	ISSUED FOR PHASE 1 CONSTRUCTION

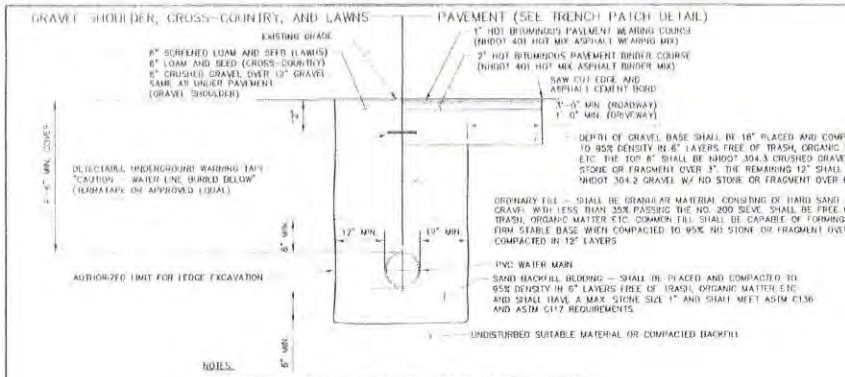
REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
1,4 DIOXANE CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	T.J.R.	AUG 2013
DRAWN	T.A.C.	AUG 2013
CHECKED	P.J.W.	AUG 2013
APPROVED	E.D.A.	AUG 2013

PLAN OF WATERMAIN
STA. 1+50 TO 10+10
DEER RUN ROAD

DRAWN	TAC	JULY 2013	111
SCALE	AS SHOWN	20114.082.008	0

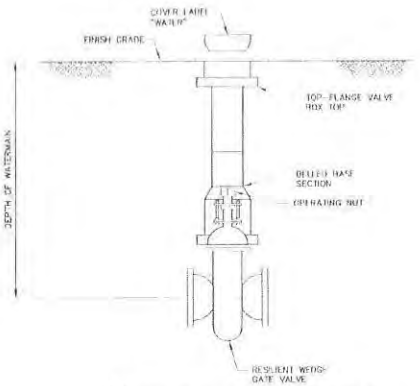


NOTES:

1. HOT BITUMINOUS PAVEMENT SHALL CONFORM TO DIVISION 400 AND GRAVEL BASE SHALL CONFORM TO DIVISION 300 REQUIREMENTS OF THE NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION (NHDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION LATEST EDITION.

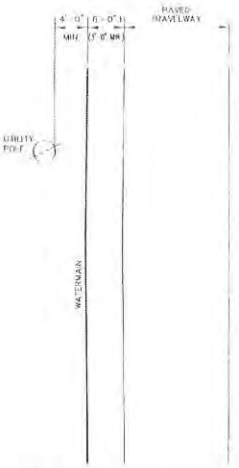
2. IF TRENCHING IS REQUIRED IN ISLAND POND ROAD OR MAIN STREET (ROUTE 121) THE HOT BITUMINOUS PAVEMENT WEARING COURSE SHALL BE 1 1/2" AND THE HOT BITUMINOUS PAVEMENT BINDER COURSE SHALL BE 2 1/2". THE REMAINDER OF THE TYPICAL TRENCH SECTION IS THE SAME.

TYPICAL TRENCH SECTION



NOTE:
VALVE BOXES SHALL BE CAST IRON, TWO-PIECE, SLIDING TYPE WITH 5 1/4" MIN. INSIDE SHAFT DIA. AND GMP HEAVY DUTY VALVE BOX COVER (EJ PRESCOTT OR APPROVED EQUAL)

VALVE BOX DETAIL



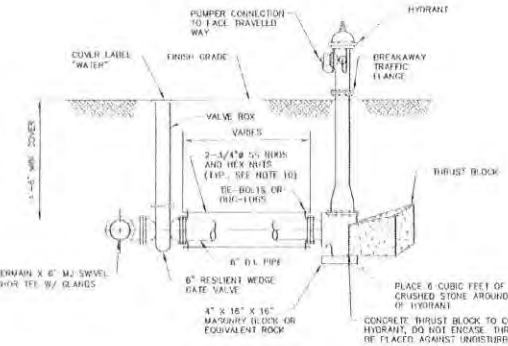
NOTES:

1. THE WATERMAIN SHALL MAINTAIN EVEN ALIGNMENT (HORIZONTAL AND VERTICAL) WITH BENDING AS REQUIRED. ABRUPT CHANGES IN DIRECTION SHALL BE MADE WITH STANDARD FITTINGS AS INDICATED ON THE DRAWINGS OR AS APPROVED BY THE OWNER.

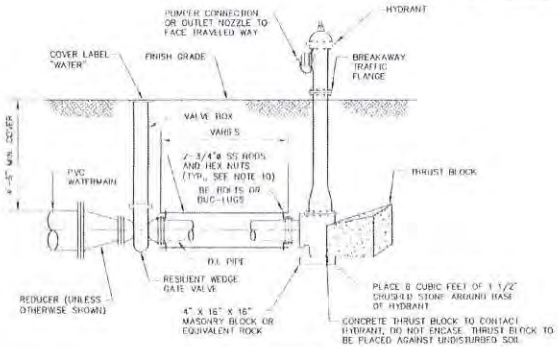
2. THE WATERMAIN SHALL BE LOCATED OFF THE EDGE OF PAVEMENT AND IN THE EDGE OF WAY AS SHOWN ABOVE UNLESS OTHERWISE SHOWN ON THE DRAWINGS.

3. THE WATERMAIN SHALL NOT BE LOCATED IN THE PAVED TRAVELWAY EXCEPT AT ROAD CROSSINGS UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR AT LOCATIONS APPROVED BY THE OWNER.

TYPICAL WATERMAIN LOCATION DETAIL



FIRE HYDRANT



END OF LINE HYDRANT

NOTES:

1. ALL FIRE HYDRANTS SHALL BE MUELLER SUPER CENTURION 250, OPEN LEFT.

2. ALL POST HYDRANTS SHALL BE ECLIPSE NO. 2, OPEN LEFT (THE KUPFERLE FOUNDRY CO. OR APPROVED EQUAL)

3. IF THE HYDRANT IS MORE THAN 10' FROM THE HYDRANT VALVE THEN INSTALL MEGALUG JOINT RESTRAINT AT VALVE AND HYDRANT.

4. ALL HYDRANTS SHALL BE INSTALLED WITH A HYDRANT VALVE ATTACHED TO AN ANCHOR TEE OFF THE WATERMAIN (UNLESS OTHERWISE SHOWN)

5. HYDRANTS SHALL BE INSTALLED PERPENDICULAR TO THE GROUND

6. ALL HYDRANTS SHALL BE INSTALLED WITH BREAKAWAY TRAFFIC FLANGE LOCATED BETWEEN 6" AND 12" OF THE FINISHED GRADE SURROUNDING THE HYDRANT.

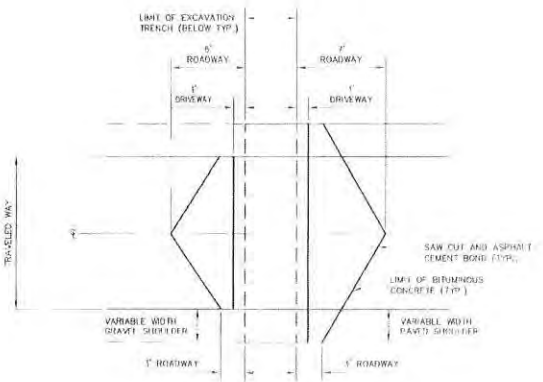
7. ALL HYDRANTS SHALL BE WATER RIGHT NON-DRAINING

8. ALL HYDRANTS SHALL HAVE MECHANICAL JOINT INLET CONNECTIONS

9. BACKFILL AROUND THE HYDRANT FROM FINISHED GRADE TO 12" ABOVE THE TOP OF THE HYDRANT SHOE (OR ELBOW) SHALL BE WITH ORDINARY FILL AND THE REMAINDER SHALL BE SAND BACKFILL. SPREAD IN UNIFORM LIFTS NOT TO EXCEED 12" BEFORE COMPACTION AND MOISTENED OR ALLOWED TO DRY AS NECESSARY FOR PROPER COMPACTION. COMPACT THOROUGHLY BY MEANS OF SUITABLE POWER DRIVEN TAMPERS OR OTHER POWER DRIVEN EQUIPMENT.

10. AT CONTRACTORS OPTION, DI MJ FOSTER ADAPTORS MAY BE USED BETWEEN MJ FITTINGS AND VALVES WHERE CLOSE SETTING SPACING IS REQUIRED. RODS OR OTHER RESTRAINT IS NOT REQUIRED FOR JOINTS USING FOSTER ADAPTORS.

HYDRANT CONNECTION DETAIL



NOTE:
TYPICAL TRENCH OPENING IN PAVEMENT AND APPROVED METHOD FOR PATCHING DIAMOND SHAPE CUT FOR ROADWAYS AND PARALLEL CUT FOR DRIVEWAYS.

TYPICAL TRENCH PATCH DETAIL

0	10/15/13	JW	ISSUED FOR PHASE 1 CONSTRUCTION			
NO.	DATE	APP'D	REVISION			

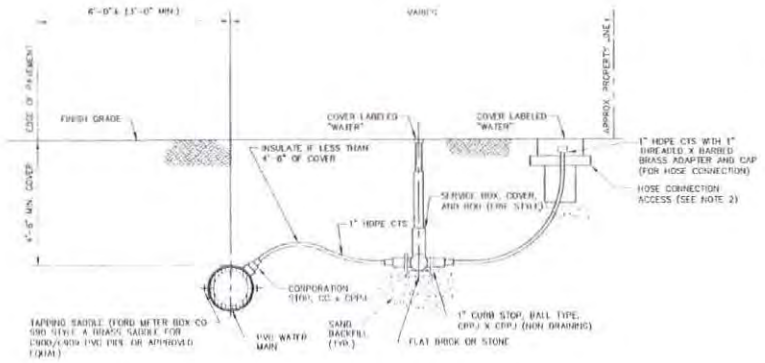
REMOVAL ACTION--WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE--ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	L.J.B.	AUG 2013
DES. ENG.	T.A.C.	AUG 2013
PROJ. ENG.	P.J.W.	AUG 2013
PROJ. MGR.	E.D.A.	AUG 2013
APPROVED		
APPROVED		

WATERMAIN DETAILS 1

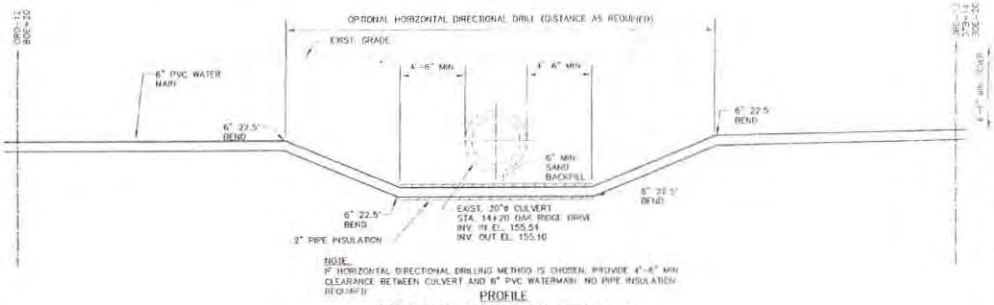
DRAWN	TAC	DATE JULY 2013	SHEET NO. 301
W.O.	NONE	W.A. 20114.082.008	DR. 0



NOTES:

1. ALL PARTS SHALL BE AS MANUFACTURED BY EJ PRESCOTT OR APPROVED EQUAL UNLESS OTHERWISE NOTED.
2. HOSE CONNECTION ACCESS SHALL BE CAST IRON TOP-FLANGE VALVE BOX TOP WITH QWP HEAVY DUTY VALVE BOX COVER (EJ PRESCOTT OR APPROVED EQUAL)

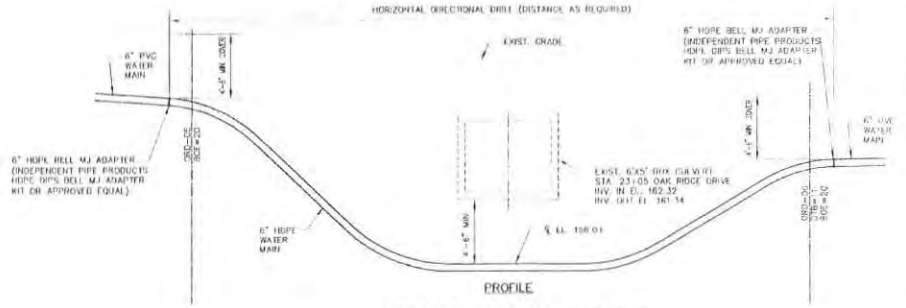
INJECTION/PRESSURE TEST CONNECTION MANUAL AIR RELIEF DETAIL



NOTE:
IF HORIZONTAL DIRECTIONAL DRILLING METHOD IS CHOSEN, PROVIDE 4'-6" MIN CLEARANCE BETWEEN CULVERT AND 6" PVC WATERMAIN. NO PIPE INSULATION REQUIRED.

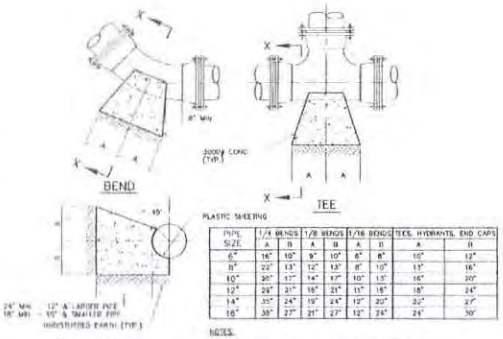
PROFILE

CULVERT CROSSING DETAIL 1



PROFILE

CULVERT CROSSING DETAIL 2

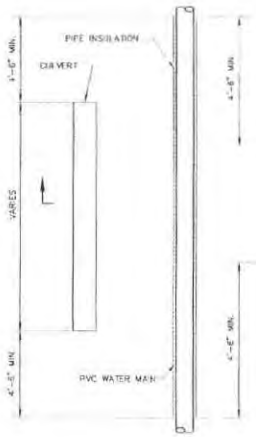


PIPE SIZE	1/4 BENDS		1/8 BENDS		1/16 BENDS		TEES, HYDRANTS, END CAPS	
	A	B	A	B	A	B	A	B
6"	16"	10"	9"	10"	6"	8"	10"	12"
8"	22"	13"	12"	13"	8"	10"	13"	16"
10"	30"	17"	14"	17"	10"	13"	16"	20"
12"	36"	21"	16"	21"	11"	15"	18"	24"
14"	35"	24"	19"	24"	12"	20"	20"	27"
16"	38"	27"	21"	27"	12"	24"	24"	30"

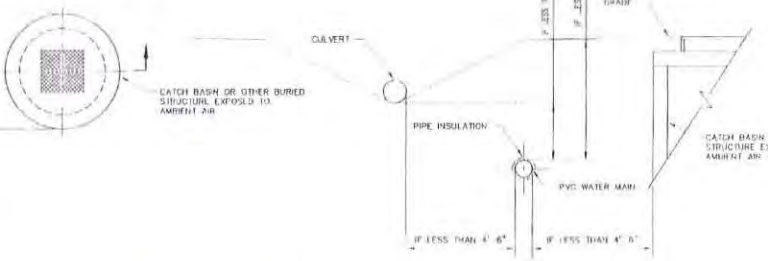
NOTES:

1. THRUST BLOCKS FOR PIPE GREATER THAN 16" DIA. SHALL BE DESIGNED IN ACCORDANCE WITH DIPRA HANDBOOK OF DUCTILE IRON PIPE, LATEST EDITION.
2. REMOVE ANY CONCRETE FROM FITTING FASTENERS.

THRUST BLOCK DETAIL



PLAN



NOTE:
PIPE INSULATION REQUIRED WHEN BURIED DISTANCE BETWEEN PIPE AND EXPOSED SURFACES IS LESS THAN 4'-6" AS SHOWN ON THIS DETAIL.

PIPE INSULATION DETAIL

SECTION

0	08/08/13	ISSUED FOR PHASE 1 CONSTRUCTION	
NO.	DATE	REVISION	BY

REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP-W-05-042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS

DESIGNED	E.J.B.	AUG 2013
DFT. CHK.	E.A.C.	AUG 2013
PROJ. MGR.	P.J.N.	AUG 2013
PRIN. IN CHG.	E.D.A.	AUG 2013
QA REVIEW		
APPROVED		

NEW HAMPSHIRE LICENSED PROFESSIONAL ENGINEER

WATERMAIN DETAILS 2

DRAWN	DATE	SCALE	DRAWING NO.
TAC	JULY 2013	NONE	302
SURV.	JOB NO.		0
NONE	20114.082.008		

HAMPSTEAD AREA WATER COMPANY, INC

WATER SYSTEM STANDARDS & TECHNICAL SPECIFICATIONS

HAMPSTEAD AREA WATER COMPANY, INC.
54 Sawyer Avenue
Atkinson, NH 03811
www.hampsteadwater.com

INTRODUCTION

These Technical Specifications will govern all work performed in the Hampstead Area Water Company distribution systems. HAWC has the right to make changes and updates to any information contained within this document without prior notice.

CONTACT DIG SAFE 72 HOURS
PRIOR TO CONSTRUCTION

WATER SYSTEM DESIGN STANDARDS

APPLICABILITY

Design Standards have been prepared under the direction of the Hampstead Area Water Company to provide minimum design and construction criteria for any distribution system component installed within or outside (where eventual connection to the distribution system is contemplated) the community water system service area.

This design code is intended as a summary engineering reference manual containing the minimum standards for the design and construction of water distribution systems.

Consult the Water Department for specific information on General Design Criteria for Water Systems (603) 362-4299. It is unlawful for any persons other than Water Department personnel to operate any Hampstead Area Water Company water system equipment or facilities. You must obtain written permission to disturb any soil within the water company's easement area and nothing can be installed or altered in the Sanitary Protective Area of any Hampstead Area Water Company Well head.

INSPECTION, TESTING, AND APPROVAL

For extensions installed by the developer, the Company may require payment in advance of construction of a main pipe extension fee of up to $3.00 per foot to defray the Company's costs of engineering, inspection and administration associated with main extensions.

Backfill shall not be done until Hampstead Area Water Company's designated representative for alignment, depth, and proper bedding inspects the line. The Contractor shall notify Hampstead Area Water Company 48 hours before the start of construction. Inspections of the trench shall be made each day before backfill of the trench. Hampstead Area Water Company provides **4** site inspections per project. If any additional inspections are necessary HAWC will directly bill the developer / owner $150 per additional inspection.

DISTRIBUTION SYSTEM CONSTRUCTION & INSTALLATION

The Hampstead Area Water Company will make all taps on the Hampstead Area Water Company distribution system.

Hampstead Area Water Company requires all installation of main lines and appurtenances to conform to AWWA Standards and Design Criteria for Potable Water Systems.

UTILITY BILLING OFFICE

The Utility Billing office (603) 362-4299 handles all the billing, meters, and backflow prevention installations.

PROCEDURE FOR SUBMITTAL OF PLANS AND SPECIFICATIONS FOR REVIEW

Plans and specifications shall be submitted for preliminary review in two copies. Subsequent to review, one red-marked copy shall be returned to the Design Engineer for modification prior to submittal of the final plans and specifications. Final plans and specifications shall be submitted in two copies. Plan drawings of water mains (22" x 34") showing the proposed construction, all existing utilities, all utilities to be installed prior to the proposed construction, and future construction--such as drainage culverts--which have a bearing on the proposed construction, shall be submitted. Standard or special detail drawings for fire hydrants, thrust blocks, tie-rods, and bedding material for water mains shall be included in the plans and specifications. Legal description of all easements and crossing licenses to be obtained by the owner for the construction shall be included with the initial submittal. All drawings will be made in AutoCAD format on disk and given to the Hampstead Area Water Company, Inc.

