The City of Waltham

Invites
Interested Parties
To propose the best offer and or bid
For the service or product herewith described:

AREA 13 14B SEWER and MANHOLE REHABILITATION PROJECT (11 Streets)

The GENERAL BID is due: 10.00 AM Friday February 22, 2019

PRE BID Meeting and Briefing on Site: **10.00 AM Friday February 15, 2019**
(Meet in the Auditorium of 119 Scholl Street, Waltham)

LAST DAY FOR WRITTEN QUESTIONS: 12 Noon Monday February 18, 2018
(To Jpedulla@city.waltham.ma.us)

WEST END AREA 13/14-B-1

SEWER AND MANHOLE REHABILITATION (11 Streets)

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SEWER AND MANHOLE REHABILITATION

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Mayor's letter

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DIVISION 0

SECTION 00010

INVITATION TO BID

West End Area 13/14-B-1 Sewer and Manhole Rehabilitation Project, (11 Streets)

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the **West End Area 13/14-B-1 Sewer and Manhole Rehabilitation Project, (11 Streets)** will be received by Joseph Pedulla, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **10:00 a.m., February 22, 2019** at which time and place all bids will be publicly opened and bids read aloud. Bids submitted after this time will not be accepted. The project involves the following major items:

1. Furnishing and installing new sanitary sewer pipes including the following components:
   a. Gravity sanitary sewers
   b. Sewer service laterals
   c. Sewer manholes
   d. Removal and disposal or abandonment of existing sewer manholes, sewers and laterals
   e. Disposal of demolition and excess materials
   f. Trench dewatering
   g. Excavation and backfill
   h. Post-CCTV inspections of new sanitary sewer pipes.
   i. Appurtenant work.
2. Existing flow management and bypass pumping for installation of new sanitary sewer pipes and manholes. The existing sanitary sewer pipes diameters range from 6-inches to 24-inches.
3. Inspection of certain sewer pipes and sewer manholes. This includes locating and raising frame and cover to grade. Refer to Tables 1 and 2 below and Appendix B.
4. Sewer system pipe and manhole rehabilitation and replacement. Refer to Tables 3 and 4 below and Appendices A and C.
5. Locating and replacing certain sanitary sewer services.
6. Testing of sanitary sewer pipes and manholes for proper installation and performance.
7. Locating and replacing certain water services.
8. Testing and disinfecting water services for proper installation and performance.
9. Sump pump discharge relocation.
10. Site work including curbing and landscaping.
11. Pavement restoration work including daily temporary paving; permanent trench paving; sidewalk and driveway paving; and full-width mill and overlay. Refer to Table 5 for the roadway restoration per street. Refer to the Figure in Appendix E for paving limits for project area.
12. Other miscellaneous work shown in the Specifications for a complete and operational system.

Contract Documents may be obtained by visiting the City's web site at www.city.waltham.ma.us/bids after January 31, 2019.

PRE-BID CONFERENCE will be held **10 AM February 15, 2019.** Meet in the auditorium of 119 School Street.

BID SECURITIES shall be in amount of 5% of the bid and in the form of a certified check drawn upon a bank within the State of Massachusetts or a bid bond executed by a surety company authorized to do business in Massachusetts, made payable to the **OWNER**.

The successful bidder must furnish a 100% **PERFORMANCE** and **PAYMENT BOND** and will be required to execute the Contract Agreement within five (5) days following notification of the acceptance of his Bid. The **OWNER** reserves the right to reject any or all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items deemed advisable for the best interests of the **OWNER**. The award of the contract may be contingent upon the appropriation of funds from City Council Meeting. All costs associated with the preparation of the bids shall be the responsibility of the bidder, regardless of whether or not the Contract is award.

END OF SECTION

Section 00 10 00

INSTRUCTIONS FOR BIDDERS

1. READ ALL DOCUMENTS.

   Bidders should familiarize themselves with all the documents contained herein; it is mandatory that all Bids be in compliance with all the provisions contained in said documents.

2. FORMS AND ATTACHMENTS.

   Bids are to be completed on the forms provided ONLY and enclosed in a sealed envelope marked on the outside "BID (title)" and the name and address of bidder. Attachments submitted in addition to the Waltham Purchasing Department produced forms may not be considered.

3. PRINTED OR TYPED RESPONSE.

   All information must be typewritten or printed in ink, including the price the bidder offers in the space as provided on the bid form.

4. CORRECTIONS.

   Bids that are submitted containing cross outs, white outs or erasures, will be rejected. All corrections or modifications to the original bid are to be submitted in a separate envelope, properly marked on the outside, "CORRECTION/ MODIFICATION TO BID (title)" and submitted prior to the bid opening.

   ALL DOCUMENTS SUBMITTED WITH YOUR RESPONSE MAY BE INCORPORATED INTO THE CONTRACT.

5. PRICE IS ALL INCLUSIVE.

   Bid prices shall encompass everything necessary for furnishing all items, materials, supplies or services as specified, and in accordance with the specifications, including proper packing, cost of delivery, and in the case of services, completion of same, as per specifications.