CONSTRUCTION DETAILS – GENERAL

1. Trench Bottom and Pipe Bedding –

A typical recommended trench is shown in *Detail D-1*. The minimum cover shall be not less than 4.5 feet for year round systems. The trench bottom should be smooth and free of frozen material. A minimum of 6 inches of sand bedding is to be placed and compacted below the pipe.

2. Backfill –

Sand backfill is to be placed and thoroughly compacted to a point at least 6 inches over the pipe. Material excavated from the trench can generally be used for backfill above the sand but should exclude debris, pavement, organic matter, mulch, peat, excavated ledge, and stones over 10 inches in diameter. Compaction in 3 foot lifts is recommended.

3. Tracing Element –

All PVC piping must be installed with a metallic tracing element to aid in locating the pipe in case future repairs are needed. Tracers include metallic "terra-tape" or copper tracing element. The tracing element should be placed approximately one foot below finish grade.

4. Thrust Blocks –

Allow sufficient undisturbed trench wall for placement of thrust blocks at changes in direction, branches, and dead ends. Thrust blocks are to be cast in-place concrete totally filling the space between the undisturbed soil and the fitting. Dimensions of thrust blocks are to be specified by the Hampstead Area Water Company's Planning Department.

5. Clearance with other Utilities –

Where waterlines and other utilities must cross, minimum clearance at the crossing must be 6 inches except in the case of sanitary sewers. If a water line must cross a sewer the water line must cross above the sewer with a minimum 18 inches clearance. Separation of water and sewer lines running parallel is to be a minimum of 10 feet horizontally. In the event that this is not attainable see NHDES subsurface rule Env-Ws 1009.01.

6. Customer Connections –

Connection piping is to be polyethylene CTS. Connection piping is to be laid in a straight line with minimum cover of 4.5 feet. The service must be thoroughly flushed to remove debris and tapping cuttings. Location of all connection taps on the main must be included on record drawings. All service boxes and gate valves must be brought to finish grade. *See Detail D-2, Detail D-5, & Detail D-6*

7. Water Meters –

a. Hampstead Area Water Company supplies and installs 5/8" to 1" meters at its expense. The cost of supplying and installing any fittings, valves, or meter horns required for the meter installation will be at the owner's expense.
b. Remote reader boxes are to be installed with each meter. The remote reader cable will be installed by Hampstead Area Water Company during the setting of the box. The remote box must be installed on the outside of the building near the electric meter or at a location pre-approved by Hampstead Area Water Company. If the remote box wire must be run behind sheetrock or within any finished wall then it is the owners responsibility to have their contractor install remote box wire provided by Hampstead Area Water Company. Hampstead Area Water Company can not set the box until the remote wire has been installed.
c. The remote reader box will be installed by Hampstead Area Water Company at a height of 42" above the finished grade facing the road. No plants or bushes shall be planted in the area of the remote reader, which will inhibit access to the remote reader. *See Detail D-3*

8. Piping –

State design standards require pipe, fittings, and installation techniques to conform to the most recent revision of the appropriate American Water Works Association (AWWA) specifications.

a. All water mains shall be sized by the Planning department of Hampstead Area Water Company, Inc.
b. All water mains should be SDR21 PVC Pipe water main and shall conform to AWWA Standard unless otherwise specified by Hampstead Area Water Company.
c. All fittings are to be equipped with appropriate PVCGRIP mechanical joint.
d. All water mains shall be installed with a minimum cover of 4.5'
e. Direct tapping of PVC pipe is not allowed. Tapping saddles shall be used for all taps on PVC water main.

9. Fire Hydrants –

a. All fire hydrants are to be installed on an 8" water main. If the Hydrant is more that 10' from the hydrant valve than install the hydrant with a Megalug or a grip ring retainer.
b. All fire hydrants shall be installed with a hydrant valve attached to an anchor tee off the water main.
c. Hydrant must be installed perpendicular to the ground.
d. All hydrants must be installed with breakaway coupling located between 6" and 12" of the finished grade surrounding the hydrant.
e. All Hydrant Drain holes are to be plugged water tight.
f. Backfill around the hydrant from the ground surface to 1' above the top of the hydrant shoe shall be with select common borrow. *See Detail D-4*

Common Borrow - Spread selected borrow in layers of uniform thickness not exceeding 12" before compaction and moistened or allowed to dry as directed. Compact thoroughly by means of suitable power driven tampers or other power driven equipment.

10. Pressure Testing –

All water services must be visually inspected by a Hampstead Area Water Company inspector prior to backfilling. The corporation, curb valve, and any couplings must be left exposed for the test. The test shall involve pressuring the service and visually inspecting each joint along the service to insure that there is no leakage. Services with pressures exceeding 80 PSI are required to install a Pressure reducing Device. For an approved list of devices and installation standards contact the HAWC Planning Department.

Piping must be subjected to pressure and leakage testing according to AWWA specification C600 or C900 which is summarized as follows: Fill the test section of pipe slowly and expel air from high points in the line. The test pressure is to be at least 1.25 times the working pressure of each test section and must be maintained for a minimum 2 hour test period. Leakage from the test section, or the quantity of water which must be supplied to maintain pressure within 5 psi of the test pressure, for two hours, must not exceed the values in the following table:

Allowable Leakage per 1000 ft. of Pipeline*-gph

Average Test Pressure (PSI)	NOMINAL PIPE DIAMETER - INCHES															
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450	48	64	95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400	45	60	90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350	42	56	84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300	39	52	78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275	37	50	75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250	36	47	71	.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	34	45	68	.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.08
200	32	43	64	.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	30	40	59	.80	.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	28	37	55	.74	.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125	25	34	50	.67	.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	23	30	45	.60	.75	.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

11. Pump House Construction & Design

Pump House – All new pump houses must be approved by the HAWC planning department. HAWC reserves the right to change the pump house design to their specifications. Specifications are determined on a site specific basis.

SCADA (*Supervisory Control and Data Acquisition)* **–**
All new pump houses must include SCADA. This will enable the water company to gather information from different aspects of the water system, and transfer the information back to a central site such as the Water office SCADA computer. Each new pump house will have to be assessed on a site specific basis to determine the level of SCADA to be involved.

12. Disinfection –

Each pipeline must be chlorinated according to the following procedure:

a. Flush the line thoroughly to remove any remaining debris, mud, and stones.
b. Introduce chlorine through a tap at one end of the line while flushing from the other end. A chlorine solution of 50 ppm should remain in the line for a minimum of 24 hours.
c. Following chlorination completely flush the distribution system and take a sample for bacteriological testing in a container supplied by an approved laboratory.

13. Attachments –

I. Acceptable Materials or Equivalent products to be used

1. PVC Pressure Pipe
2. PVC FastTap Saddles
3. Polyethylene Tubing
4. Quick Joint Coupling 1" Service from 2" pipe
5. Ball Valve Curb Stops
6. Ball Valve Curb Stops Cont'd.
7. Valve & Service boxes
8. Mueller Resilient Wedge Gate Valves
9. Resilient Wedge Valves
10. Resilient Wedge Valves Cont'd.
11. Aluminum Valve Box Top & Gate Box Aligner
12. Metropolitan Fire Hydrant
13. Metropolitan Fire Hydrant
14. Metropolitan Fire Hydrant
15. Double Band Service Saddles
16. Double Strap Service Saddles
17. Ford PVC Fast tap for Pipe larger than 4"
18. PVC mechanical PVCGrip
19. PVC mechanical PVCGrip Cont'd.
20. PVC mechanical PVCGrip Cont'd.

II. Details

D-1 Typical Service Installation Detail
D-2 Typical Trench Detail
D-3 Typical Service Meter Installation
D-4 Typical Hydrant Installation
D-5 Typical Service Box in Non-Paved Areas
D-6 Typical Domestic Service tapped off Fire Service

JM Eagle *Building essentials for a better tomorrow™*

ACCEPTABLE MATERIALS OR HAMPSTEAD AREA WATER COMPANY APPROVED EQUIVALENT PRODUCTS TO BE USED

QUALITY • PERFORMANCE • LONGEVITY
50-YEAR WARRANTY on JM Eagle Plastic Pipe
GUARANTEED

ULTRA BLUE™ PVCO

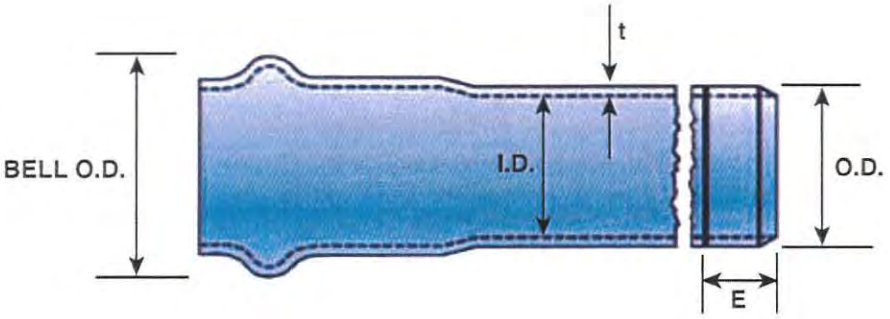
AWWA C909 PIPE

SUBMITTAL AND DATA SHEET

PIPE SIZE (IN)	APPROX. BELL O.D. (IN)	AVERAGE O.D. (IN)	MIN. T. (IN)	APPROX. ID (IN)	STOP LINE DISTANCE MIN. E (IN)	APPROX. WEIGHT (LBS/FT)	APPROX. WEIGHT (LBS/JNT)
Pressure Class 235*							
6	8.53	6.90	0.221	6.43	5 3/4	3.21	69
8	10.83	9.05	0.290	8.44	6 1/2	5.50	117
10	13.43	11.10	0.356	10.35	7 1/4	8.36	169
12	15.72	13.20	0.423	12.31	7 3/4	11.87	239
Pressure Class 165							
16	20.05	17.40	0.395	16.56	9½	14.51	300

* UL 1285 Listed — 6"-12" PC 235

* Check for availability.



I.D. : Inside Diameter
O.D. : Outside Diameter
T. : Wall Thickness
E: Distance between Assembly Mark to the end of spigot

Product Standard:	ANSI/AWWA C909 UL1285 6"-12" PC 235
Pipe Compound:	ASTM D1784 Cells Class 12454
Gasket:	ASTM F477
Integral Bell Joint:	ASTM D3139
Certifications:	ANSI/NSF Standard 61 UL1285 6"-12" PC 235
Pipe Length:	20 feet laying length
Installation:	AWWA C605 JM Eagle™ Installation Guide

JM Eagle *Building essentials for a better tomorrow™*

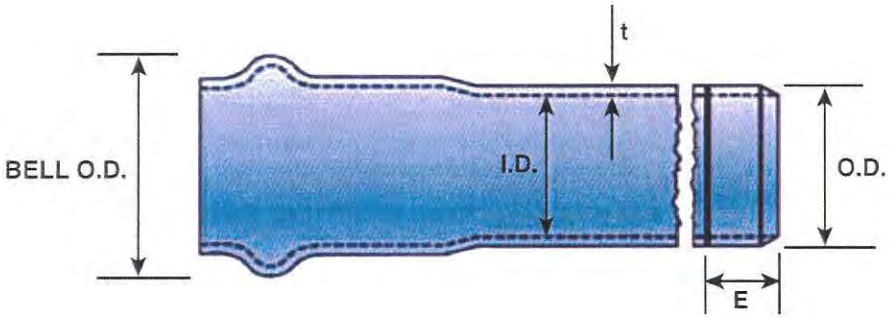
QUALITY • PERFORMANCE • LONGEVITY
50-YEAR WARRANTY on JM Eagle Plastic Pipe
GUARANTEED

ULTRA BLUE™ PVCO

IPS 200 PSI
ASTM F-1483

SUBMITTAL AND DATA SHEET

PIPE SIZE (IN)	APPROX. BELL O.D. (IN)	AVERAGE O.D. (IN)	MIN. T. (IN)	APPROX. I.D. (IN)	STOP LINE DISTANCE MIN. E (IN)	APPROX. WEIGHT (LBS/FT)	APPROX. WEIGHT (LBS/JNT)
Pressure Rating 200							
6	8 1/8	6.625	0.182	6.24	4 1/2	2.5	51
8	10 1/4	8.625	0.236	8.13	4 1/2	4.2	84
10	12 1/4	10.750	0.295	10.13	5 1/2	6.4	127
12	14 3/4	12.750	0.349	12.02	5 1/2	8.9	179



I.D. : Inside Diameter
O.D. : Outside Diameter
T. : Wall Thickness
E: Distance between Assembly Mark to the end of spigot

Product Standard:	ASTM F1483
Pipe Compound:	ASTM D1784 Cells Class 12454
Gasket:	ASTM F477
Integral Bell Joint:	ASTM D3139
Certifications:	ANSI/NSF Standard 61
Pipe Length:	20 feet laying length
Installation:	AWWA C605
	JM Eagle™ Installation Guide

PVC FASTTAP® SADDLES

PVC FaSTTaP® SaDDLES foR IPS Mains

OUTLET	MAIN SIZE◊	PART NUMBER 13/16" CR PUNCH
3/4" IPS FEMALE SLIP OR 1" IPS MALE SLIP SOLVENT WELD	1"	5361-14-0713-00†
	1 1/4"	5261-15-0713-00
	2"	5261-17-0713-00
	2 1/2"	5261-18-0713-00
	3"	5261-19-0713-00
	3 1/2"	5261-20-0713-00‡
	4"	5261-21-0713-00
	5"	5261-23-0713-00‡
	6"	5261-24-0713-00
	8"	5261-26-0713-00‡
	10"	5261-27-0713-00‡
	12"	5261-28-0713-00‡
1" IPS FEMALE SLIP SOLVENT WELD	1"	5361-14-0714-00†
	1 1/4"	5261-15-0714-00
	2"	5261-17-0714-00
	2 1/2"	5261-18-0714-00
	3"	5261-19-0714-00
	3 1/2"	5261-20-0714-00‡
	4"	5261-21-0714-00
	5"	5261-23-0714-00‡
	6"	5261-24-0714-00
	8"	5261-26-0714-00‡
	10"	5261-27-0714-00‡
	12"	5261-28-0714-00‡
3/4" MPT	1"	5361-14-0913-00†
	1 1/4"	5261-09-0913-00
	2"	5261-17-0913-00
	2 1/2"	5261-18-0913-00
	3"	5261-19-0913-00‡
	3 1/2"	5261-20-0913-00
	4"	5261-21-0913-00
	5"	5261-23-0913-00‡
	6"	5261-24-0913-00
	8"	5261-26-0913-00‡
	10"	5261-27-0913-00‡
	12"	5261-28-0913-00‡
1" MPT	1"	5361-14-0914-00†
	1 1/4"	5261-15-0914-00
	2"	5261-17-0914-00
	2 1/2"	5261-18-0914-00
	3"	5261-19-0914-00
	3 1/2"	5261-20-0914-00‡
	4"	5261-21-0914-00
	5"	5261-23-0914-00‡
	6"	5261-24-0914-00
	8"	5261-26-0914-00‡
	10"	5261-27-0914-00‡
	12"	5261-28-0914-00‡
3/4" FPT	1"	5361-14-1513-00†
	1 1/4"	5261-15-1513-00
	2"	5261-17-1513-00
	2 1/2"	5261-18-1513-00
	3"	5261-19-1513-00
	3 1/2"	5261-20-1513-00‡
	4"	5261-21-1513-00
	5"	5261-23-1513-00‡
	6"	5261-24-1513-00
	8"	5261-26-1513-00‡
	10"	5261-27-1513-00‡
	12"	5261-28-1513-00‡

OUTLET	Main Size◊	PART NUMBER 13/16" CR PUNCH
1" FPT	1"	5361-14-1514-00†
	1 1/4"	5261-15-1514-00
	2"	5261-17-1514-00
	2 1/2"	5261-18-1514-00
	3"	5261-19-1514-00
	3 1/2"	5261-20-1514-00‡
	4"	5261-21-1514-00
	5"	5261-23-1514-00‡
	6"	5261-24-1514-00
	8"	5261-26-1514-00‡
	10"	5261-27-1514-00‡
	12"	5261-28-1514-00‡
3/4" CTS (7/8" OD) COMPRESSION△	1"	5361-14-2506-00†
	1 1/4"	5261-15-2506-00
	2"	5261-17-2506-00
	2 1/2"	5261-18-2506-00
	3"	5261-19-2506-00
	3 1/2"	5261-20-2506-00‡
	4"	5261-21-2506-00
	5"	5261-23-2506-00‡
	6"	5261-24-2506-00
	8"	5261-26-2506-00‡
	10"	5261-27-2506-00‡
	12"	5261-28-2506-00‡
1" CTS (1 1/8" OD) COMPRESSION△	1"	5361-14-2508-00†
	1 1/4"	5261-15-2508-00
	2"	5261-17-2508-00
	2 1/2"	5261-18-2508-00
	3"	5261-19-2508-00
	3 1/2"	5261-20-2508-00‡
	4"	5261-21-2508-00
	5"	5261-23-2508-00‡
	6"	5261-24-2508-00
	8"	5261-26-2508-00‡
	10"	5261-27-2508-00‡
	12"	5261-28-2508-00‡
3/4" IPS COMPRESSION△	1"	5361-14-2513-00†
	1 1/4"	5261-15-2513-00
	2"	5261-17-2513-00
	2 1/2"	5261-18-2513-00
	3"	5261-19-2513-00
	3 1/2"	5261-20-2513-00‡
	4"	5261-21-2513-00
	5"	5261-23-2513-00‡
	6"	5261-24-2513-00
	8"	5261-26-2513-00‡
	10"	5261-27-2513-00‡
	12"	5261-28-2513-00‡
1" IPS COMPRESSION△	1"	5361-14-2514-00†
	1 1/4"	5261-15-2514-00
	2"	5261-17-2514-00
	2 1/2"	5261-18-2514-00
	3"	5261-19-2514-00
	3 1/2"	5261-20-2514-00‡
	4"	5261-21-2514-00
	5"	5261-23-2514-00‡
	6"	5261-24-2514-00
	8"	5261-26-2514-00‡
	10"	5261-27-2514-00‡
	12"	5261-28-2514-00‡

33-2940-00
Combination Tapping Tool & Saddle Bolt Wench

- **For sizes not listed, contact Continental Industries.**
- PVC Fasttaps are rated at 200 psi.
- ◊ = Main sizes are for OD controlled pipe. Reference Tables 1, 2, 3, 4 & 5 on page 14.
- △ = Compression fittings are for OD controlled tubing or pipe and are supplied without stiffeners. Reference Tables 1, 3 & 4 on page 14.
- Recommended accessories;
  - 33-2940-00 ~ Combination Tapping Tool & Saddle Bolt Wench for Fasttaps
- † = 1" IPS mains are furnished with 1/2" CR punch.
- ‡ = With stainless steel band strap.

Tubing F-2

Polyethylene Tubing

800-EJP-24 HR

HDPE Tubing
High Molecular Weight

Polyethylene Tubing has many distinct advantages over other types of service pipe. It will not rust, rot or corrode. It has exceptional toughness, excellent resistance to abrasion and will flex repeatedly without damage. CTS Polyethylene Tubing is designed for 200 P.S.I. IPS Polyethylene is offered in four different working pressures 100, 125, 160 and 200 P.S.I.

Its pressure rating remains unaffected by mild nicks and scratches that may occur during installation. The tubing will not crack or split at subzero temperatures, even if filled with ice. The insulating qualities of Polyethylene help to prevent water from freezing inside the pipe. Should freezing occur, thawing should be done with steam or hot air, not with direct flame.

Short Spec:

Copper Tube Size (CTS) Polyethylene shall have a working pressure rating of 200 P.S.I. and shall conform to AWWA C901, ASTM D3350 and ASTM D2737. Iron Pipe Size (IPS) Polyethylene shall have a working pressure of 160 P.S.I. and shall conform to AWWA C901, ASTM D3350 and ASTM D2239.

BLUE CTS PLASTIC TUBING

SIZE	LENGTH OF COIL	PRODUCT NUMBER
3/4"	100 ft.	46130 1
3/4"	500 ft.	46140 1
1"	100 ft.	46150 1
1"	300 ft.	46160 1
1 1/4"	300 ft.	46165 1
1 1/2"	100 ft.	46170 1
2"	100 ft.	46190 1

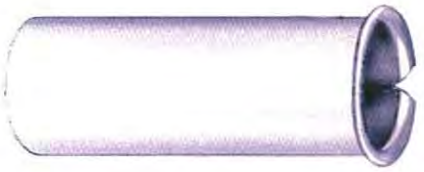
NOTES:

- Virgin natural HDPE
- Continuous footage marks every two feet
- NSF certified meets C901-96 standard

HDPE PLASTIC TUBING

SIZE	LENGTH OF COIL	PRODUCT NUMBER	
		CTS	IPS
3/4"	100 ft.	46130	46226
3/4"	500 ft.	46140	NS
1"	100 ft.	46150	46231
1"	300 ft.	46160	46233
1 1/4"	100 ft.	46164	46234 2
1 1/4"	300 ft.	46165	46234 1
1 1/2"	100 ft.	46170	46235 1
1 1/2"	300 ft.	46180	46235 5
2"	100 ft.	46190	46240

NOTE: Our copper tube size Polyethylene Tubing can be used with compression fittings without special adapters. See our service brass section for a complete line of fittings and valves.



INSERT STIFFENERS

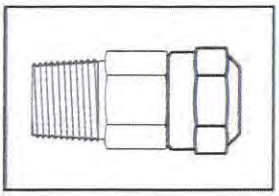
SIZE	PRODUCT NUMBER
3/4"	47730
1"	48330
1 1/4"	48525
1 1/2"	48910
2"	49310

NOTE: Insert stiffeners are required when compression connections are made to insure a leak-free installation.

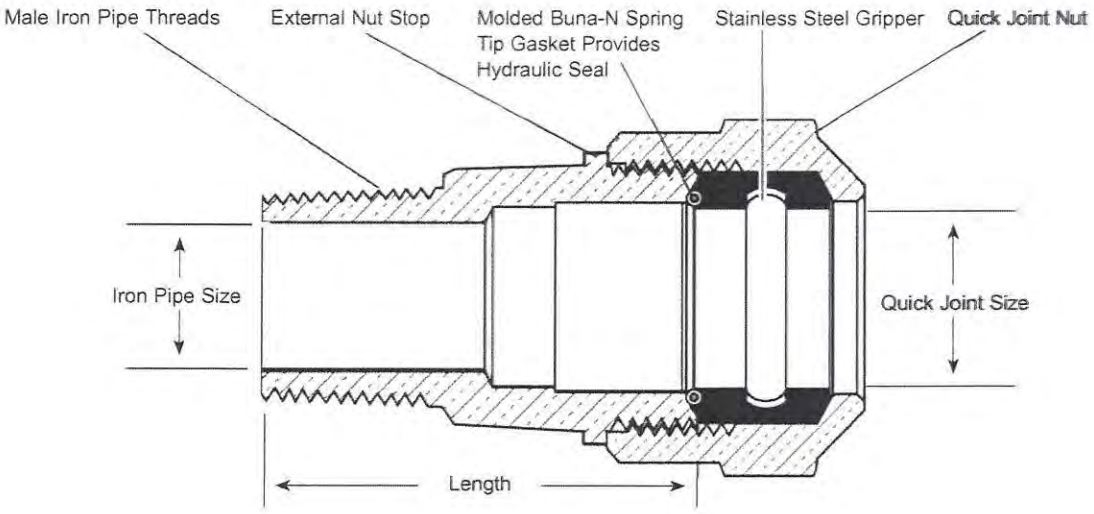
Pipeline Specialists
EJP
Everett J. Prescott, Inc.

SUBMITTAL INFORMATION

Quick Joint Coupling - *(C84-xx-Q style)*



MALE IRON PIPE THREAD BY QUICK JOINT FOR COPPER OR PLASTIC TUBING (CTS)



Description		Length	Approx. Wt. Lbs	Part Number	✓ Submitted Item(s)
Male Iron Pipe	Q.J. for CTS				
1/2"	1/2"	2"	.5	▼ C84-11-Q	
3/4"	5/8"	2-1/4"	-	▼ C84-32-Q	
3/4"	3/4"	2-1/4"	.6	▼ C84-33-Q	
3/4"	1"	2-3/8"	.7	▼ C84-34-Q	
1"	3/4"	2-19/32"	.7	▼ C84-43-Q	
1"	1"	2-9/16"	.8	▼ C84-44-Q	
1-1/4"	1-1/4"	2-5/8"	1.4	▼▼ C84-55-Q	
1-1/2"	1-1/2"	3"	1.8	▼▼ C84-66-Q	
2"	2"	3-1/4"	2.3	▼▼ C84-77-Q	

▼ UL Classified to ANSI/NSF Standard 61.
▼▼ Add "-K" to end of catalog number for item to be UL classified to ANSI/NSF Standard 61
Note: Ford recommends insert stiffeners when using plastic pipe or tubing.

FEATURES

- All brass conforms to AWWA Standard C800 (ASTM B-62 and B-584, UNS NO C83600 - 85-5-5-5)
- Body design provides hexagonal wrench flats for proper installation.

The Ford Meter Box Company considers the information in this submittal form to be correct at the time of publication. Item and option availability, including specifications, are subject to change without notice. Please verify that your product information is current.

The Ford Meter Box Company, Inc.
P.O. Box 443, Wabash, Indiana U.S.A. 46992-0443
Phone: 260-563-3171 / Fax: 800-826-3487
Overseas Fax: 260-563-0167
http://www.fordmeterbox.com

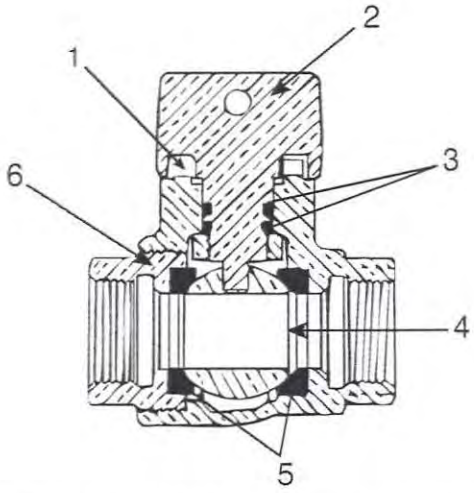
10/07/04

Submitted By:

Service Brass G-5

Ball Valve Curb Stops

800-EJP-24 HR



G

What Is A Curb Stop? How and Why Is It Used?

After the service connection has been made to the main, the water service line is laid to the home owner's property line and a shut off valve is installed. This shut off valve is called a Curb Stop and is used to provide the utility with a valve to stop water flow for both temporary or permanent purposes. The Ball Valve Curb Stop referred to in this section comes with a TFE or fluorocarbon coated, brass ball. The use of these materials helps to eliminate corrosion and electrolysis associated with common plug type curb stops.

DESCRIPTION	SIZE	PRODUCT NUMBER
IP X IP	3/4"	47280
	1"	47930
	1 1/4"	48410
	1 1/2"	48670
	2"	49080

Specifications:

Ball Valves shall be designed and manufactured to conform to AWWA Standard C800-89 (ASTM B-62–Index 115–85-5-5-5). Ball Valves shall be individually inspected and tested for leaks by air pressure under water.

Ball Valves are ideal for use in water service lines. Tightness in both directions at all pressures, easy turning, non-binding, and minimum pressure loss—these characteristics are added to good engineering design, quality material and precise manufacturing.

A variety of end connections are available for connecting to copper, iron, and plastic pipe, or directly to a water meter. Ends are integral or secured with adhesive to prevent unintentional disassembly.

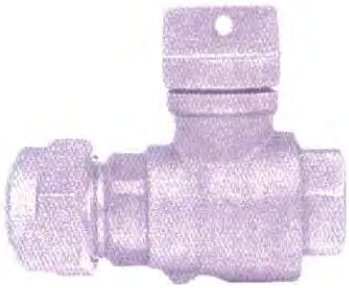
Features Of The Ball Valve

1. Integral Checks allow only 90° rotation of ball. Full 360° rotation available upon request.
2. One piece Cap and Stem
3. Double Buna-N Stem O-Rings assure permanent watertight seal at top
4. TFE or Fluorocarbon Coated Brass Ball provides maximum flow capacity and ease of turning
5. Two Buna-N Seals provide positive shut-off in either direction.
6. Heavy Cast Bronze Body. End Piece is epoxied into body to assure watertight seal.

Service Brass G-6

Ball Valve Curb Stops

800-EJP-24 HR



DESCRIPTION	SIZE	PRODUCT NUMBER
CPPJ X CPPJ	3/4"	47230
	1"	47880
	1 1/4"	48380
	1 1/2"	48640
	2"	49050

DESCRIPTION	SIZE	PRODUCT NUMBER
CPPJ X IP	3/4"	47250
	1"	47910
	1 1/4"	48400
	1 1/2"	48660
	2"	49070

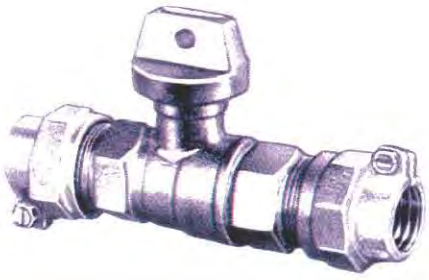
Options Available:

- Stop and waste feature is available on 1 1/2" and 2" valves.
- Handles for Ball Valves may be ordered separately from page G-13.
- 360° rotation available upon request.
- Open-right Ball Valves in 3/4" and 1" sizes are available upon request.

NOTE:

- All fittings are available in standard CPPJ and Quik Style compression connections. Please specify.
- Stainless steel insert stiffeners are recommended for use with plastic tubing(CTS); see page G-12.

'BH' Ball Valves



CPPJ X CPPJ	END SIZE	JOINT TYPE	PRODUCT NUMBER
	3/4"	CPPJ	47231

BH Ball Valves have a full 5/8" round water passage, providing more than adequate capacity for most single services. Designed for use as a curb stop, the BH valve is strong and rugged, replacing both inverted key curb stops and plug-types.

Pipeline Specialists EJP Everett J. Prescott, Inc.

Valve and Service Boxes E-1

Erie Style Service Boxes

800-EJP-24 HR

E

The EJP SERVICE BOX is the result of many years of development . It is made up of three basic components: the cover, the service box, and the rod.

The EJP service box cover features two designs. The standard cover is the plug-type which has a deep slot for the release of surface water and removal of debris. The brass pentagon plug features a coarse "rope" thread to enable quick and easy removal. The two hole cover is available in cast iron with non-seize Teflon lubricant, or a bronze thread insert.

The EJP service box is available in a number of heights to accommodate any bury depth from 4'0" to 8'0". Each box is adjustable 1'0" within its height range. The service box base is reinforced at the arch and pipe ring area and the arch will accommodate up to 1" curb stops.

The EJP service box rod is the key to a proper box. The rod is offset for centering in the pipe and has a heavy ductile iron yoke end, with a brass cotter pin. The rod's strength is derived from hot swedging it into the ductile iron yoke. They also come in stainless steel.

Plug Cover

Two-Hole Cover

EJP Service Box Cover

DESCRIPTION	PRODUCT NUMBER
Service Box Plug Cover Rope	45370
Service Box 2-Hole Cover	45385
Service Box 2-Hole Cover BI	45390
1 Service Box Plug Cover Sewer	45392 600
1 Service Box 2-Hole Cover BI Sewer	45388 600

BI = Bronze Insert
NOTE: Covers with special markings are available upon request.

EJP Service Box

DESCRIPTION	DEPTH OF BURY	PRODUCT NUMBER
3'-4' Service Box	3'-4'	45400
3½'-4½' Service Box	3½'-4½'	45405
4'-5' Service Box	4'-5'	45410
4½'-5½' Service Box	4½'-5½'	45415
5'-6' Service Box	5'-6'	45420
5½'-6½' Service Box	5½'-6½'	45425
6'-7' Service Box	6'-7'	45430
6½'-7½' Service Box	6½'-7½'	45435
7'-8' Service Box	7'-8'	45440

EJP Service Box Rod

DESCRIPTION	LENGTH	PRODUCT NUMBER
9/16" Service Box Rod (Stock Size)	18"	45472
	24"	45475
	30"	45485
	36"	45490
	42"	45500
	48"	45505
5/8" Service Box Rod	18"	45510
	24"	45515
	30"	45520
	36"	45525
	42"	45530
	48"	45535
½" SS Service Box Rod	24"	45476
	36"	45486

Pipeline Specialists
EJP
Everett J. Prescott, Inc.

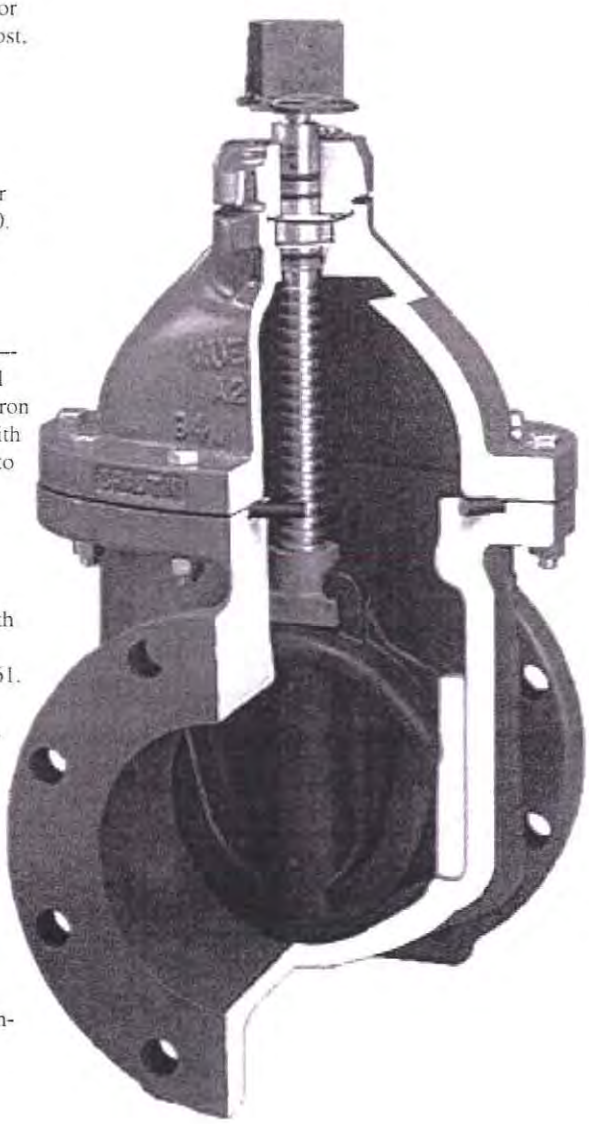
MUELLER® 2360 SERIES™ RESILIENT WEDGE GATE VALVE

Mueller Co. **10.3**

Rev. 8-04

MUELLER® 2-1/2"-12" Resilient Wedge Gate Valve

- TWO ANTI - FRICTION WASHERS — polymer washers (one above and one below the thrust collar) further reduce operating torque in both the opening and closing directions.
- STEM — machined from forged manganese bronze bar stock for strength where it is needed most, at the thrust collar.
- WEDGE — cast iron, fully encapsulated in molded rubber complying with ASTM D2000.
- MUELLER® PRO-GARD™ FUSION EPOXY COATING— of nominal 10 mils protects all interior and exterior exposed iron surfaces and complies fully with AWWA C550 and is certified to NSF 61.
- MANUFACTURED AND TESTED — in compliance with ANSI/AWWA C509 Standard and is certified to ANSI/NSF 61. Manufactured at facility with ISO 9001 certification and UL 262, FM 1120/1130.
- BI-DIRECTIONAL FLOW
- FLAT BOTTOM SURFACES — allow all 2360 series valves to stand upright for ease of handling and storage.
- TRIPLE O-RING SEALS — two above the thrust collar; one below. Uppermost serves as dirt seal. Retain lubrication on thrust collar and isolate it from waterway and outside contamination. Top two can be replaced with valve fully open and under pressure.



- 250 PSIG MAXIMUM WORKING PRESSURE— hydrostatically tested at 500 psig. Surpasses ANSI/AWWA C509 standards by 25% (UL/FM 200 psig working pressure, 400 psig hydrostatic pressure).
- EXTENDED WEDGE GUIDES— molded as part of the wedge, fit into guide channels in the valve body and maintain optimum wedge alignment with the stem throughout the wedge's travel, preventing the disc from tilting downstream during operation.
- GUIDE CAP BEARINGS — protective guide cap bearings made of a polymer bearing material snap over each rubber encapsulated guide on the wedge, providing a bearing interface between the wedge guides and the body's interior guide channels, protecting both from wear, even after thousands of cycles under severe pressure and flow conditions.
- SMOOTH, OVERSIZED FLOW WAY — all Mueller 2360 series RW Valves have a full, round, unobstructed flow way which accommodates full-sized shell cutters without interference and which provides superior flow characteristics.
- TEN YEAR LIMITED WARRANTY — (see separate Mueller Warranty document for terms).

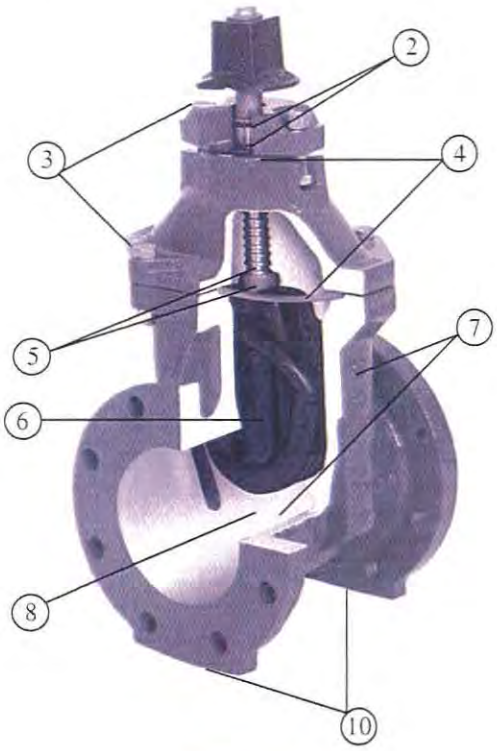
Revised 6/01

Resilient Wedge Valves F Series

C

800-EJP-24 HR

F Series Full Weight Ductile Iron Resilient Wedge Valves



OPEN LEFT

Features:

1. **Delrin thrust bearings** - above and below the thrust collar reduce friction and minimize operating torques.
2. **Two "O"-ring seals** - are replaceable with the valve fully open and subjected to full-rated working pressure.
3. **Stainless steel nuts and bolts** - are available upon request.
4. **"O"-ring seals** - at stuffing box and bonnet to body flanges to insure the best possible seal.
5. **Bronze stem and nut** - high strength, noncorrosive, insures long, trouble free life.
6. **100% urethane coated wedge** - insures bubble-tight seal every time up to 200 psi.
7. **Epoxy coating** - fusion bonded to both the inside and outside of the body and bonnet; conforms to AWWA C-550 standard.
8. **Smooth, unobstructed waterway** - is free of pockets, cavities and depressions allowing for minimal flow loss and lower pumping costs.
9. **200 psi working pressure** - 400 psi shell tested.
10. **Pads on bottom** - of all valves aid in installation and keep valve in upright position for easier storage.
11. **UL and FM approved.**

NOTES:

- F Series valves are constructed of full weight ductile iron conforming to AWWA C-509 Standards.
- For more information on the F Series Resilient Wedge Valve please call your local EJP sales office.