6. PRICE DISCREPANCY.

   In the event of a discrepancy between the Unit Price and the Extension, the Unit Price shall prevail.

7. EXCEPTIONS

   No Exceptions will be acceptable to the City. The City's intent is to purchase precisely what is specified in the document.

8. BID DEPOSITS.

   Bid deposits are to be made payable to the City of Waltham. In the event that the successful bidder fails to execute a Contract within (10) days of the receipt of said contract, such security shall be retained by the city as liquidated damages. Unsuccessful bidders' deposits will be returned immediately following the award to said successful bidder.

9. WITHDRAW.

   A Bid may be withdrawn by written request prior to the schedule for the Bid Opening. No withdrawals are permitted after the bid opening date and time. Withdrawals after the bid opening date will cause the forfeit of the bid Deposit.

10. AWARD.

    Bids will be awarded not later than (90) ninety days after the scheduled bid opening date, unless otherwise stated, in the specifications. Unless otherwise specified, bids will be evaluated on the basis of, completeness of your RFP response, responsiveness, responsibility, best price and experience.

11. AWARD CRITERIA.

    Qualified and responsive proposals will be evaluated based on the following rating, which will apply to all Price, Technical, Experience and Compliance requirements.

12. DISCOUNTS.

    Discounts for prompt payments, based on City Pay Day, will be considered when making awards.

13. TAX EXEMPT.

    Purchases by the City of Waltham is exempt from any Federal, State or Massachusetts Municipal Sales and/or Excise Taxes.

14. SAMPLES.

    The Waltham Purchasing Department may require the submission of samples either before or after the awarding of a contract. Samples are to be submitted, at no charge to the City, so

as to ascertain the product's suitability. If specifically stated in the Bid that samples are required, said samples must be submitted with the Bid prior to the Official Bid Opening. Failure to submit said samples would be cause for rejection of Bid. All samples must be called for and picked up within (30) thirty days of award or said samples will be presumed abandoned and will be disposed of.

15. ACTIVE VENDOR LIST.

    Vendors who wish to remain on the Active Bid List must either submit a Bid, No Bid, or a letter requesting same, no later than the Official Bid Opening. This is applicable to those vendors who have received the Invitation to Bid.

16. FUNDS APPROPRIATION.

    The contract obligation on behalf of the City is subject to prior appropriation of monies from the governmental body and authorization by the Mayor.

17. THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.

18. THE TAX ATTESTATION CLAUSE, CERTIFICATION OF NON-COLLUSION AND THE CORPORATION INFORMATION, are an integral part of the Invitation for Bid and must be completed and signed by the person submitting the Bid, or by the person/persons who are officially authorized to do so.

19. STANDARD OF QUALITY.

    Where, in the specifications, one certain kind, type, catalog number, brand or manufacturer of material is named, it shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal and the Bidder may select one or the other. If the Bidder proposes to offer a substitute as an equal, he shall so indicate on the Bid Form, the kind, type, catalog number, brand, or manufacturer of material that is offered as an equal, and describe where it differs from the specifications. Substituted items must be capable of performing all the functions and/or operational features described or indicated in

the specifications. Failure to indicate the description of any substitute item on the Bid will be interpreted to mean that the Bidder will furnish the item or service as specified.

20. MODIFICATION.

No agreement, understanding, alteration or variation of the agreement, terms or provisions herein contained shall bind the parties, hereto unless made and executed in writing by the parties hereto.

21. ASSIGNMENT.

The final payment for work done under this Contract shall be made only after the Contractor has signed a statement under the penalty of perjury, certifying that he has completed the work described in the final estimate. Neither party hereto shall assign this Contract or sublet it in part or as a whole without the prior written consent of the other party hereto. The Contractor shall not assign any sum or sums due or becoming due to him hereunder without the prior written consent of the City.

22. DELIVERIES*:*

a) The Contractor shall pay all freight and delivery charges. The Waltham Purchasing Department does not pay for shipping and packaging expenses. Items must be delivered as stipulated in the specifications. All deliveries must be made to the inside of city buildings. Sidewalk deliveries will not be accepted. City personnel are not required to assist in the deliveries and contractors are cautioned to notify their shippers that adequate assistance must be provided at the point of delivery, when necessary.

b) All items of furniture must be delivered inside the building, set up, in place and ready for use. Deliveries are to be made between the hours of 8:30 a.m. and 3:00 p.m., Monday through Friday, except on holidays.

c) All damaged items, or items which do not comply with specifications will not be accepted and title therefore will not vest to the Waltham Purchasing Department until such items are accepted and signed for, in good order, by the receiving department.

d) The contractor must replace, without further cost to the Waltham Purchasing Department, such damaged or non-complying items before payment will be made.

23. LABELING.

All packages cartons or other containers must be clearly marked with (a) building and room destination; (b) description of contents of item number from specifications; (c) quantity; (d) City of Waltham Purchase Order Number and (e) Vendor's name and order number.