Pipeline Specialists EJP Everett J. Prescott, Inc.

Valves and Tapping Sleeves C-4

Resilient Wedge Valves F Series

800-EJP-24 HR

MJ X MJ

MJ – PIV

MJ X CUT-IN

MJ X TAPPING

NOTE: Contact your local EJP sales office for availability of end connections not shown in following table.

SIZE	DIR. TO OPEN	WORKING PRESSURE	PRODUCT NUMBER				MAX. CUTTER SIZE	# OF TURNS TO OPEN
			MJ X MJ	* MJ-PIV	* MJ X ** CUT-IN	* MJ X TAPPING		
2"	OR	200	39139 2	NA	NA	NA	NA	4¾
	OL		39139 1					
3"	OR	200	39152 1	NA	NA	NA	NA	10
	OL		39153 1					
4"	OR	200	39196	NS	NS	39190	4"	13½
	OL		39197	NS	NS	39193		
6"	OR	200	39334	NS	NS	39316	6"	19½
	OL		39337	NS	NS	39319		
8"	OR	200	39472	NS	NS	39496	8"	25½
	OL		39469 1	NS	NS	39497 1		
10"	OR	200	39666	NS	NA	39686	10"	31½
	OL		39669	NS		39689		
12"	OR	200	39884 1	NS	NA	39897	12"	37¾
	OL		39886 1	NS		39896		
16"	OR	200	40187	NS	NA	NS	NA	51
	OL		40188	NS		NS		

* See pages C-14 –17 for Tapping Sleeves and page C-11 for Cut-In Sleeves and PIV Indicator Posts.
** MJ X Cut-In Valves are used on oversized (pit cast) pipe.

NOTE: Full sized shell cutters may be used with these tapping valves, although undersized cutters are recommended.

Specification:

- Valves shall conform to the latest revision of AWWA Standard C-509 covering resilient seated gate valves and be approved by UL/FM.
- The wedge shall be of ductile iron completely encapsulated with urethane rubber.
- The urethane sealing rubber shall be permanently bonded to the ductile iron wedge to meet ASTM tests for rubber metal bond ASTM D429.
- Stems for Resilient Wedge Valve shall be cast bronze with integral thrust collar. The stem stuffing box shall be the "O"-ring seal type with two "O"-rings located above the thrust collar, replaceable with valve fully open and subjected to full rated working pressure.
- There shall be two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of the wedge and shall be made of solid bronze. There shall be a smooth, unobstructed waterway free of all pockets, cavities and depressions in the seat area.
- All exterior nuts and bolts shall be ⅝" minimum diameter and shall be cadmium plated, corrosion resistant steel (Type 18-8 stainless steel are available upon request).
- The body and bonnet shall be coated with a fusion bonded epoxy on both the interior and exterior. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to requirement for both AWWA (twice the specified working pressure) and 400 psi for UL/FM requirements.

Pipeline Specialists EJP Everett J. Prescott, Inc.

Valve and Service Boxes E-8

Aluminum Valve Box Top & Gate Box Aligner

800-EJP-24 HR

Gate Box Aligner

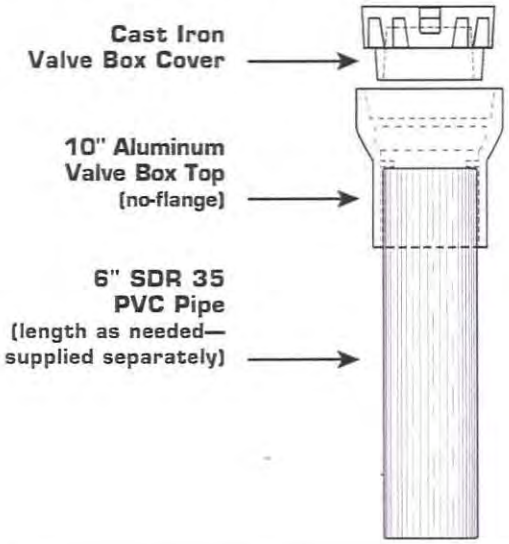
Valve shown with Gate Box Aligner installed under operating nut

The Gate Box Aligner is a high-strength, plastic device designed to eliminate the annoying and costly problem of having to re-dig a valve box base that has shifted off center during the backfilling process. The Gate Box Aligner is easily installed by removing the valve's operating nut and sliding it over the valve stem. When in place it automatically centers the valve box base around the operating nut and prevents the backfill material from interfering with valve operation while still allowing surface water to drain out. Any surface debris that does enter the valve box can quickly and easily be flushed out using air or water.

DESCRIPTION	PRODUCT NUMBER
Gate Box Aligner	45158

Aluminum Valve Box Top W/Lid

The Aluminum Valve Box Top is a 10" Slide Type Valve Box Top made of lightweight, corrosion resistant aluminum. The Aluminum Valve Box Top uses a standard cast iron, drop style cover and SDR 35 PVC Pipe for the base section (PVC pipe supplied separately).



DESCRIPTION	PRODUCT NUMBER
10" Aluminum Valve Box Top W/CI Lid	45050

Features:

- Made of corrosion resistant aluminum; simplifies removal of cast iron cover by reducing rust build-up
- SDR 35 PVC Pipe is used for the base, making it ideal for deep burial applications. The pipe can be cut to desired length in the field
- SDR 35 PVC base, with its non-corrosive, smooth exterior, is less prone to lifting from frost
- One piece PVC base reduces problems associated with misalignment (common with 2 and 3 piece cast iron bases)
- Lightweight; easier to handle and install than cast iron valve boxes
- Less expensive than cast iron valve boxes
- Accepts standard Fixed and E-Z Rise valve box extensions
- Can be used in traffic areas
- Reduces inventory

NOTE: SDR 35 PVC Pipe can be ordered from Section A.

Pipeline Specialists
FETAL EJP
Everett J. Prescott, Inc.

2004 EDITION

METROPOLITAN®/M-94

FIRE HYDRANT INSPECTION, OPERATION & MAINTENANCE

AWWA C502 DRY BARREL TRAFFIC MODEL HYDRANT
250 PSI OPERATING PRESSURE • 500 PSI TEST PRESSURE

U.S. Pipe's METROPOLITAN/M-94 fire hydrant makes your job easier because it's made with fewer parts than other hydrants. Its simple design is ahead of its time, making it faster and easier to assemble and disassemble. Fewer parts also means fewer problems. And the METROPOLITAN/M-94 hydrant has the quality and reliability you've come to expect from U.S. Pipe, the nation's leading supplier of Ductile Iron Pipe. So, it's no more than you have to. Make life easier with U.S. Pipe.

NOTE: DRAIN PLUGGED

AWWA Standards

MORE THAN JUST PIPE.

U.S. PIPE

PART NUMBERS & DESCRIPTIONS

ALL MATERIALS CONFORM TO AWWA C502

METROPOLITAN /M-94 Features & Benefits

Bronze Valve Plate

A bronze upper valve plate with urethane drain valve facings.

Travel Stop

A new travel stop feature provides a positive feel when the hydrant is completely open.

Main Valve

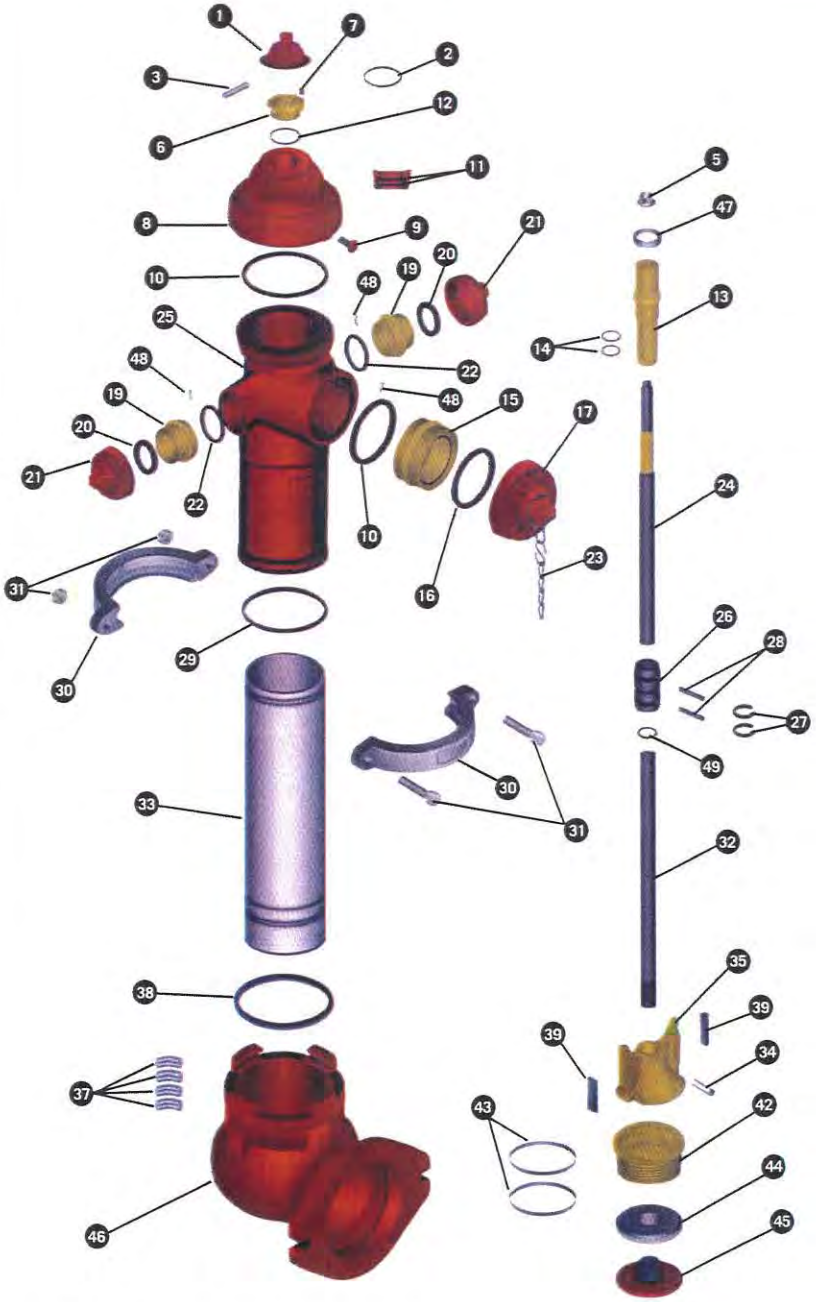
The complete main valve mechanism provides improved flow characteristics and less chance of damage due to rock entrapment.

Operating Nut

The Ductile Iron operating nut with a weather shield weatherproofs the hydrant. Ductile Iron provides durability and wear resistance. A tamper resistant alloy steel locking pin fastens the operating nut to the stem nut.

Ductile Iron Bonnet

A Ductile Iron bonnet is securely fastened to the upper barrel with inter-locking "breech lock" lugs for tamper resistance. It is easily removed for access to the main valve.



The METROPOLITAN®/M-94 Ductile Iron fire hydrant is a boltless constructed dry barrel traffic model hydrant rated at 250 psi working pressure. It conforms to ANSI/AWWA C502 — AWWA Standard for Dry Barrel Fire Hydrants and is UL Listed and FM Approved.

METROPOLITAN® is a Registered Trademark of U.S. Pipe and Foundry Company.

Part Numbers & Descriptions

ITEM#	PART NAME	QTY. REQ'D	MATERIAL
1	Operating Nut	1	Ductile Iron
2	Operating Nut Seal	1	Rubber
3	Operating Nut Locking Pin	1	Steel
4	Hyrdrant Lubricant (in chamber)	1	Beacon 290
5	Travel Stop Nut	1	Steel
6	Hold Down Nut	1	Bronze
7	Hold Down Nut Screw	1	Steel
8	Bonnet	1	Ductile Iron
9	Bonnet Locking Screw	1	Stainless Steel
10	Bonnet Seal	1	Rubber
11	O-Ring	1	Rubber
12	Bonnet — Revolving Nut O-Rings	2	Rubber
13	Revolving Nut	1	Bronze
14	Inner Revolving Nut O-Rings	2	Rubber
15	Pumper Nozzle	1	Bronze
16	Pumper Nozzle Cap Gasket	1	Rubber
17	Pumper Nozzle Cap	1	Ductile Iron
18	Pumper Nozzle O-Ring	1	Rubber
19	Hose Nozzle	2	Bronze
20	Hose Nozzle Cap Gasket	2	Rubber
21	Hose Nozzle Cap	2	Ductile Iron
22	Hose Nozzle O-Rings	2	Rubber
23	Chain Assembly	1	Steel
24	Valve Rod Upper, Including Bronze Sheath with O-Ring and Shear Proof Rod Pin	1	Steel
25	Standpipe Upper	1	Ductile Iron
26	Valve Rod Coupling (Frangible)	1	Gray Iron
27	Coupling Retaining Rings	2	Stainless Steel
28	Rod Coupling Pins	2	Stainless Steel
29	Standpipe Coupling Seal	1	Rubber
30	Standpipe Coupling Halves (Frangible)	2	Gray Iron
31	Standpipe Coupling Bolt and Nut	2	Steel
32	Valve Rod Lower	1	Steel
33	Standpipe Lower	1	Ductile Iron
34	Top Plate Pin — Shear Proof	1	Steel
35	Valve Top Plate	1	Manganese Bronze
37	Elbow Locking Key	4	Stainless Steel
38	O-Ring Gasket	1	Rubber
39	Drain Valve Facing	2	Rubber
42	Seat Ring	1	Bronze
43	Seat Ring O-Rings	2	Rubber
44	Main Valve	1	Rubber
45	Valve Bottom Plate	1	Ductile Iron
46	Elbow, Including Bronze Sub-Seat, and Plastic Drain Hole Liner	1	Ductile Iron
47	Anti-Friction Bearing	1	Delrin® 500*
48	Nozzle Wedge Lock	3	Bronze
48	Dampener	1	Rubber

*Main valve opening available in 4-1/2" or 5-1/4". *Delrin® is a Registered Trademark of DuPont or its affiliates.*

Traffic Repair Kit

ITEM#	PART NAME	QTY. REQ'D	MATERIAL
26	Valve Rod Coupling (Frangible)	1	Gray Iron
27	Coupling Retaining Rings	2	Stainless Steel
28	Rod Coupling Pins	2	Stainless Steel
29	Standpipe Coupling Seal	1	Rubber
30	Standpipe Coupling Halves (Frangible)	2	Gray Iron
31	Standpipe Coupling Bolt and Nut	2	Steel

Extension Kit

ITEM#	PART NAME	QTY. REQ'D	MATERIAL
51	Extension Rod Coupling Assembly (Non-Frangible)	1	Ductile Iron
52	Rod Extension	1	Steel
53	Extension Coupling Gasket	1	Rubber
54	Standpipe Coupling Halves (Non-Frangible)	2	Ductile Iron
55	Standpipe Extension	1	Ductile Iron
56	Extension Coupling Bolt and Nut	2	Stainless Steel

Accessories

Extension of the METROPOLITAN®/M-94 Ductile Iron fire hydrant to adjust for changes in ground elevation, is easily done without digging. Kit includes the barrel and rod units from 6" to 36" long in 6" increments (longer units available on special order). Extension kit comes complete with nonbreakable rod and barrel couplings, gaskets and fasteners. Only a wrench and screwdriver are needed for assembly.

Consists of complete breakaway coupling for barrel and rod with gaskets and fasteners. Hydrant can be restored to service with only a screwdriver and wrench without removing the bonnet.

Consists of a compact seat removal wrench, a combination spanner wrench and two allen wrenches. The combination spanner wrench takes the place of three tools for bonnet removal, for removing the travel stop nut and for removing the hold down nut and valve bottom plate.

All Bonnet O-Rings, Revolving Nut O-Rings, Thrust Washer, Bonnet Seal, Standpipe Seal

Seat Ring, Main Valve (Rubber), Seat Ring O-Rings

Revised 6/01

Double Band Service Saddles

800-EJP-24 HR

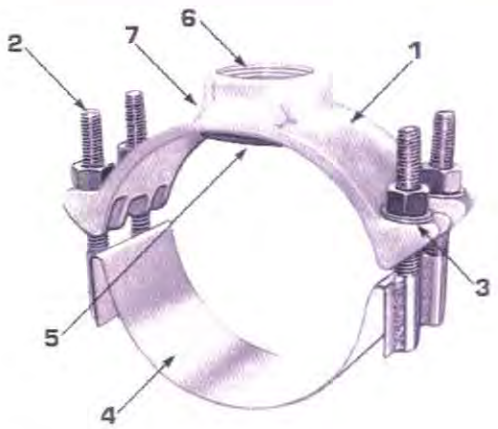
Style FC202 Wide Band Saddles

Wide Band Service Saddles are recommended for larger taps and for use on larger O.D. pipe. These saddles equalize the pressure on the pipe and can be used on Asbestos Cement, Cast or Ductile Iron and C900 PVC pipe.

The FC202 epoxy coated saddle with stainless steel band may be used for all applications but is recommended especially for use in highly corrosive areas and on C900 PVC pipe. The FC202 Saddle should be pre-sized when used on C900 PVC pipe. Pre-sized saddles will conform to the pipe O.D. without placing undue stress on the PVC pipe.

The open and closed lug design allows pre-assembly of the bands, thus ensuring a safe yet simple installation. The heavy duty gasket assures the saddle will maintain pressure in excess of the pipe rating.

The convenient marking system quickly and easily identifies the type of thread in the boss. For AWWA tapered thread, the top edge of the boss has a machined groove around the outside edge, while the boss for iron pipe thread is smooth.



J

Specifications:

1. **Body:** High strength ductile iron per ASTM A536
2. **Bolts:** 5/8" 18-8 stainless steel NC threaded bolts are used on 4" thru 12" saddles. 1/2" bolts are furnished on saddles 3" or smaller.
3. **Nuts & Washers:** 1/2" or 5/8" fluorocarbon coated heavy hex nuts and washers made from 18-8 type 304 stainless steel. Welds are fully passivated for corrosion resistance.
4. **Bands:** 18-8 type 304 stainless steel with a 3 1/4" minimum width.
5. **Gasket:** Buna-N rubber per ASTM D2000.
6. **Threads:** CC per AWWA C800 or standard female iron pipe.
7. **Finish:** Approximately 12 mils of fusion applied epoxy coating.

NOMINAL PIPE SIZE	O.D. RANGE	PRODUCT NUMBER OUTLET SIZE AND THREAD TYPE			
		3/4" CC	1" CC	1 1/2" CC	2" CC
2"	2.35-2.50	SADDLES WITH THESE SIZE OUTLETS ARE AVAILABLE BUT USUALLY STOCKED IN SINGLE BAND ONLY— SEE FC101 SADDLES ON PAGE J-24		NA	NA
3"	3.80-4.25			54788 F	NA
4"	4.74-5.26			55380 F	55425 F
6"	6.84-7.60			56209 F	56259 F
8"	8.99-9.79			56982 F	57035 F
10"	11.10-12.12			57762 F	57818 F
12"	13.20-14.38			58482 F	58552 F

NOTES:

- Saddles with IP inlet thread are available by special order. Other O.D. ranges are also available. Please contact your local EJP sales office.
- NA means not available.

Pipeline Specialists EJP Everett J. Prescott, Inc.

Clamps, Couplings and Saddles J-28

Double Strap Service Saddles

800-EJP-24 HR

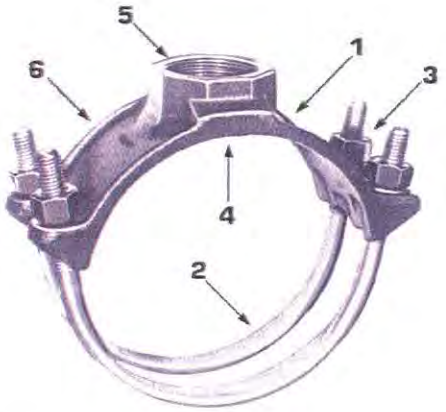
Style F202 Double Strap Saddles

Double Strap Service Saddles are recommended for larger taps and for use on larger O.D. pipe. Double strap saddles equalize the pressure on the pipe and can be used on Asbestos Cement, Cast or Ductile Iron and C900 PVC pipe.

The F202 Saddle should be pre-sized when used on C900 PVC pipe. Pre-sized saddles will conform to the pipe O.D. without placing undue stress on the C900 PVC pipe.

The open and closed lug design allows pre-assembly of the straps, thus ensuring a safe yet simple installation. The heavy duty gasket assures the saddle will maintain pressure in excess of the pipe rating.

The convenient marking system quickly and easily identifies the type of thread in the boss. For AWWA tapered thread, the top edge of the boss has a machined groove around the outside edge, while the boss for iron pipe thread is smooth.



Specifications:

1. **Body:** High strength ductile iron per ASTM A536
2. **Straps:** 5/8" AISI C1010 Steel, zinc plated with Di-chromate seal. Each strap has 5/8" flat bearing surface; 1/2" straps are furnished on saddles 3" and smaller.
3. **Heavy Hex Nuts & Washers:** 1/2" or 5/8" AISI steel alloy, zinc plated with Di-chromate seal.
4. **Gasket:** Buna-N rubber per ASTM D2000.
5. **Threads:** CC per AWWA C800 or standard female iron pipe.
6. **Finish:** Red alkyd enamel shop coat.

NOMINAL PIPE SIZE	O.D. RANGE	PRODUCT NUMBER			
		OUTLET SIZE AND THREAD TYPE			
		3/4" CC	1" CC	1 1/2" CC	2" CC
2"	2.35-2.50	54350 F	54393 F	NA	NA
3"	3.80-4.25	54753 F	54778 F	54788 1F	NA
4"	4.74-5.26	55240 F	55300 F	55360 F	55420 F
6"	6.84-7.60	56040 F	56120 F	56190 F	56250 F
8"	8.99-9.79	56830 F	56900 F	56970 F	57030 F
10"	11.10-12.12	57600 F	57670 F	57740 F	57800 F
12"	13.20-14.38	58350 F	58420 F	58480 F	58540 F

NOTES:

- Saddles with IP inlet thread are available by special order. Other O.D. ranges are also available. Please contact your local EJP sales office.
- NA means not available.

Pipeline Specialists EJP Everett J. Prescott, Inc.

The Meter Setter
No. 5
May 2007

Tap Into Reliability

Ford Meter Box continues to expand and improve the product line of Stainless Steel Tapping Sleeves

The FTSAS, designed for 4" through 36" nominal pipe sizes, has 3" through 24" flanges available.

- Body, Strap and UNC threaded bolts and nuts are made of 18-8 Type 304 stainless steel.
- Flange can be either 18-8 Type 304 stainless steel or ASTM A36 carbon steel.
- Tapping Sleeve is fully passivated for corrosion resistance.
- Outlet style gasket is Buna-N (Nitrile).
- Removable bolts provide better accessibility.
- Other sizes available.

Ford FTSAS
All Stainless Steel
Tapping Sleeve

Ford Meter Box also offers the Ford **FAST** and the **FTSS** Stainless Steel Tapping Sleeves. The FAST design consists of non-detachable bolts; the FTSS has removable bolts. These tapping sleeves are available in 3" through 24" nominal pipe size with 3" through 12" outlets.

- Body, Straps and UNC threaded bolts and nuts are made of 18-8 Type 304 stainless steel.
- Flange can be either 18-8 Type 304 stainless steel or ASTM A36 carbon steel.
- A gridded virgin SBR or Buna-N gasket completely surrounds the pipe, aiding in prevention of pipe breakage.
- Outlet gasket is Buna-N and provides a watertight seal.
- Tapping Sleeve is fully passivated for corrosion resistance.
- **MJ outlet is available.**
  - Flange can be either 18-8 Type 304 stainless steel or ASTM A36 carbon steel.
  - Buna-N connecting gasket.
  - Revolutionary outlet design ensures a watertight connection and has a face-to-face bond between the valve and tapping sleeve, eliminating joint deflection.

Ford FAST-MJ
All Stainless Steel
Tapping Sleeve

Ford FTSS
All Stainless Steel
Tapping Sleeve

Ford Stainless Steel Tapping Sleeves offer superior design and quality construction to provide reliability and durability for all of your tapping requirements. See our Stainless Steel Tapping Sleeves at the ACE '07 in Toronto; or for more information about our products, please contact your local Ford distributor or The Ford Meter Box Company, Inc.

The Ford Meter Box Co., Inc. 775 Manchester Avenue, P.O. Box 443, Wabash, Indiana, USA 46992-0443
Telephone: 260-563-3171 FAX: 800-826-3487 Overseas FAX: 260-563-0167 http://www.fordmeterbox.com

PVC Ring Lock series 3500 (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System
Designed for C900/C905 and IPS PVC Pipe
Patent #5,947,527

PVC Ring Lock series 3500 for PVC pipe

INFORMATION

The PVC Ring Lock System is an innovative design with a 360° grip-ring feature. This feature provides uniform restraining pressure around the circumference of the pipe, thus avoiding pipe distortion and point loading. Its unique independent restraining and sealing features allows it to be used for Push-On and Mechanical Joint fittings, Valves and Fire Hydrants. It can be used on any class, C900 PVC and IPS PVC pipe.

Innovative 360° Grip-Ring Restraint

FEATURES & ADVANTAGES

- Unique ring design provides 360° pipe restraint, so there is no point loading on the pipe.
- No washers or spacers to remove when used on CI OD PVC pipe or IPS PVC pipe
- One ring fits both CI OD PVC pipe and IPS PVC pipe used.
- Universal application for various types of PVC pipe simplifies inventory requirements and reduces carry cost.
- Double headed torque limiting bolts utilize 1¼" wrench size on both hex heads.
- Torque limiting bolts are designed with collars so that a wrench won't slip off bottom for easier installation.
- PVC Grip sizes 4"-12" are listed with Underwriters Laboratories for use on DR18 class 150 C900 PVC pipe and are Factory Mutual Research Approved for use on DR18 class 150 C900 PVC pipe.
- Tested to and meets the requirments of ASTM F1674 through 12" size
- Safety factor is twice (2:1) the standardized pressure rating of the pipe on which it is used.
- Offers a full 5° deflection through 12" and 3° on 16"
- Gland, ring and follower gland are made from high strength ductile iron per ASTM A536, grade 65-45-12 and are compatible with all mechanical joints conforming to ANSI/AWWA C111/A21.11.
- Eliminates tie rods and thrust blocks
- For use on HDPE or C909 pipe, Please contact Star Engineering
- Standard gland color is Coral Red (RAL 3016).

SAMPLE SPECIFICATIONS

Restrainer mechanism shall be integrated into the design of the follower gland. The gripping or restraining mechanism shall transmit uniform restraining pressure around the circumference of the pipe, thus avoiding point loading or pipe distortion. This restraining process shall be kept separate from the mechanical joint sealing process and not a part of the sealing function. Glands and rings components shall be manufactured of ductile iron conforming to ASTM A536, grade 65-45-12.

The restraining torque limiting bolt system shall have a torque-limiting feature designed to break off at preset torque limit to ensure proper actuation. Both the twist off head and the removal head shall be the same size as the T-bolt nut.

The restraining mechanism design can replace the standard mechanical joint gland and can be used with the standard mechanical joint bells conforming to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/A21.53 of the latest revision.

The restraining mechanism shall have a pressure rating equal to that of the pipe on which it is used. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the pressure rating of the pipe on which it is used). The restraining mechanism through 12" size shall be Listed by Underwriters Laboratories, Inc., Approved by Factory Mutual Researchand shall be tested to ASTM F 1674. The restraining device for C900/C905 PVC and IPS PVC Pipe shall be Star Pipe Products PVC Ring Lock Series 3500 or equal.

STAR® PIPE PRODUCTS

® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

STAR PIPE PRODUCTS
HOUSTON CORPORATE TOLL FREE 1-800-999-3009 FAX 281-538-4000
www.starpipeproducts.com

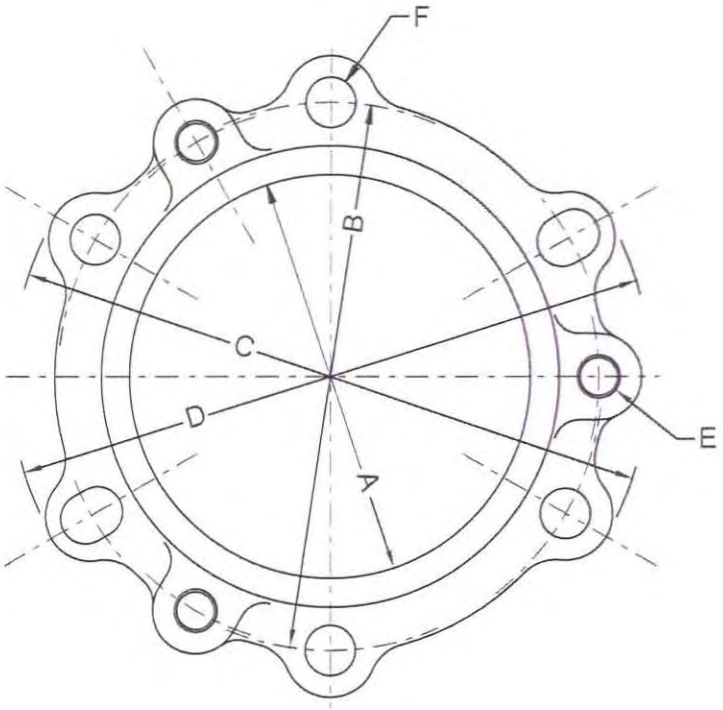
FM Approvals
Quality System Registrar
ISO 9001:2000

PVC Ring Lock series 3500 (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System
Designed for C900/C905 and IPS PVC Pipe
Patent #5,947,527

STAR® PIPE PRODUCTS

TECHNICAL INFORMATION



PVC RING LOCK 3500 SPECIFICATIONS*

SIZE	ANSI/AWWA C900/C905 PIPE O.D.	IPS PIPE O.D.	A	B	C	D	E	F	APPROX WT. (LBS)
4	4.80	4.50	4.90	7.50	9.13	9.13	4 @ .75	4 @ .75	13
6	6.90	6.63	7.00	9.50	11.13	11.75	3 @ .75	6 @ .75	16
8	9.05	8.63	9.15	11.75	13.38	14.00	4 @ .75	6 @ .75	21
10	11.10	10.75	11.20	14.00	15.63	16.75	6 @ .75	8 @ .75	31
12	13.20	12.75	13.30	16.25	17.88	19.13	8 @ .75	8 @ .75	41
16	17.40	N/A	17.54	21.00	22.50	22.50	10 @ .75	12 @ .75	73

*All dimensions in inches except where indicated.

STANDARDIZED PRESSURE RATINGS**

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD		ASTMD2241 IPS OD	
DR 14	200 PSI	DR 18	235 PSI	SDR 17	250 PSI
DR 18	150 PSI	DR 21	200 PSI	SDR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI	SDR 26	160 PSI
		DR 32.5	125 PSI		

**For the ordinary water works with transient surges only. Ratings are for PVC pipes with SERIES 3500 Restrainer

REV. 02.06

® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

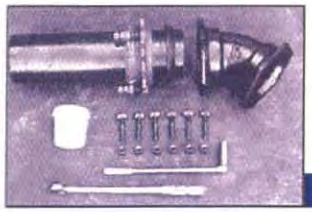
STAR PIPE PRODUCTS
HOUSTON CORPORATE TOLL FREE 800-999-3009 | +1 281 358-9000
WWW.STARPIPEPRODUCTS.COM

FM Approvals
Quality System Registration
ISO 9001:2000

PVC Ring Lock series 3500 (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System
Designed for C900/C905 and IPS PVC Pipe
Patent #5,947,527

INSTALLATION INSTRUCTIONS - SIZES 4"- 16"



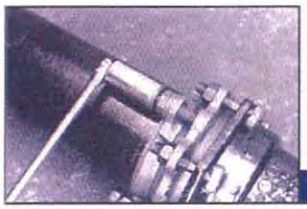
The rubber gasket will seal more effectively if the surfaces with which it comes in contact are thoroughly cleaned just before assembly to remove all loose foreign material. Lubrication and additional cleaning should be provided by brushing both the gasket and the plain end with soapy water or pipe lubricant. Slide the PVCGrip on the plain end, followed by the MJ gasket.

After insertion of the pipe into the bell of the fitting firmly press the gasket into the gasket recess. During this process the joint should be kept straight.

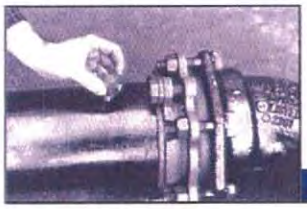
Slide the PVCGrip toward the MJ bell with the gland lip against the gasket. Insert T-bolts and hand tighten nuts.

IMPORTANT: Make deflection after joint is assembled but before tightening T-bolts.

When tightening bolts, it is essential that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. All T-bolts should be tightened until they are within the torque range per ANSI/AWWA C600 (See table A below). T-Bolts should be tightened alternately on opposite sides (Star Pattern).



After correct assembly of the mechanical joint, tighten each torque limiting bolt by turning approximately 180 degrees in a clockwise direction, alternating between bolts on opposite sides (Star Pattern), until the break away heads twist off. Never turn a single head over 180 degrees without alternating to another bolt.



If removal is necessary, use the 1 1/4" hex provided. [If reassembly is required, contact Star for replacement torque limiting bolts].

Note: Not to be used on plain end fittings, DI or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE[1] OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1 1/4	120-150

[1] These torque ranges are requirements of AWWA C600

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FM Approvals
ISO 9001:2000

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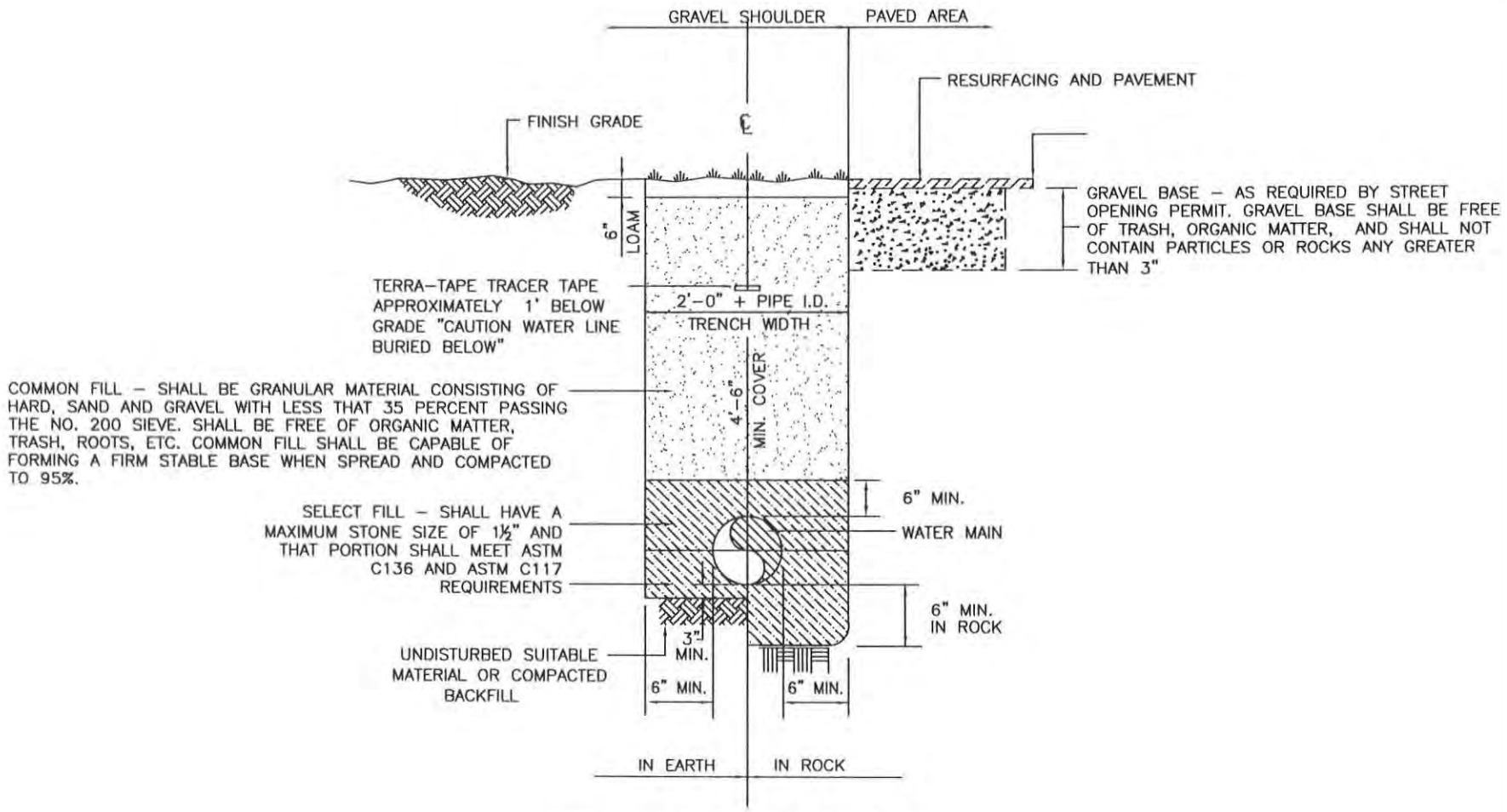
STAR® PIPE PRODUCTS
HOUSTON CORPORATE TOLL FREE: 800-999-3009 FAX: 281-558-7007
www.starpipeproducts.com



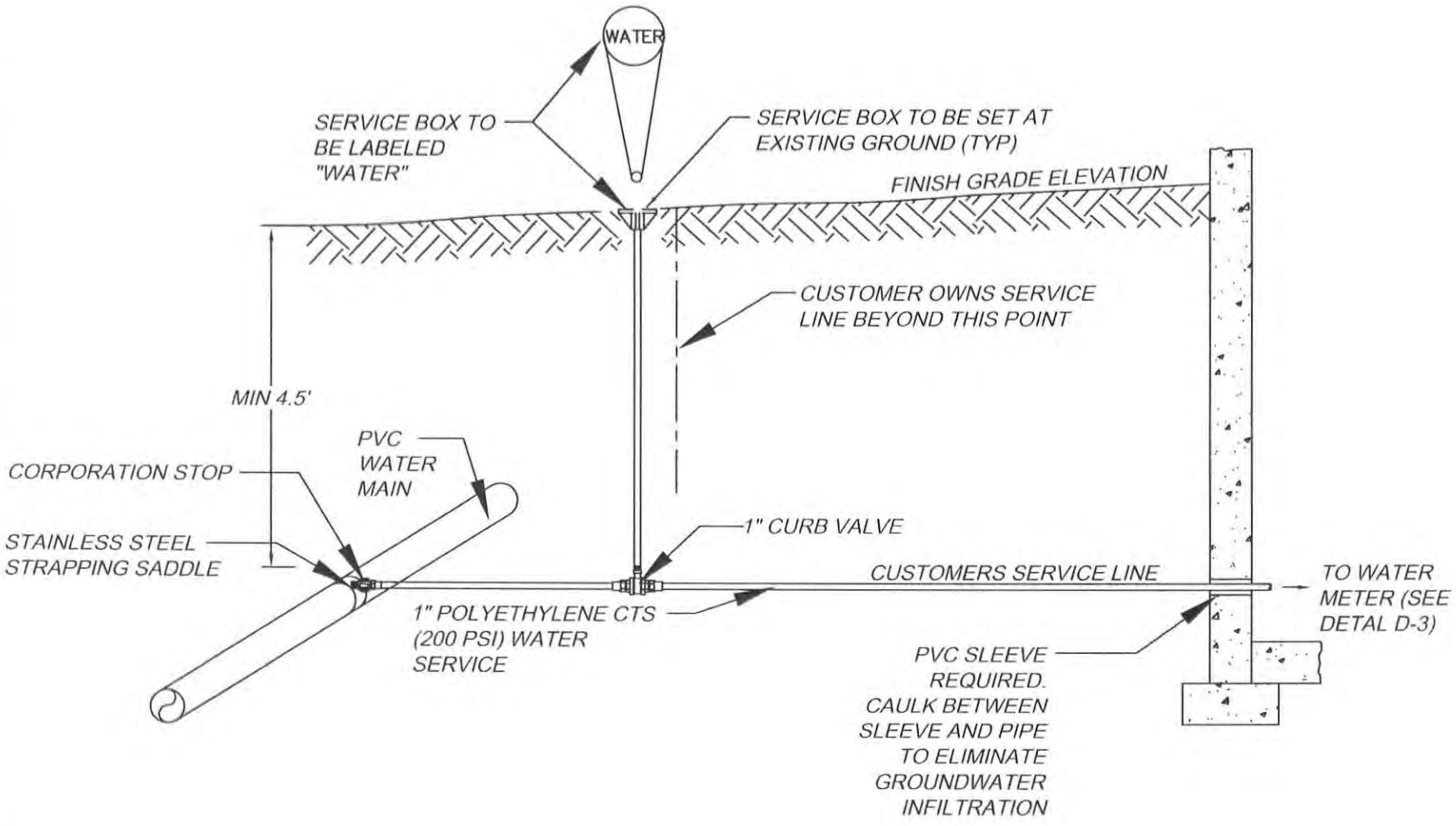
WATER MAIN TRENCH DETAIL

NOT TO SCALE

NOTES:

1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO HAWC TECHNICAL SPECIFICATIONS.
2. ALL PIPE SHOULD HAVE A MINIMUM DEPTH OF 4.5' FROM TOP OF PIPE TO FINISH GRADE.
3. REQUIREMENTS FOR SUBBASE AND BASE MATERIAL TYPE ARE TO BE IN ACCORDANCE WITH LOCAL AUTHORITY HAVING LOCAL JURISDICTION IN PAVED AREAS.
4. REQUIREMENTS FOR GRAVEL, LOAM AND/OR SEED ARE TO BE IN ACCORDANCE WITH LOCAL AUTHORITY HAVING LOCAL JURISDICTION.