24. GUARANTEES.

Unless otherwise stipulated in the specifications, durable items and installation shall be guaranteed by the contractor for a period of not less than one year from the date of delivery and acceptance by the receiving department. In addition, the manufacturer's guarantee shall be furnished. Any items provided under this contract which are or become defective during the guarantee period shall be replaced the contractor free of charge with the specific understanding that all replacements shall carry the same guarantee as the original equipment. The contractor shall make such replacement immediately upon receiving notice from the Purchasing Agent.

25. SINGLE VENDOR.

The Waltham Purchasing Department desires to award a single contract based on the Grand Total Price. However, where applicable, the City reserves the right to make multiple awards on a unit price basis if, in the opinion of the Waltham Purchasing Department, it is in the best interest of the Waltham Purchasing Department.

26. BEST AND FINAL OFFER.

The Waltham Purchasing Department reserves the right to request best and final offers from one or more bidders. Best and final offer will be exercised should the CPO deem it is in the best interest of the Waltham Purchasing Department in order to obtain the best value.

27. BALANCED BIDDING (if Applicable)

Bids should be made on each separate item of work shown in the BID with reasonable relation to the probable cost of doing the work included in such items, and the right is reserved to reject wholly any Bid where an item or items thereof are obviously unbalanced or appear to the CITY to be so unbalanced as to affect or to be liable to affect adversely any interests of the CITY. The attention of the Bidder is called to the fact that unbalancing of Bids may adversely affect the CONTRACTOR if certain portions of the work are increased or decreased.

28. ORIGINAL SIGNATURES

Where a signature is required in the bid documents, the vendor is required to place an original “wet” signature .The Certificate of Vote Authorization, Certificate of Non Collusion Certificate, Tax Compliance Certificate, Debarment Certification, Notary Public Certification and the Bid Form (price form) MUST bear an original “Wet” signature by the authorized corporate officer. Electronic signatures are not allowed or accepted.

29. PRINTING AND ASSEMBLY BID SUBMISSION

Bid responses shall be submitted in single page printing format. No double sided printing is accepted by the City. The response binding shall be with an appropriately sized clip binder. No staples, no metal or plastic binding is accepted.

30. TERMINATION FOR CONVENIENCE

The City of Waltham may, in its sole discretion, terminate all or any portion of this Agreement or the work required hereunder, at any time for its convenience and/or for any reason by giving written notice to the Contractor thirty (30) calendar days prior to the effective date of termination or such other period as is mutually agreed upon in advance by the parties.

If the Contractor is not in default or in breach of any material term or condition of this Agreement, the Contractor shall be paid its reasonable, proper and verifiable costs up to the of termination to the extent previous payments made by the City of Waltham to the Contractor have not already done so. Such payment shall be the Contractor's sole and exclusive remedy for any Termination for Convenience, and upon such payment by the City of Waltham to the Contractor, the City of Waltham shall have no further obligation to the Contractor.

The City of Waltham shall not be responsible for the Contractor's anticipatory profits or overhead costs attributable to unperformed work.

Section 00 20 00

Compliance

The documents in this section shall bear "wet" Original signatures and returned with your bid

Compliance

The compliance documents in this section must be completed, signed and returned **with your bid package**.

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

Check when Complete

- Non-collusion form and Tax Compliance form…… _____
- Corporation Identification Form…….. _____
- Certificate of Vote Authorization…….. _____
- Certificate of Insurance (showing all limits of WC &GL)..... _____
- Three (3) References…… _____
- 5% Bid Bond or Certified Check>..... _____
- Debarment Certificate …….. _____
- Prevailing Wage Certificate……. _____
- Right-to-know Law…… _____
- OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149) _____

Before the commencement of the Job, the contractor must provide to the above office:

- Performance and Payment Bonds **each** for 100% of the contract value and naming the City of Waltham

Your Company's Name: _____

Service or Product Bid_____

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

_____, _____
(Signature of person signing bid or proposal) Date

_____
(Name of business)

Wet Signature Required

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, & 49A,I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____, _____
Signature of person submitting bid or proposal Date

_____
Name of business

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

I _____, Clerk of_____hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the_____day of_____at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That _____(*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seat, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that_____ is duly elected/appointed_____ _____of said corporation

SIGNED:

(Corporate Seal)

_____

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of_____ **Date:**

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me,_____

Notary Public;

My Commission expires: _____

Wet Signature Required

CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

If a Corporation:

Incorporated in what state _____
President _____
Treasurer _____
Secretary _____
Federal ID Number_____

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?
Yes _____, No _____

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

If a Partnership: (Name all partners)
Name of partner _____
Residence _____
Name of partner _____
Residence _____

If an Individual:
Name _____
Residence _____

If an Individual doing business under a firm's name:
Name of Firm _____
Name of Individual _____
Business Address _____
Residence _____
Date _____

Name of Bidder _____
By _____
Signature
_____
Title
_____
Business Address (POST OFFICE BOX NUMBER NOT ACCEPTABLE)
_____
State Telephone Number Today's Date