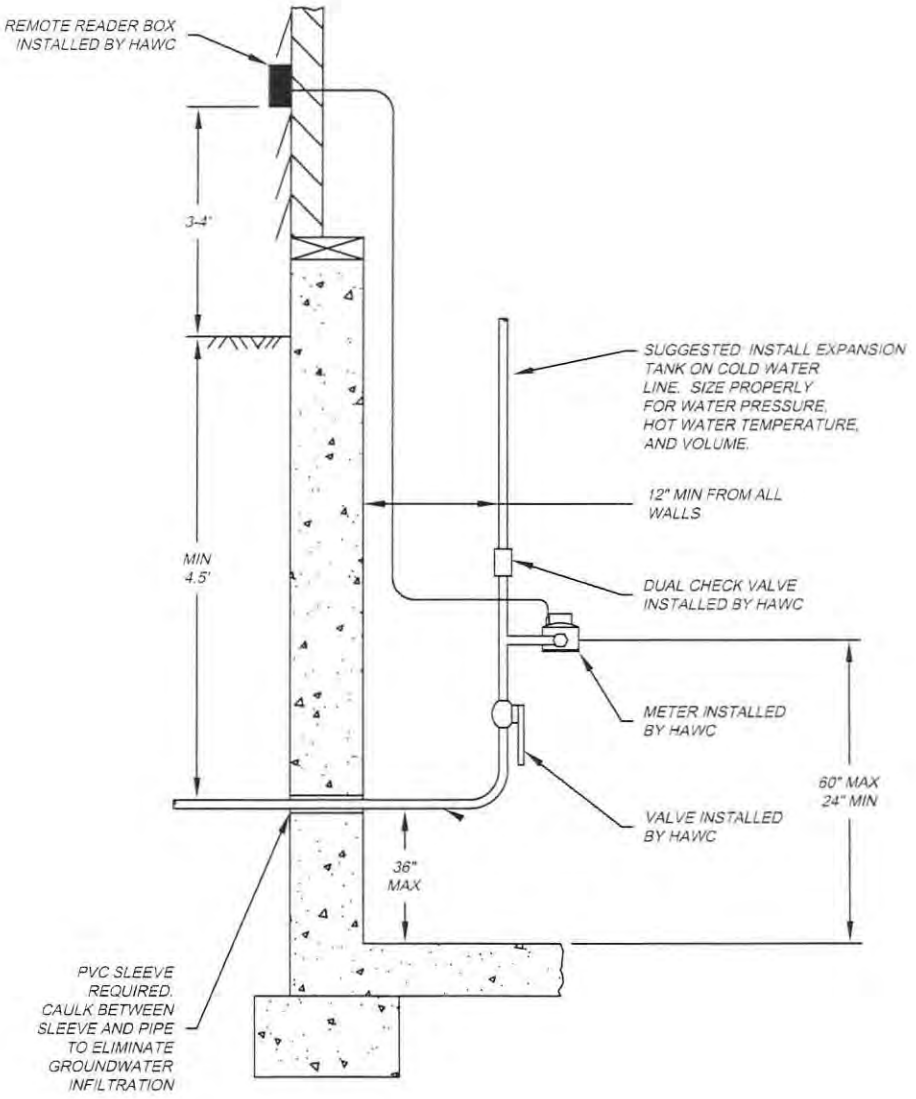
DETAIL D–1
TYPICAL TRENCH DETAIL
HAMPSTEAD AREA WATER COMPANY, INC.
REV: 8–11 SCALE: NTS



NOTES

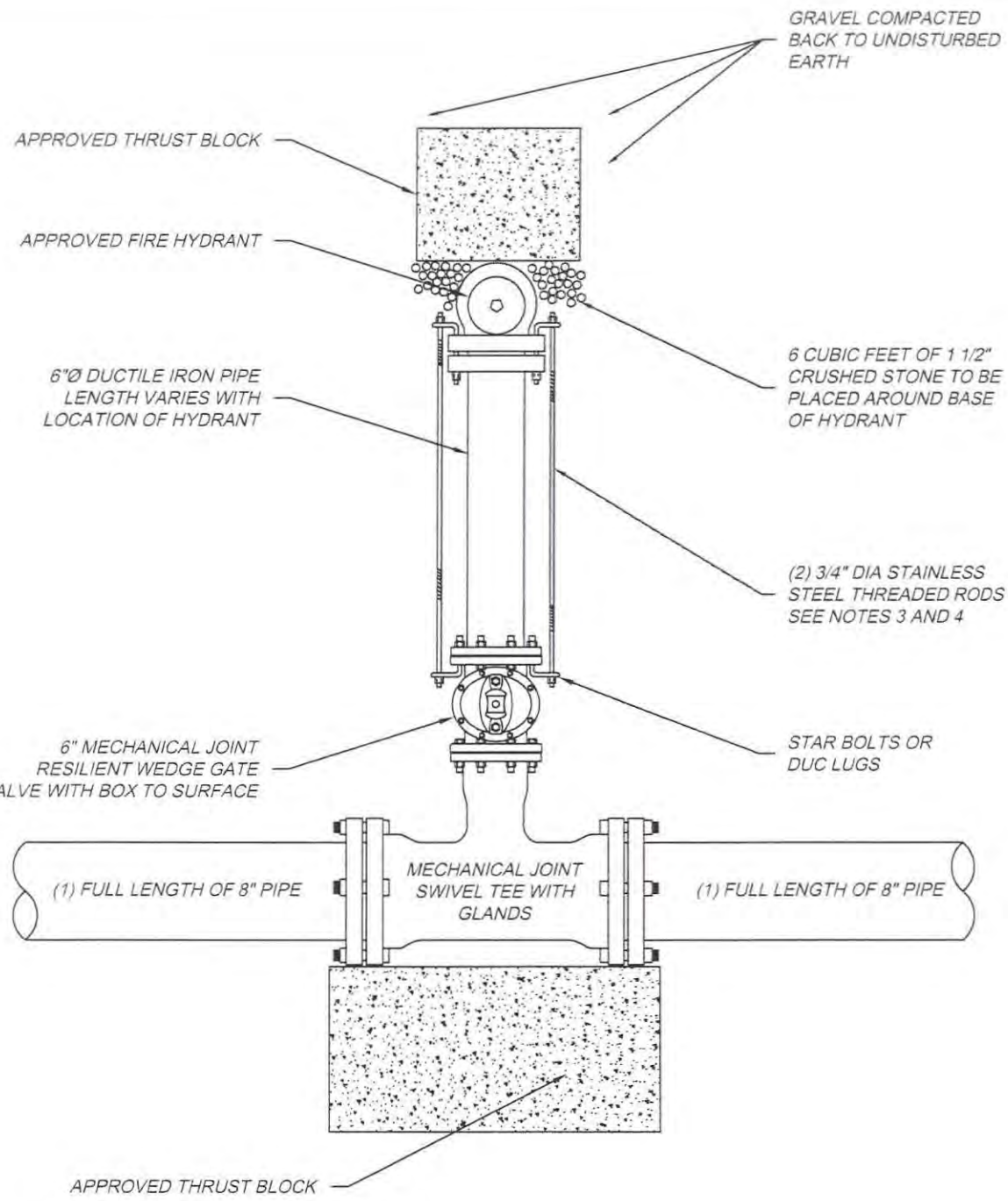
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO HAWC TECHNICAL SPECIFICATIONS.
2. ALL PIPE SHOULD HAVE A MINIMUM DEPTH OF 4.5' FROM TOP OF PIPE TO FINISH GRADE.
3. IF WATER MAIN IS PVC OR TRANSITE, A DOUBLE STAINLESS STEEL STRAP TAPPING SADDLE MUST BE USED TO CONNECT THE CORPORATION TO THE WATER MAIN.

DETAIL D-2
TYPICAL SERVICE INSTALLATION DETAIL
HAMPSTEAD AREA WATER COMPANY, INC.
REV: 3-07 SCALE: NTS



NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO HAWC SPECIFICATIONS

DETAIL D-3
TYPICAL SERVICE METER INSTALLATION
HAMPSTEAD AREA WATER COMPANY, INC.
REV: 3-07 SCALE: NTS



NOTES:

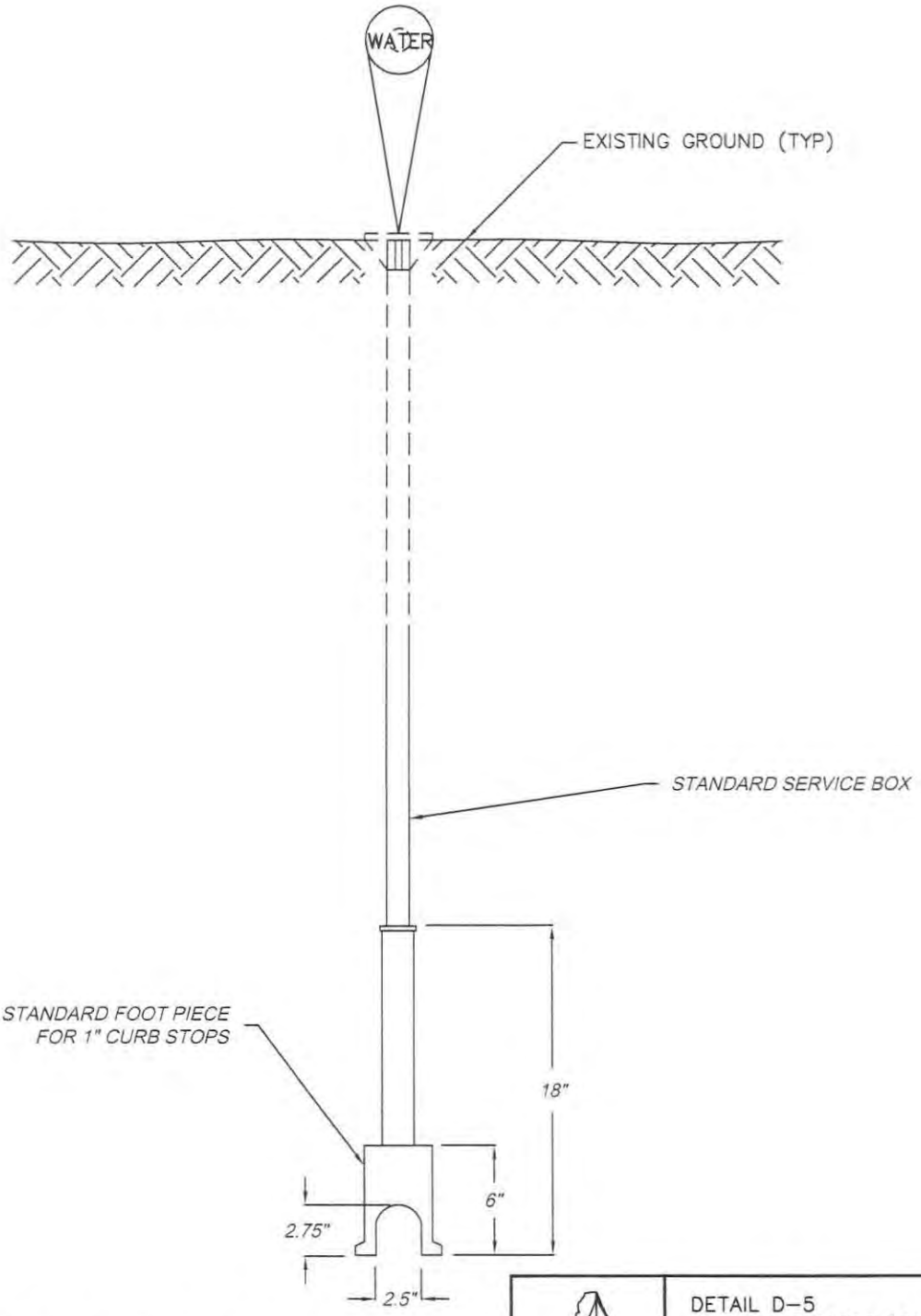
1. ALL MATERIAL AND INSTALLATION PROCEDURES WILL CONFORM TO HAWC TECHNICAL SPECIFICATIONS.
2. ALL PIPE SHOULD HAVE A MINIMUM DEPTHS OF 4.5' FROM TOP OF PIPE TO FINISH GRADE.

DETAIL D-4

TYPICAL HYDRANT INSTALLATION

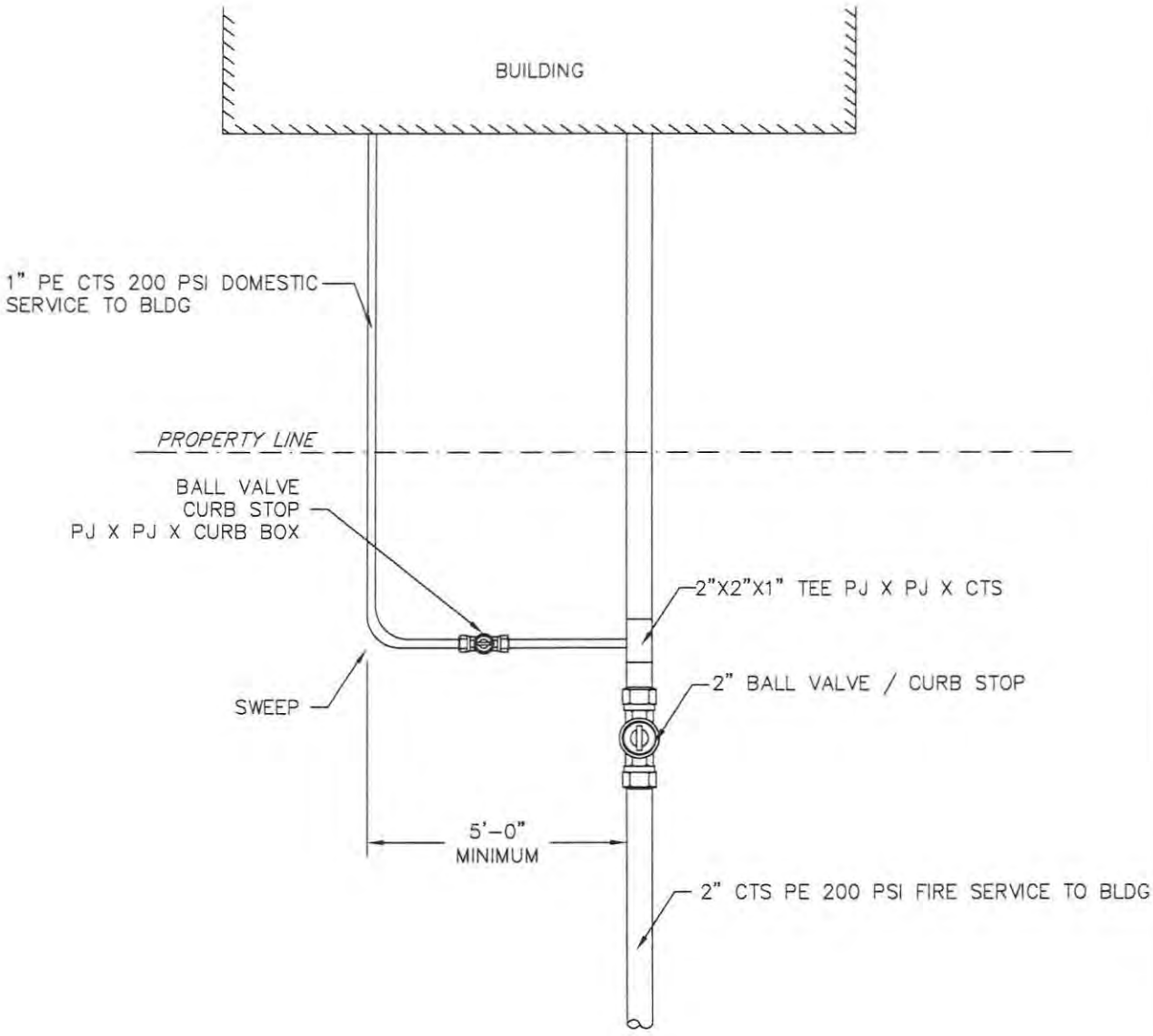
HAMPSTEAD AREA WATER COMPANY, INC.

REV: 3-07 SCALE: NTS



NOTE:
ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO HAWC TECHNICAL SPECIFICATIONS.

DETAIL D–5
TYPICAL SERVICE BOX DETAIL
IN NON–PAVED AREAS
HAMPSTEAD AREA WATER COMPANY, INC.
REV: 3–07 SCALE: NTS



NOTES:

1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO H.A.W.C. TECHNICAL SPECIFICATIONS.
2. ALL PIPE SHOULD HAVE A MINIMUM DEPTH OF 4.5' FROM TOP OF PIPE TO FINISH GRADE.

DETAIL D-6
TYPICAL DOMESTIC SERVICE TAPPED OFF FIRE SERVICE
HAMPSTEAD AREA WATER COMPANY, INC.
REV: 3-07 SCALE: NTS

Attachment 2

POTENTIAL ADDRESSES TO BE SERVICED

(subject to change)

1 Emery Drive
3 Emery Drive
4 Emery Drive
6 Emery Drive
9 Emery Drive
10 Emery Drive
11 Emery Drive
14 Emery Drive
16 Emery Drive
17 Emery Drive
6 Belknap Drive
12 Belknap Drive
14 Belknap Drive
12 Brookside Terrace
16 Brookside Terrace
18 Brookside Terrace
8 Oak Ridge Drive
18 Oak Ridge Drive

Attachment 3

WATER LINE EXTENSION
QUITCLAIM TRANSFER OF WATER UTILITY ASSETS

Whereas, the United States Environmental Protection Agency ("EPA") issued an Action Memorandum on June 10, 2012 authorizing a removal action for the New Hampshire Dioxane Site (the "Site"), located in Atkinson, New Hampshire, to provide a long-term domestic potable water supply to certain homes located within the Site; and

Whereas, EPA's contractors, and subcontractors have constructed a water line extension of the Hampstead Area Water Company ("HAWC") water distribution system, and HAWC has agreed to accept, own, and operate the completed project so as to provide domestic potable water to certain connected homes pursuant to the removal action:

EPA, located at 5 Post Office Square, Suite, 100, Boston, MA 02109-3912, in consideration of the agreement to operate the water system described below by HAWC, located at 54 Sawyer Avenue, Atkinson, New Hampshire, and other adequate consideration, does hereby assign and transfer to HAWC any and all its right, title and interest in and to all of the water line extension, specifically including the following assets:

PUC CODE	DESCRIPTION	CONTRACTORS PRICE
303	Easement Deed	$0.00
304	Pump House and Site Work	$0.00
304	Booster Pumping Station	$0.00
304	Electric service (equipment)	$0.00
307	Wells (drilling, Testing, engineering)	$0.00
309	Supply Mains (mains, manholes, pipes, trenching, backfill, valves etc. from pump house to wells	
	i. __4__inch x _____feet	$0.00
	ii _____inch x _____feet	$0.00
311	Pumping Equipment (Pumps, motors, pump house, plumbing, electric, switches, connectors, piping, valves etc)	$0.00
320	Water Treatment (filters etc)	$0.00
330	Distribution Storage (tanks, valves, standpipes, hydro tanks	$0.00
331	Transmission and Distribution mains	
	i._____" x _____ feet at $_____/foot	$0.00
333	Services (water lines to "curb stop" at customer's property line)	
	i._____customers x $ _____ per service	$0.00
334	Meters _____customers x _____ per customer	$0.00
335	_____Hydrants x $_____ per hydrant (includes installation)	$0.00

339	Miscellaneous [not otherwise included]	$0.00
Total		$0.00

To have and to hold the same unto HAWC and its assigns and successors forever

Dated_____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

_____ By:_____

Witness Duly authorized

Attachment 4

Return to:
Robert C. Levine, Esq.
Hampstead Area Water Company, Inc.
54 Sawyer Avenue
Atkinson, NH 03811

CUSTOMER'S ACKNOWLEDGMENT AND AGREEMENT REGARDING HIGH PRESSURE WATER SERVICE FORM

I (We) the undersigned, _____, have agreed to accept water service from the Hampstead Area Water Company, Inc. ("HAWC") at_____ _____, which was acquired by us, by deed dated _____ and recorded at Rockingham County Registry of Deeds, Book____ Page _____.

I (We) understand that HAWC's tariff for Water Service as approved by the New Hampshire Public Utilities Commission in addition to the most current version of the International Plumbing Code required that HAWC maintain a normal maximum operating pressure below 80 pounds per square inch gage ("psig") at the service entrance, before the meter under no flow conditions and;

I (We) understand that PUC 604.04 provides that in systems of widely varying elevations a utility may undertake to furnish a service which does not comply with the foregoing pressure and pressure variation specifications if the customer is fully advised of the conditions under which average service may be expected, and the customer's agreement secured in writing. Such agreement shall be binding on all future customers served at the same location under similar circumstances.

Finally, I (We) have been informed that the average water pressure for water service at __ _____ will be greater than the maximum pressure of 80 psig stipulated above.

I (We) hereby acknowledge and agree, in consideration for HAWC's rendering water service to me (us), that

I. Due to widely varying elevations in the HAWC distribution system and/or related pressure fluctuations during peak seasonal demand periods at and around the above location, the service furnished by HAWC may not comply with the foregoing specifications;

II. Service will be accepted on behalf of myself (ourselves), my (our) successors, heirs and assigns, notwithstanding the foregoing high operating pressures;

III. This form may, in the sole discretion of HAWC, be placed on record at the Rockingham County Registry of Deeds.

IV. I (We) Hereby waive and release all rights of action and claims for damage, injury or other loss which I (We) may now have or in the future have against HAWC and the U.S. Environmental Protection Agency as a result of said high operating pressures.

V. I (We) hereby agree to install a pressure reducing valve in accordance with the most current version of the International Plumbing Code and/or HAWC's tariff.

IN WITNESS WHEREOF, I (WE) have hereunto set my (our) hand(s) this _____day of _____, 20___.

_____ _____

Witness Name:

_____ _____

Witness Name:

STATE OF NEW HAMPSHIRE
COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me by _____ this _____ day of _____, 20___ , as my/our free act and deed.

_____

Justice of the Peace/Notary Public
my commission expires:

EXHIBIT 2

EMERY DRIVE EXTENSION

QUITCLAIM TRANSFER
OF WATER UTILITY ASSETS

Whereas, the United States Environmental Protection Agency ("EPA") issued an Action Memorandum on June 10, 2012 authorizing a removal action for the New Hampshire Dioxane Site (the "Site"), located in Atkinson, New Hampshire, to provide a long-term domestic potable water supply to certain homes located within the Site; and

Whereas, EPA's contractors, and subcontractors have constructed a water line extension of the Hampstead Area Water Company ("HAWC") water distribution system, and HAWC has agreed to accept, own, and operate the completed project so as to provide domestic potable water to certain connected homes pursuant to the removal action:

EPA, located at 5 Post Office Square, Suite, 100, Boston, MA 02109-3912, in consideration of the agreement to operate the water system described below by HAWC, located at 54 Sawyer Avenue, Atkinson, New Hampshire, and other adequate consideration, does hereby assign and transfer to HAWC any and all its right, title and interest in and to all of the water line extension, specifically including the following assets:

PUC CODE	DESCRIPTION	CONTRACTORS PRICE
303	Easement Deed	$0.00
304	Pump House and Site Work	$0.00
304	Booster Pumping Station	$0.00
307	Wells (drilling, Testing, engineering)	$0.00
309	Supply Mains (mains, manholes, pipes, trenching, backfill, valves etc. from pump house to wells	$0.00
311	Pumping Equipment (Pumps, motors, pump house, plumbing, electric,, connectors, piping, valves etc.)	$0.00
320	Water Treatment (filters etc.)	$0.00
330	Distribution Storage (tanks, valves, standpipes, hydro tanks)	$0.00
331	Transmission and Distribution mains i. 8", 6", and 4" piping	$1,163,000.00
333	Services (water lines to curb stop at each customer's property line)	$25,000.00
334	Meters 18 customers x $350.00 per customer	$6,300.00
335	Hydrants x $5.000.00 per hydrant (includes installation)	$30,000.00
339	Miscellaneous (not otherwise included)	$0.00
Total		$1,224,300.00

To have and to hold the same unto HAWC and its assigns and successors forever

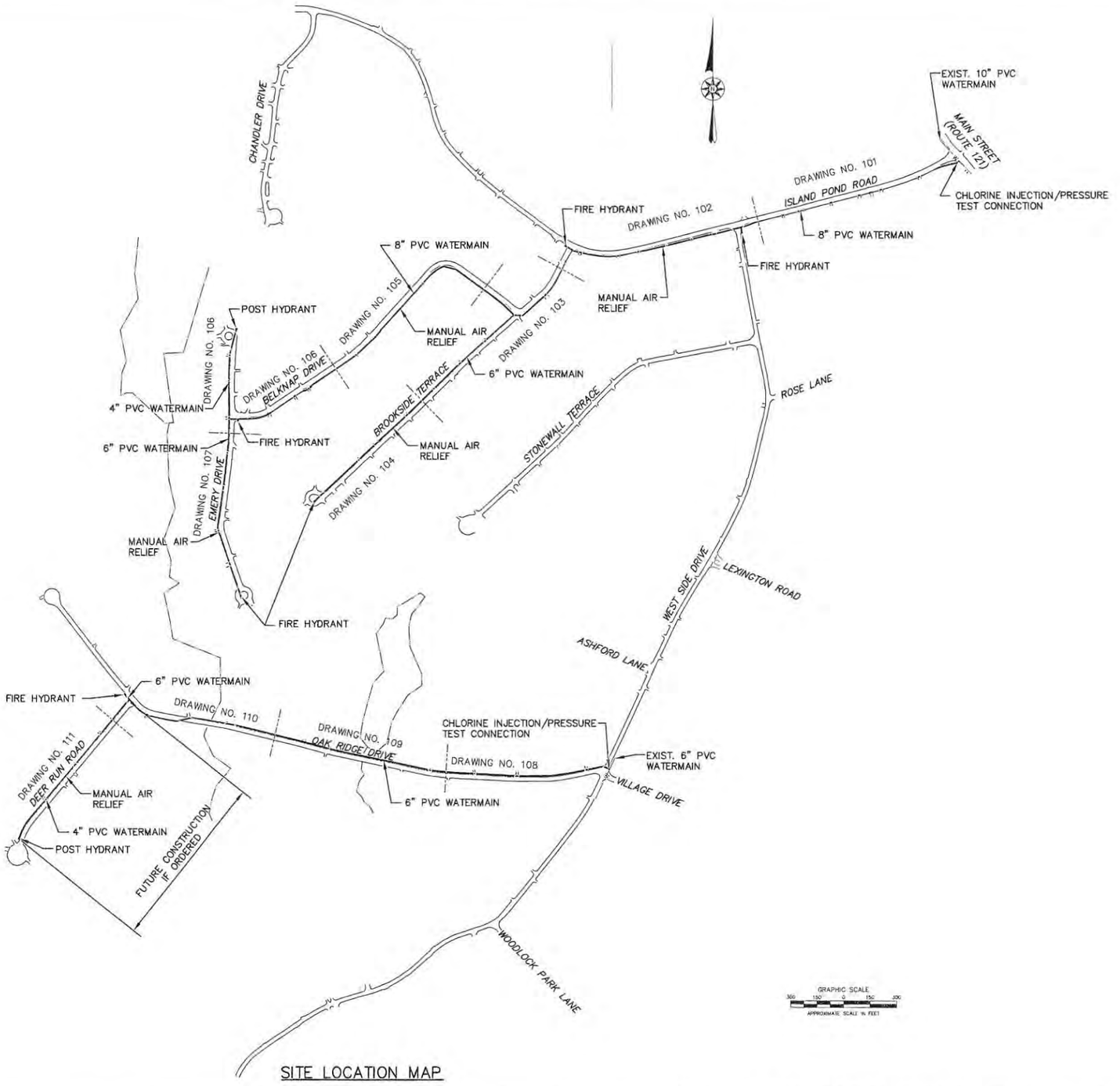
Dated_____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

_____ By:_____

Witness Duly authorized

F:\Legal\HAWC\Emery Drive Extension\Pleadings\Exhibit 2 Emery Dr Quitclaim Transfer 12-17-13.Docx



SITE LOCATION MAP

INDEX OF DRAWINGS

NO.	DATE	APPR.	REVISION
0	6/30/13	P.J.W.	ISSUED FOR PHASE 1 CONSTRUCTION

REMOVAL ACTION–WATERMAIN EXTENSION AND SERVICES
NH DIOXANE CONTAMINATION SITE–ATKINSON, NH
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 1
CONTRACT NUMBER EP–W–05–042
TASK ORDER NUMBER 0008

WESTON SOLUTIONS
CONCORD, NEW HAMPSHIRE

CHECKED:	L.J.B.	AUG 2013	CLIENT APPROVALS	DATE
DES. ENG:	T.A.C.	AUG 2013		
PROJ. ENG:	P.J.W.	AUG 2013		
PROJ. MGR:	E.D.A.	AUG 2013		
APPROVED				
APPROVED			ISSUED FOR	DATE

THE STATE OF NEW HAMPSHIRE
PETER J. WELCH
NO. 9691
LICENSED PROFESSIONAL ENGINEER

SITE LOCATION MAP AND INDEX TO DRAWINGS

DRAWN: TAC	DATE: JULY 2013	DRAWING NO: 002	REV. NO: 0
SCALE: AS SHOWN	W.O. NO: 20114.082.008	SHT.	OF

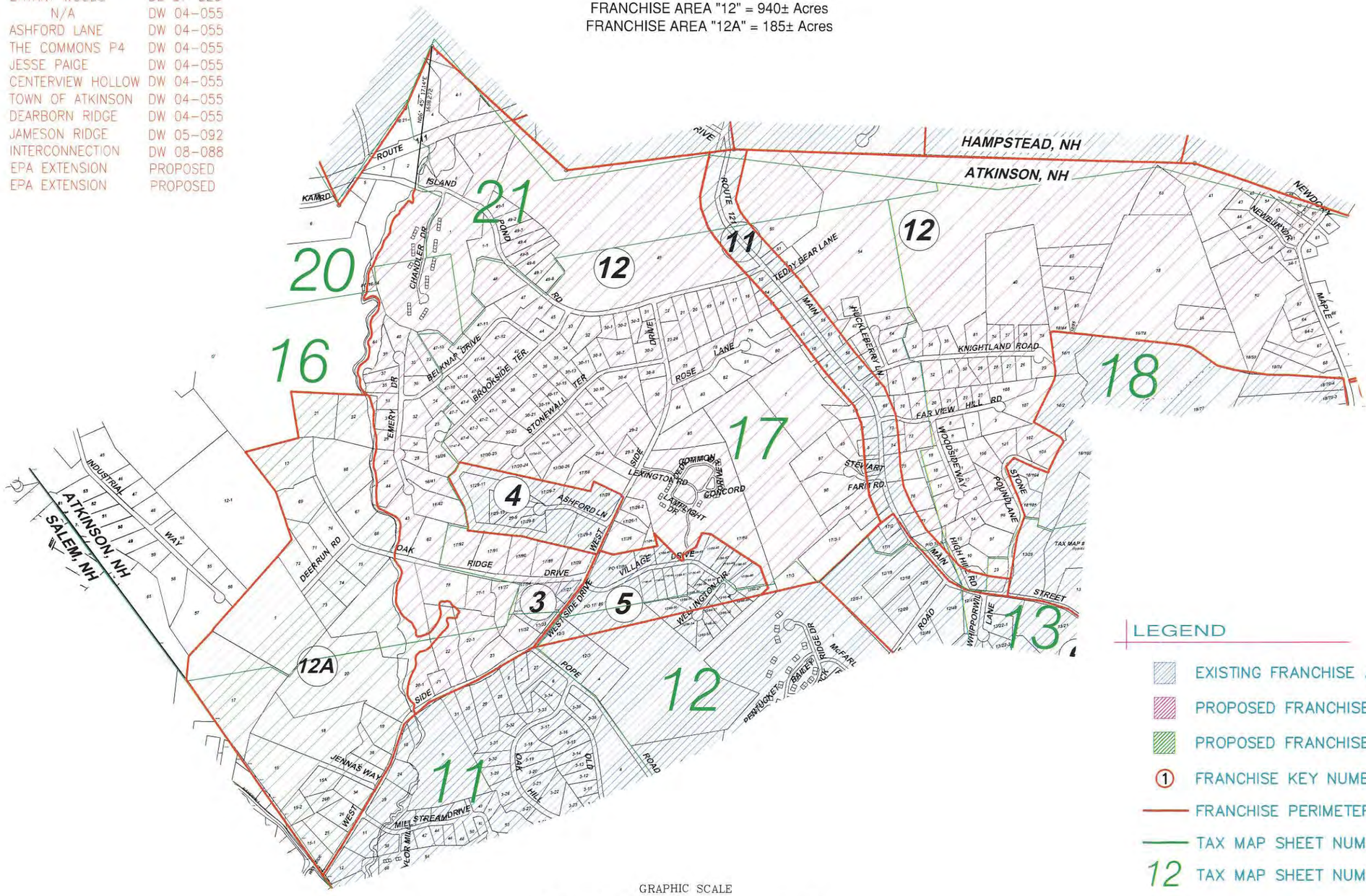
DRAWING PATH C:\Users\CHARLI~1.LEW\AppData\Local\Temp\AcPublish_8656\Franchise Mapping.dwg

PROPOSED ATKINSON FRANCHISE EXPANSION

PROPOSED NH DIOXANE SITE
FRANCHISE AREA "12" = 940± Acres
FRANCHISE AREA "12A" = 185± Acres

FRANCHISES

KEY #:	NAME:	FILE #:
1.	WALNUT RIDGE	DE 76-179
2.	BRYANT WOODS	DE 87-226
3.	N/A	DW 04-055
4.	ASHFORD LANE	DW 04-055
5.	THE COMMONS P4	DW 04-055
6.	JESSE PAIGE	DW 04-055
7.	CENTERVIEW HOLLOW	DW 04-055
8.	TOWN OF ATKINSON	DW 04-055
9.	DEARBORN RIDGE	DW 04-055
10.	JAMESON RIDGE	DW 05-092
11.	INTERCONNECTION	DW 08-088
12.	EPA EXTENSION	PROPOSED
12A.	EPA EXTENSION	PROPOSED



LEGEND

- EXISTING FRANCHISE AREA
- PROPOSED FRANCHISE AREA
- PROPOSED FRANCHISE AREA
- ① FRANCHISE KEY NUMBER
- FRANCHISE PERIMETER
- TAX MAP SHEET NUMBER BOUNDARY
- 12 TAX MAP SHEET NUMBER

Franchise Area

Area 12

Beginning at a point that is 200' West of Route 121 at the Town Line of Atkinson and Hampstead, thence running and turning Southerly along a line that is 200' West of Route 121 in Atkinson to the intersection with the Northern boundary of Tax Map 17, Lot 2; thence turning and running Southwesterly along the Northern boundaries of Tax Map 17, Lot 2, Tax Map 17, Lot 1, Tax Map 12, Lot 8-1 and then along the Southern boundary of Tax Map 17, Lot 3 and Tax Map 17, Lot 86 to a point at the Southwestern corner of Tax Map 17, Lot 86; thence turning and running along the Southwestern boundary of Tax Map 17, Lot 86 to the Eastern boundary of Tax Map 17, Lot 26-3; thence turning and running Southerly along the Eastern boundary of Tax Map 17, Lot 26-3 to at point at the Southwestern corner of said lot; thence turning and running Westerly along the Southern boundaries of Tax Map 17, Lot 26-3 and Tax Map 17, Lot 26 to the Eastern sideline of West Side Drive; thence turning and running Northerly along said West Side Drive to a point directly across from the Northeastern corner of Tax Map 17, Lot 29; thence turning and running directly across West Side Drive to said corner and continuing along the Northern boundaries of Tax Map 17, Lot 29 and Tax Map 17, Lot 29-7 to a point at the Northwestern corner of Tax Map 17, Lot 29-7; thence turning and running Southerly and then Easterly along the Western and then Southern boundaries of Tax Map 17, Lot 29-7 and Tax Map 17, Lot 29-5 to a point at the Southwesterly corner of Tax Map 17, Lot 29-5 and the Western sideline of West Side Drive; thence continuing on a straight line directly across to the Eastern sideline of West Side Drive; thence continuing Southerly along the Eastern sideline of West Side Drive to the intersection with Hogs Hill Brook; thence turning and running Northerly along the Eastern bank of said Hogs Hill Brook to the intersection with Island Pond Road; thence turning and running N 06° 45' 17" E at distance of 1,618.27 feet to a point at the Town Line between Atkinson and Hampstead; thence turning and running Easterly along the Town Line to the point of beginning.