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

1. Company Name:
   Address:
   Contact Name:
   Phone #
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

2. Company Name:
   Address:
   Contact Name:
   Phone #
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

3. Company Name:
   Address:
   Contact Name:
   Phone #
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

WEEKLY PAYROLL RECORDS REPORT &
STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided, A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of his or her weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those reports for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

_____

STATEMENT OF COMPLIANCE

_____, 200____

I_____, _____
(Name of signatory party) (Title)

I do hereby state that I pay or supervise the payment of the persons employed by

_____ on the_____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature_____, Title _____

Print_____

WEEKLY PAYROLL REPORT FORM

Company Name: _____

Project Name: _____

Awarding Auth.: _____

Work Week Ending: _____

☐ Final Report

☐ Prime Contractor

☐ Subcontractor
List Prime Contractor: _____

Employer Signature: _____

Print Name & Title: _____

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A*F] Weekly Total Amount
		S	M	T	W	T	F	S			(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.		

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

Wet Signature Required

RIGHT TO KNOW LAW

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature **Date**

Print Name

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name _____

Address _____

City _____, **State**_____, **Zip Code** _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

_____

Print name _____,

Date _____

Wet Signature Required

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than $10,000.00 have successfully completed a course in construction safety and health approved by the **United States Occupational Safety and Health Administration** that is at least **10 hours** in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date_____

See Chapter 306 of the Acts of 2004

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

SECTION 00310

BID FORM

PROJECT IDENTIFICATION:	West End Area 13/14-B-1 Sewer and Manhole Rehabilitation (11 Streets)
THIS BID IS SUBMITTED TO:	City of Waltham Purchasing Department
	Attn: Joseph Pedulla, Chief Procurement Officer
	Waltham City Hall
	610 Main Street
	Waltham, Massachusetts 02452

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to the Owner, as identified above.

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 30 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	**Addendum, Date**
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

K. That all, the Contract Documents as prepared by Wright-Pierce, 600 Federal Street, Suite 2151, Andover, MA 01810 and revised January 2019 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

L. The undersigned agrees that, if selected as general contractor, he/she will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price.

M. The time period for holding bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids.

N. The Bid Security accompanying this Bid shall be in the amount of 5 percent of the Bid. The Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid.

O. If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within ninety days, excluding Saturdays, Sundays, and legal holidays after the actual date of the opening of the General Bids, the undersigned will within five days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. The premiums for all Bonds required shall be paid by CONTRACTOR and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of OWNER if the Bidder fails to execute the Agreement as stated above.

P. The undersigned agrees that extra work, if any, will be performed in accordance with Contract and will be paid for in accordance with the Contract.

Q. In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the work in its entirety in the manner and under the conditions required.

R. The undersigned must furnish a 100 percent Performance Bond and a 100 percent Payment Bond with a surety company acceptable to OWNER.

S. Where indicated for amounts to be shown in both words and figures, in case of discrepancy, the amount shown in words shall govern.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

E. Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

F. The undersigned hereby certifies that he/she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

G. The undersigned bidder hereby certifies he/she will comply with the specific affirmative action steps contained in the equal employment opportunity/affirmative action (EEO/AA) provisions of this contract, including compliance with the disadvantaged business enterprise provisions as required under these contract provisions. The contractor receiving the award of the contract shall incorporate the EEO/AA provisions of this contract into all subcontracts and purchase orders so that such provisions will be binding upon each subcontractor or vendor.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

UNIT PRICE SCHEDULE

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
Sanitary Sewer Work				
1	50 LF	6-inch PVC Sanitary Sewer Pipe, all depths The sum of $_____ _____ Per Linear Foot	$_____	$_____
2	4,300 LF	8-inch PVC Sanitary Sewer Pipe, all depths The sum of $_____ _____ Per Linear Foot	$_____	$_____
3	75 LF	10-inch PVC Sanitary Sewer Pipe, all depths The sum of $_____ _____ Per Linear Foot	$_____	$_____
4	450 LF	24-inch PVC Sanitary Sewer Pipe, all depths The sum of $_____ _____ Per Linear Foot	$_____	$_____

5	2,750 LF	Sanitary Sewer Service Connection, all diameters The sum of $_____ $_____ Per Linear Foot	$_____	$_____
6a	450 VF	4-foot Diameter Manhole for Sewer or Drain The sum of $_____ $_____ Per Vertical Foot	$_____	$_____
6b	50 VF	5-foot Diameter Manhole for Sewer or Drain The sum of $_____ $_____ Per Vertical Foot	$_____	$_____
7	75 VF	Inside Manhole Drop Connection The sum of $_____ $_____ Per Vertical Foot	$_____	$_____
8	100 VF	Sewer or Drain Structure Rebuild or Remodel The sum of $_____ $_____ Per Vertical Foot	$_____	$_____

9	10 EA	Catch Basin – Replace Frame and Grate The sum of $_____ _____ Per Each	$_____	$_____
10	10 EA	Catch Basin – Replace Curb Inlet, Frame and Grate The sum of $_____ _____ Per Each	$_____	$_____
11	1 LS	Temporary Sewer Bypass Pumping The sum of $_____ _____ Per Lump Sum	$_____	$_____
Manhole Rehabilitation				
12	5 EA	Manhole – Seal Frame The sum of $_____ _____ Per Each	$_____	$_____
13	10 EA	Manhole – Point Repair of Chimney The sum of $_____ _____ Per Each	$_____	$_____

14	8 EA	Manhole – Point Repair of Wall The Sum of $_____ _____ Per Each	$_____	$_____
15	5 EA	Manhole – Point Repair of Bench The sum of $_____ _____ Per Each	$_____	$_____
16	10 EA	Manhole – Replace Frame and Cover The sum of $_____ _____ Per Each	$_____	$_____
17	6 EA	Manhole – Remove Cross Bore The sum of $_____ _____ Per Each	$_____	$_____
18	5 EA	Manhole – Clean The sum of $_____ _____ Per Each	$_____	$_____

19	50 VF	Manhole – Line The sum of $_____ $_____ Per Vertical Foot	$_____	$_____
20	100 VF	Manhole – Grout The sum of $_____ $_____ Per Vertical Foot	$_____	$_____
21	5 EA	Manhole – Root Removal The sum of $_____ $_____ Per Each	$_____	$_____
Sanitary Sewer Pipe Rehabilitation				
22	30 EA	Sanitary Sewer Pipe – Root Removal (per joint) The sum of $ _____ Per Each Joint	$_____	$_____
23	5 EA	Sanitary Sewer Pipe – Point Repair Replace 5’ to 10’ The sum of $_____ $_____ Per Each	$_____	$_____

24	5 EA	Sanitary Sewer Pipe – Cut Intruding Lateral The sum of $_____	$_____	$_____
		Per Each Joint		
25	1,250 LF	Sanitary Sewer Pipe – Line (Less than 18" Diameter) The sum of $_____	$_____	$_____
		Per Linear Foot		
26	600 LF	Sanitary Sewer Pipe – Line (18" Diameter and Greater) The sum of $_____	$_____	$_____
		Per Each		
27	80 EA	Reinstatement of Sewer Services after Lining The sum of $_____	$_____	$_____
		Per Each		
28	5 EA	Sanitary Sewer Pipe – Grout The sum of $_____	$_____	$_____
		Per Each		

29	5 EA	Inspection of Manhole, all depths The sum of $_____ $_____ Per Each	$_____	$_____
30	1,500 LF	CCTV Inspection of Sanitary Sewer Pipes, all diameters The sum of $_____ $_____ Per Linear Foot	$_____	$_____
31	600 LF	Pipe Heavy Cleaning, all diameters The sum of $_____ $_____ Per Linear Foot	$_____	$_____
Water Work				
32	2,000 LF	1-inch Diameter Copper Service Pipe The sum of $_____ $_____ Per Linear Foot	$_____	$_____
33	150 LF	2-inch Diameter Copper Service Pipe The sum of $_____ $_____ Per Linear Foot	$_____	$_____

34	30 EA	1-inch Diameter Corporation Stop The sum of $_____ $_____ Per Each	$_____	$_____
35	5 EA	2-inch Diameter Corporation Stop The sum of $_____ $_____ Per Each	$_____	$_____
36	30 EA	Abandoning Existing Corporation Stop The sum of $_____ $_____ Per Each	$_____	$_____
37	50 EA	1-inch Diameter Curb Stop and Box The sum of $_____ $_____ Per Each	$_____	$_____
38	5 EA	2-inch Diameter Curb Stop and Box The sum of $_____ $_____ Per Each	$_____	$_____

39	30 LF	8-inch Ductile Iron Water Main The sum of $_____ $_____ Per Linear Foot	$_____	$_____
40	4 EA	Gate Valve The sum of $_____ $_____ Per Each	$_____	$_____

Site Restoration				
41	1,000 LF	Removal and Resetting of Granite Curb The sum of $_____ $_____ Per Linear Foot	$_____	$_____
42	900 SY	Concrete Sidewalk Wheelchair Ramps (6-inch thick) The sum of $_____ $_____ Per Square Yard	$_____	$_____
43	500 SY	Concrete Sidewalk (4-inch thick) The sum of $_____ $_____ Per Square Yard	$_____	$_____
44	200 SY	Concrete Sidewalks, Walkways, and Driveways (6-inch thick) The sum of $_____ $_____ Per Square Yard	$_____	$_____
45	200 LF	Granite Curb - Vertical The sum of $_____ $_____ Per Linear Foot	$_____	$_____