And also as part of this Franchise,

Beginning at a point that is 200' East of Route 121 at the Town Line of Atkinson and Hampstead; thence turning and running Easterly along the Town Line to the intersection with Maple Avenue in Atkinson; thence turning and running along the Western sideline of Maple Avenue to the Southern boundary of Tax Map 18, Lot 70; thence turning and running Westerly along said Southern boundaries of Tax Map 18, Lot 70, Tax Map 18, Lot 50, Tax Map 18, Lot 78, Tax Map 18, Lot 85, and Tax Map 18, Lot 84 to the Eastern boundary of Tax Map 18, Lot 39; thence turning and running in a Southerly direction along said Eastern boundary of Tax Map 18, Lot 39, the terminus of Knightland Road, the Eastern boundaries of Tax Map 18, Lot 25, Tax Map 18, Lot 107; the Northeastern boundary of Tax Map 18, Lot 102; the Eastern boundary of Tax Map 18, Lot 103, and the terminus of Stone Pound Lane to a point at the Southern sideline of said Stone Pound Lane; thence turning and running along said Southern and Eastern sideline

of Stone Pound Lane to a point that is 200' North of the intersection with Main Street; thence turning and running Easterly and Northerly along a line that is 200' North and East of Main Street to the point of beginning.

Area 12A

Beginning at a point that is at the intersection of Hogs Hill Brook and the Southern sideline of West Side Drive; thence turning and running Southwesterly along said Southern sideline of West Side Drive to the intersection with the Town Line of Atkinson and Salem; thence turning and running Northwesterly along said Town Line to the Northwestern boundary of Tax Map 11, Lot 17; thence turning and running Northeasterly along said Northwestern boundaries of Tax Map 11, Lot 17; Tax Map 16, Lot 1, and Tax Map 16, Lot 72 to a point at the Western boundary of Tax Map 16, Lot 72; thence turning and running Northwesterly along the Western boundaries of Tax Map 16, Lot, 72, Tax Map 16, Lot 71, Tax Map 16, Lot 69, and Tax Map 16, Lot 13 to a point at the Westernmost corner of Tax Map 16, Lot 13; thence turning and running Easterly along the Northern boundary of Tax Map 16, Lot 13 to a point at the Southwesternmost corner of Tax Map 16, Lot 21; thence turning and running along the Western boundary of Tax Map 16, Lot 21 to a point at the Northwesternmost corner of Tax Map 16, Lot 21; thence turning and running along the Northern boundaries of Tax Map 16 Lot 21 and Tax Map 16, Lot 22 to the intersection with the Eastern bank of Hogs Hill Brook; thence turning and running Southerly along the Eastern bank of Hogs Hill Brook to the point of beginning.

Continuing Property Record

Classification Account **Transmission & Distribution Mains** **Number:** **331**

Unit Description: **Emery Drive Extension**
Atkinson, NH

Total Cost	1,163,000	Est. Cost of Removal		Est. Salvage	
Net Cost		Rate of Depreciation	2.00%	Est. Life in Yrs.	50
Date Acquired	2014	Yearly Depreciation	23,260.00	Est. Yr of Retire	

	Additions		Retirements		Balance		
Date	Units	Amounts	Units	Amounts	Units	Amounts	Remarks or Location
6/30/14		1,163,000				1,163,000	CIAC = 100%
TOTALS		**1,163,000**		**0.00**		**1,163,000**	

C:\Users\Judy\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\U25ZIEVQ\331 - Transmission Distribution Mains.xls

Continuing Property Record

Classification Account Services **Number:** 333

Unit Description:

Emery Drive Extension
Atkinson, NH

Total Cost	25,000.00	Est. Cost of Removal		Est. Salvage	
Net Cost		Rate of Depreciation	2.50%	Est. Life in Yrs.	40
Date Acquired	2014	Yearly Depreciation	625.00	Est. Yr of Retire	

	Additions		Retirements		Balance		
Date	Units	Amounts	Units	Amounts	Units	Amounts	Remarks or Location
6/30/14	18	25,000.00			25	25,000.00	CIAC = 100%
TOTALS		**25,000.00**		**0.00**		**25,000.00**	

Continuing Property Record

Classification Account **Meters** **Number:** **334**

Unit Description: **Emery Drive Extension**
Atkinson, NH

Total Cost	6,300.00	Est. Cost of Removal		Est. Salvage	
Net Cost		Rate of Depreciation	4.50%	Est. Life in Yrs.	10
Date Acquired	2014	Yearly Depreciation	630.00	Est. Yr of Retire	

Date	Additions		Retirements		Balance		Remarks or Location
	Units	Amounts	Units	Amounts	Units	Amounts	
6/30/14	18	6,300.00			18	6,300.00	(CIAC = 0)
TOTALS		**6,300.00**		**0.00**		**6,300.00**	

Continuing Property Record

Classification Account Hydrants **Number:** 335

Unit Description: Emery Drive Extension
Atkinson, NH

Total Cost	30,000.00	Est. Cost of Removal		Est. Salvage	
Net Cost		Rate of Depreciation	4.50%	Est. Life in Yrs.	52
Date Acquired	2014	Yearly Depreciation	576.92	Est. Yr of Retire	

	Additions		Retirements		Balance		
Date	Units	Amounts	Units	Amounts	Units	Amounts	Remarks or Location
6/30/14	6	30,000.00			6	30,000.00	(CIAC = 0)
TOTALS		**30,000.00**		**0.00**		**30,000.00**	

EXHIBIT 6

EMERY DRIVE EXTENSION

THE STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

IN THE MATTER OF

HAMPSTEAD AREA WATER COMPANY, INC.

PETITION TO EXPAND FRANCHISE, OPERATE WATER SYSTEM INSIDE OF THE NEW FRANCHISE AREA, ACQUISITION OF ASSETS AND APPROVAL OF THE APPLICATION OF EXISTING RATES

PRE-FILED TESTIMONY OF JOHN SULLIVAN

Q. Please state your name and business address:

A. John Sullivan, 54 Sawyer Avenue, Atkinson, New Hampshire.

Q. What is your present employment?

A. I am the controller for Lewis Builders Inc., employed as are most employees, by Lewis Builders Development, Inc., a wholly-owned subsidiary of Lewis Builders, Inc.

Q. As controller for Lewis, do your duties also include similar duties for Hampstead Area Water Company, Inc. ("HAWC")?

A. Yes.

Q. HAWC has submitted a ""Petition to Expand Franchise, Operate Water System Inside of the New Franchise Area, Acquisition of Assets and Approval of The Application of Existing Rates". Would you explain briefly what the purposes are for this petition?

A. Yes. There are basically three reasons for this petition. First, to seek the approval of the Commission for the expansion of the franchise in Atkinson. Secondly, to have the

Commission approve the acquisiti on of the system assets. Thirdly, to seek Commission approval for the application of the existing rates to the new franchise area.

Q. What is the proposed expansion of the system?

A. The proposed expansion requested would encompass the extension of the Atkinson-Hampstead core system in the Emery Drive area north of West Side Drive. It may also extend into the Deer Run Road area, as well. We will be acquiring that system extension from the EPA entirely as CIAC. The cost of the system being acquired is $1,224,300. The out of pocket cost to HAWC is $10,000, which represents the expenses incurred to file this petition.

Q. What are the system assets being acquired?

A. Those assets are listed on the Quitclaim Transfer, serving as the Bill of Sale, the Continuing Property Report, and the Project Cost Schedule, attached as Exhibits 2, 5 and 8 respectively.

Q. What are the rates proposed for the franchise area and how were they derived?

A. The existing tariff for the franchise area in Atkinson is our system wide rate, which is a base charge of $10.00 per month and a consumption charge of $5.02 per 100 cubic feet. We are requesting that the existing tariff be applied to the new franchise area.

Q. Does this conclude your testimony?

A. Yes.

EXHIBIT 7

EMERY DRIVE EXTENSION

STATE OF NEW HAMPSHIRE
THE NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

HAMPSTEAD AREA WATER COMPANY, INC

DW 14-

PETITION TO EXPAND FRANCHISE, OPERATE WATER SYSTEM INSIDE OF THE NEW FRANCHISE AREA, APPROVAL ACQUISITION OF ASSETS AND APPROVAL OF THE APPLICATION OF EXISTING RATES

PRE-FILED TESTIMONY OF HAROLD MORSE

Q. Please state your name, address and position with Hampstead Area Water Company, Inc.

A. My name is Harold Morse, of 54 Sawyer Avenue, Atkinson, NH and I am the President of Hampstead Area Water Company, Inc., (HAWC).

Q. Describe the overall history of HAWC?

A. HAWC is presently franchised in most areas of Hampstead and Atkinson, New Hampshire, and has franchised satellite systems in various towns in Rockingham County as per the Schedule A attached to the Petition.

Q. Why are you requesting a franchise expansion in Atkinson, New Hampshire?

A. We have been requested by the Environmental Protection Agency, (EPA) to provide water service to up to Thirty (30) homes north of West Side Drive along Emery Drive and Oak Ridge Drive as well as homes in the Deer Run Road area. The wells supplying these homes have been contaminated with 1,4-Dioxane and the EPA has contracted with an Emergency Response Company to construct the extension of our Atkinson-Hampstead core system to provide water service to these homes.

Q. Could you describe the new system extension that is being proposed and where it would be

located?

A. The system extension would serve up to Thirty (30) homes in Atkinson in the Island Pond Road, Emery Drive and Oak Ridge Drive area, as well as additional homes in the Deer Run Road area and would be 10,800 linear feet of 8" and 6" main. There will be 6 fire hydrants installed as part of this extension. The EPA has contracted with their Emergency Response Contractor (ERC) for the installation of the water system extension. The extension into part of Oak Ridge Drive and the Deer Run Road area is currently franchised by Pennichuck East. Pennichuck East has reviewed the Proposed Franchise Area 12A and has indicated it has no objection for that area to be ceded to HAWC. (See Exhibit 11). HAWC has contracted with the EPA, subject to Commission approval, for the acquisition of the system extension. HAWC will inspect the system extension construction and installation to see that the extension will be constructed according to HAWC specifications.

Q. Would this system be part of the core system for the Company?

A. Yes, it would be part of the Atkinson-Hampstead core system. HAWC will acquire the system and operate it. The system extension will be contributed by the EPA to HAWC as Contributions in Aid of Construction ("CIAC").

Q. Can you describe why the Company is requesting the area east of Route 121 to be part of this franchise area request?

A. Yes. Centerview Hollow Land Company, LLC, a related company to HAWC, has recently acquired a large tract of land for development, Tax Map 17, Lot 54. The Company has also received numerous requests for hookups in that area east of Route 121 since the water line interconnection.

Q. What is the present tariff charged by the Company?

A. The tariff for HAWC is a consolidated rate of $10.00 base charge per month with a consumption charge of $5.02 per 100 cubic feet of water consumed.

Q. Are you requesting that the consolidated rate be extended to the new proposed area should the Commission grant the proposed Franchise Areas 12 and 12A?

A. Yes.

Q. Where does the consolidated rate for HAWC come from?

A. The rate was established under DW-12-170 by Order number 25,519.

Q. Does this conclude your testimony?

A. Yes.

EXHIBIT 8

EMERY DRIVE EXTENSION

PROJECT COST SCHEDULE

PUC ACCOUNT	CONTRACTOR'S DESCRIPTION [Include machine and labor costs]	PRICE
303	Easement Deed	$0.00
304	Pump House and Site Work	$0.00
304	Booster Pumping Station	$0.00
307	Wells (drilling, Testing, engineering)	$0.00
309	Supply Mains (mains, manholes, pipes, trenching, backfill, valves etc. from pump house to wells	$0.00
311	Pumping Equipment (Pumps, motors, pump house, plumbing, electric,, connectors, piping, valves etc.)	$0.00
320	Water Treatment (filters etc.)	$0.00
330	Distribution Storage (tanks, valves, standpipes, hydro tanks)	$0.00
331	Transmission and Distribution mains i. 8", 6", and 4" piping	$1,163,000.00
333	Services (water lines to curb stop at each customer's property line)	$25,000.00
334	Meters 18 customers x $350.00 per customer	$6,300.00
335	Hydrants x $5.000.00 per hydrant (includes installation)	$30,000.00
339	Miscellaneous (not otherwise included)	$0.00
Total		$1,224,300.00

HAMPSTEAD AREA
WATER COMPANY, INC

54 SAWYER AVENUE, ATKINSON, NH 03811
TEL: 603.362.4299 FAX: 603.362.4936
www.hampsteadwater.com

January 17, 2014

Board of Selectmen
Town of Atkinson
21 Academy Avenue
Atkinson, NH 03811

Dear Board Members:

This letter is to advise you that the Hampstead Area Water Company, Inc. is filing a petition with the State of New Hampshire Public Utilities Commission to franchise a limited area in your town.

The purpose of the franchise area will be to serve Dioxane contamination site, along Emery Drive in Atkinson.

We request that the Board of Selectmen acknowledge, in writing, to the Public Utilities Commission that they have been duly notified of this proposed petition to franchise this limited area. We have provided a form which you can sign and mail in the enclosed stamped envelope.

By signing this letter you are **not** waiving any right to intervene, should you so desire, nor to appear before or take part in the franchise proceedings before the PUC, should you so desire, but are only acknowledging that we have notified you of this proposed franchised petition.

If you have any questions, please do not hesitate to call me at the above number at extension 113.

Very truly yours,

Robert C. Levine,
General Counsel

RCL/ja
encl.

F:\Legal\HAWC\Emery Drive Extension\Pleadings\Exhibit 09 Emery Dr Ltr To Atkinson Selectmen 01-17-14.Docx

TOWN OF ATKINSON

Deborah Howland
Public Utilities Commission
21 Fruit Street, Suite 10
Concord, New Hampshire 03301-2429

RE: Petition of Hampstead Area Water Company, Inc. for a water system extension to service homes along Emery Drive, in Atkinson, NH.

Dear Ms. Howland:

Please be advised that the Atkinson Selectmen have been notified of the proposed petition to acquire and operate a water system extension to serve the along Emery Drive, located in Atkinson, New Hampshire, which will consist of up to 30 homes, due to Dioxane contamination of the individual water wells of these homes.

Our address is 21 Academy Avenue, Atkinson, New Hampshire 03811, and our telephone number is 603-362-5266.

Dated:_____

Atkinson Board of Selectmen

By:_____

Title: _____

PENNICHUCK

25 MANCHESTER STREET
PO BOX 1947
MERRIMACK, NH 03054-1947
(603) 882-5191
FAX (603) 913-2305

WWW.PENNICHUCK.COM

SENT VIA EMAIL

December 26, 2013

Mr. Charles Lanza
Hampstead Area Water Company, Inc.
54 Sawyer Avenue
Atkinson, NH 03811

RE: Pennichuck East Franchise Area in Atkinson

Dear Charlie:

Pennichuck East Utility, Inc. agrees with the Hampstead Area Water Company that it is in the best interests of the customers in proposed Franchise Area 12A (the section of the attached map highlighted in green) for it to surrender this franchise area to the Hampstead Area Water Company.

If you have any questions regarding this letter please do not hesitate to contact me at (603) 913-2330.

Very truly yours,

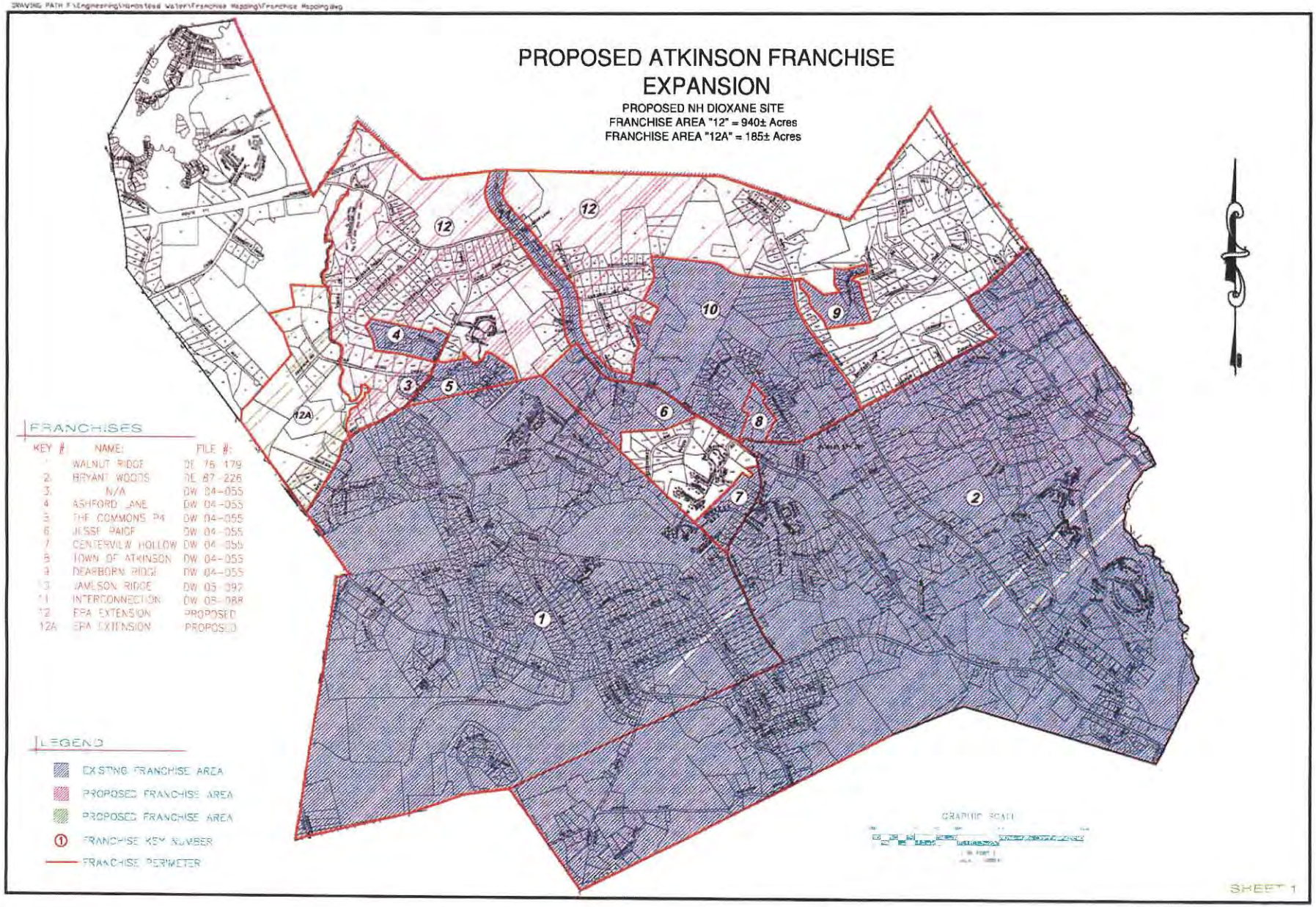
Donald L. Ware

Donald L. Ware, P.E.
Chief Operating Officer

DRAWING PATH F:\Engineering\Nonstead Water\Franchise Mapping\Franchise Mapping.dwg

PROPOSED ATKINSON FRANCHISE EXPANSION

PROPOSED NH DIOXANE SITE
FRANCHISE AREA "12" = 940± Acres
FRANCHISE AREA "12A" = 185± Acres



FRANCHISES

KEY #	NAME:	FILE #:
1	WALNUT RIDGE	DE 75-179
2	BRYANT WOODS	DE 87-226
3	N/A	DW 04-055
4	ASHFORD LANE	DW 04-055
5	THE COMMONS P4	DW 04-055
6	JESSE PAIGE	DW 04-055
7	CENTERVIEW HOLLOW	DW 04-055
8	TOWN OF ATKINSON	DW 04-055
9	DEARBORN RIDGE	DW 04-055
10	JAMESON RIDGE	DW 05-097
11	INTERCONNECTION	DW 05-088
12	EPA EXTENSION	PROPOSED
12A	EPA EXTENSION	PROPOSED

LEGEND

- EXISTING FRANCHISE AREA
- PROPOSED FRANCHISE AREA
- PROPOSED FRANCHISE AREA
- ① FRANCHISE KEY NUMBER
- FRANCHISE PERIMETER

GRAPHIC SCALE

SHEET 1