46	1,000 LF	Bituminous Concrete Curb/Berm The sum of $_____ _____ Per Linear Foot	$_____	$_____
47	42,000 SY	Milling The sum of $_____ _____ Per Square Yard	$_____	$_____
48a	10,000 SY	Binder Course Pavement – Trench Patch The sum of $_____ _____ Per Square Yard	$_____	$_____
48b	2,750 SY	Binder Course Pavement – Blowout Repair The sum of $_____ _____ Per Square Yard	$_____	$_____
49	1,500 TON	Leveling/Shim Course Pavement The sum of $_____ _____ Per Ton	$_____	$_____

50	5,700 TON	Surface Course Pavement The sum of $_____ _____ Per Ton	$_____	$_____
51	700 SY	Bituminous Concrete Driveway/Sidewalk Pavement The sum of $_____ _____ Per Square Yard	$_____	$_____
52	270 EA	Raise Existing Structure Frame and Cover The sum of $_____ _____ Per Each	$_____	$_____
53	1,500 SY	Loam and Seed The sum of $_____ _____ Per Square Yard	$_____	$_____
54	1 LS	Rodent Control The sum of $_____ _____ Lump Sum	$_____	$_____
55	2,500 LF	Loop Detectors and Lead-in Wires The sum of $_____ _____ Per Linear Foot	$_____	$_____

Management of Contaminated Soils/Fill

56	1 L.S.	Management of Excess Soil, Fill and Material The sum of $_____ $_____ Lump Sum	$_____	$_____
57	Allowance	Removal and Disposal of Excess Soil and Waste Material The sum of $ One Hundred-Fifty Thousand Dollars and Zero Allowance	$ 150,000.00	$ 150,000.00
58	2,000 LF	Removal and Disposal of Asbestos Cement Pipe, all depths The sum of $_____ $_____ Per Linear Foot	$_____	$_____

General Project

59	15 EA	Test Pit Excavation The sum of $___ $_____ Per Each	$___	$_____
60	75 EA	Test Pit Excavation for Locating Water and Sewer Services The sum of $___ $_____ Per Each	$___	$_____

61	100 CY	Flowable Fill for Backfill The sum of $_____ $_____ $_____ Per Cubic Yard	$_____	$_____
62	275 CY	Ledge Excavation and Disposal The sum of $_____ $_____ $_____ Per Cubic Yard	$_____	$_____
63	275 CY	Unsuitable Earth Excavation below Grade and Replacement Backfill The sum of $_____ Per Cubic Yard	$_____	$_____
64	30 LF	Trench Pipe Insulation The sum of $_____ $_____ $_____ Per Linear Foot	$_____	$_____
65	160 LF	Relocation of Existing Water Lines The sum of $_____ $_____ Per Linear Foot	$_____	$_____
66	1 LS	Erosion and Sedimentation Control The sum of $_____ $_____ Per Lump Sum	$_____	$_____

67	1 LS	Traffic Control The sum of $_____ Lump Sum	$_____	$_____
68	140 WK	Portable Changing Message Board Sign The sum of $_____ Per Week	$_____	$_____
69	1 LS	Utility Support and Coordination The sum of $_____ Lump Sum	$_____	$_____
70	1 LS	Mobilization and Demobilization (5% Maximum) The sum of $_____ Lump Sum	$_____	$_____
71	Allowance	Uniform Police Officers for Traffic Control The sum of $ Three Hundred-Fifty Thousand Dollars and Zero Cents Allowance	$ 350,000.00	$ 350,000.00

These quantities are not guaranteed. Payment will be based on actual quantities constructed and accepted in place.

Price Adjustments

72a	N/A	Diesel Fuel Price Adjustment The base price for Diesel Fuel is $2.53/gallon.	$ N/A	The base price listed shall be used to determine monthly price differential. See section 01151.
72b	N/A	Gasoline Fuel Price Adjustment The base price for Gasoline is $1.97/gallon.	$ N/A	The base price listed shall be used to determine monthly price differential. See section 01151.
72c	N/A	Liquid Asphalt Price Adjustment The base price for liquid asphalt is $527.50/ton.	$ N/A	The base price listed shall be used to determine monthly price differential. See section 01151.
72d	N/A	Cast-in-Place Portland Cement Concrete Price Adjustment The base price for Portland cement is $125.00/ton.	$ N/A	The base price listed shall be used to determine monthly price differential. See section 01151.

SUBTOTAL (BASE BID): Total of Items 1 through 71

$_____ (in figures)

$_____ (in words)

ARTICLE 6 – TIME OF COMPLETION

6.01 The undersigned hereby agrees that the Work will be **Completed Fully (Final Completion) within 210 days** after the date of the Notice to Proceed. **All work including final pavement and site restoration shall be completed no later than October 31, 2019.** Refer to Section 01010, Paragraph 3.3 "Construction Sequence" for more information.

ARTICLE 7 – DEFINED TERMS

7.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 8 – PROJECT AREAS

8.1 The work under this contract includes, but is not limited to, locations within the right-of-ways on the following streets and easements in the City of Waltham, Massachusetts.

1. Andrea Road
2. Auburn Street
3. Bedford Street
4. Boynton Street
5. Cabot Street
6. Eddy Street
7. Everett Street
8. Pearl Street
9. South Street
10. Vernon Street
11. Weston Street
12. Winthrop Street
13. Various Easements

ARTICLE 9 – CITY OF WALTHAM CONTACTS

9.01 The City of Waltham (Owner) contacts are:

A. Water and Sewer Department
   Gerard Shaughnessy, Superintendent, gshaughnessy@city.waltham.ma.us
   Emergencies - 781-314-3855 (7am-3pm), 781-858-0557 (After hours)
   Non-emergencies – 781-314-3810 (8:30am-4:30pm)
B. Engineering Department - 781-314-3830
   Steve Casazza, PE, City Engineer
C. Police Department - 781-314-3600
D. Fire Department - 781-314-3710
E. Wires Department – 781-314-3175

9.02 The Wright-Pierce (Engineer), who is providing construction oversight, contact is:

A. Matthew Corbin, PE, 978-416-8018

ARTICLE 10 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By: *[Signature]* _____

[Printed name] _____

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____ Fax Number: _____

Contact Name and e-mail address: _____

_____

CERTIFICATIONS

_____		_____
Social Security Number or		Individual or Corporate Name
Federal Identification Number		(Print or Type)
	For Certifications by:	_____
		(Signature of Authorized Person)
Signatures for Joint Ventures	For Certifications by:	
		(Signature of Authorized Person)
	For Certifications by:	_____
		(Signature of Authorized Person)

END OF SECTION

SECTION 00 52 00

AGREEMENT
CITY OF WALTHAM

ARTICLE 1. This agreement, made this _____ day of _____, 2018 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

_____

_____
hereinafter called the CONTRACTOR.

ARTICLE 2. Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the others herein contained, do hereby agree, the CITY OF WALTHAM for itself, and said contractor for his heirs, executors, administrators and assigns as follows:

To furnish all equipment, machinery, tools and labor, to furnish and deliver all materials required to be furnished (except as otherwise specified) and deliver in and about the project and to do and perform all work in strict conformity with the provisions of this Contract and of the Notice to Bidders, bid, Project Manual, and Drawings hereto annexed. The said Notice to Bidders, bid, Project Manual, and Drawings are hereby made a part of this contract as fully and to the same effect as if the same had been set forth at length and incorporated in the contracts.

ARTICLE 3. In consideration of the foregoing premises the CITY agrees to pay and the CONTRACTOR agrees to receive as full compensation for everything furnished and done by the CONTRACTOR under this contract, including all work required by not included in the items herein mentioned, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set forth in the accompanying bid.
Date for final completion of the project is **365 days** from the date of the Notice to Proceed and ***no later than November 1, 2019.***

Actual construction activity will commence on or about the date of the Notice-to-Proceed (NTP).

This Agreement entered into as of the day and year first written above.

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

_____
Jeannette A. McCarthy, MAYOR,
City of Waltham
Date: _____

_____
John B. Cervone, City Solicitor
Date: _____
APPROVED AS TO FORM ONLY

_____
Stephen Casazza, City Engineer
Date: _____

_____
Joseph Pedulla, Purchasing Agent
Date: _____

_____
Paul Centofanti, Auditor
Date: _____

I CERTIFY THAT SUFFICIENT FUNDS
ARE AVAILABLE FOR THIS CONTRACT

FOR THE COMPANY

_____
CONTRACTOR (Signature),
Date: _____

_____
Company

_____
Address

SECTION 00 61 00

PERFORMANCE BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,
_____ as

principal and _____ as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF _____DOLLARS ($_____)
(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

_____
heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract; and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the City of any extension of time for the performance of the Contract, or any other forbearance on the part of either the City or the Contractor to the other, shall not in any way release the Contractor and the Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who may have any suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY
Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00 61 50

PAYMENT BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,
_____ as

principal and _____ as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF _____DOLLARS ($_____)
(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

_____
heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract; and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the City of any extension of time for the payment of the Contract, or any other forbearance on the part of either the City or the Contractor to the other, shall not in any way release the Contractor and the Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who

may have any suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY
Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00700

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Engineer*—The individual or entity named as such in the Agreement.

21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

46. *Unit Price Work*—Work to be paid for on the basis of unit prices.

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*:

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide*:

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*:

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or

2. is of such a nature as to require a change in the Drawings or Specifications; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice as required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

    a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

    b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

    c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

    d. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.
13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) it has a proven record of performance and availability of responsive service; and

4) it is not objectionable to Owner.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

a. shall certify that the proposed substitute item will:

1) perform adequately the functions and achieve the results called for by the general design,

2) be similar in substance to that specified, and

3) be suited to the same use as that specified.

b. will state:

1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,

2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

1) all variations of the proposed substitute item from that specified, and

2) available engineering, sales, maintenance, repair, and replacement services.

d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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 persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

1. Before submitting a Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings*:

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

   a. Contractor shall submit the number of Samples required in the Specifications.

   b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures*:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal;

6. the issuance of a notice of acceptability by Engineer;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by Owner.

D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. an itemization of the specific matters to be covered by such authority and responsibility; and

3. the extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance*:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 71 00

PREVAILING WAGE SCHEDULE

Please visit the City Web Site at www.city.waltham.ma.us/bids for a copy of the schedules

SECTION 00810

SUPPLEMENTAL CONDITIONS

Unless otherwise noted, all paragraphs are additive to similarly numbered paragraphs in SECTION 00700 – GENERAL CONDITIONS. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2013, Rev1 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

PART I AMENDMENTS TO GENERAL CONDITIONS

Article No.

1.0	DEFINITIONS AND TERMINOLOGY
2.0	PRELIMINARY MATTERS
3.0	DOCUMENTS: INTENT, REQUIREMENTS AND REUSE
4.0	COMMENCEMENT AND PROGRESS OF WORK
5.0	AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS
6.0	BONDS AND INSURANCE
7.0	CONTRACTOR'S RESPONSIBILITIES
8.0	OTHER WORK AT THE SITE
9.0	OWNERS RESPONSIBILITIES
10.0	ENGINEER'S STATUS DURING CONSTRUCTION
11.0	AMMENDING CONTRACT DOCUMENTS: CHANGES IN WORK
12.0	CLAIMS
13.0	COST OF WORK:ALLOWANCES: UNIT PRICE WORK
14.0	TEST AND INSPECTIONS
15.0	PAYMENTS TO CONTRACTOR
16.0	SUSPENSION OF WORK AND TERMINATION
17.0	FINAL RESOLUITION OF DISPUTES
18.0	MISCELLANEOUS

PART II ADDITIONS TO GENERAL CONDITIONS

PART III STATE AND FEDERAL GOVERNMENT PROVISIONS

PART I AMENDMENTS TO GENERAL CONDITIONS

1.0 DEFINITIONS AND TERMINOLOGY

A. The following language shall be added at the beginning of the definition entitled "Contract Documents" in the General Conditions (1.01.A.13).

"The Invitation to Bid, Instructions to Bidders"

B. 1.01.A.18, Add the words "or plans" after the word "drawings in the first line of the definition entitled "Drawings" in the General Conditions.

C. 1.01.A.38, Delete the definition of Specifications in the General Conditions in its entirety and add the following in its place:

"Sections included under Division 1 through Division 16 of the Contract Documents"

D. 1.01.A.40 The definition of Substantial Completion shall be deleted in the General Conditions in its entirety and add the following in its place:

Substantial completion shall mean either that the work required by the Contract has been completed except for work having a contract price of less than one percent o the then adjusted total contract price, or substantially all of the work has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the Contract.

E. The following new definitions shall be added at the end of Article 1 of the General Conditions:

Conditions of the Contract–The combined General Conditions and Supplementary Conditions.

Engineer – GCG Associates, Inc., 84 Main Street, Wilmington, MA, 01887, said corporation to be considered an agent of the Owner.

Site – The specific area adjacent to and including the area upon which the construction work is performed.

2.0 PRELIMINARY MATTERS

A. Delete paragraph 2.03A in its entirety and insert in it place:

2.03. A: Contract time will commence on the date specified in the Notice to Proceed.

3.0 DOCUMENTS: INTENT, REQUIREMENTS AND REUSE

Four paragraphs shall be added immediately after paragraph 3.01.E of the General Conditions which is to read as follows:

3.01.F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

3.01.G. Contract Documents shall forthwith be physically amended to make such insertion.

3.01.H. In case of any discrepancy between these Conditions of the Contract and any Federal Government provisions, the Federal Government provision shall prevail.

3.01.I. In case of any discrepancy between these between these Conditions of the Contract and any Commonwealth of Massachusetts provisions, the Commonwealth of Massachusetts provision shall prevail.

3.01.J In the event of conflicts, inconsistencies or discrepancies among the Contract Documents, to the extent applicable, the better quality or greater quantity of work shall be provided without change to the Contract Price. In the event of such conflicts, inconsistencies or discrepancies which do not relate to the quality or quantity of work, the Contractor shall request clarifications or interpretations from the Engineer as provided in Article 10.

5.0 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

A. A new paragraph shall be added immediately after paragraph 5.01.C of the General Conditions which is to read as follows:

D. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, the Contractor shall begin the work upon such land and rights-of-way as the Owner has previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for work, Contractor shall not be entitled to make or assert claim for the damage by reason of said delay, or to withdraw from the Agreement except by consent of the Owner. Time for

completion of the work will be extended as provided in Article 11, to such time as the Owner determines will compensate for the time lost by such delay.

B. A new paragraph shall be added immediately after paragraph 5.03.B of the General Conditions which is to read as follows (if borings performed):

5.03.C. The Engineer has relied upon the data obtained from subsurface investigations made at the site in the form of test borings and probes. Such data is in the form of logs which are included in the Section 00220 and soil samples which may be examined at the Engineer's office during regular business hours. The locations of the test borings and probes are indicated on the Drawings. Such logs and samples are not part of the Contract Documents.

C. Two new paragraphs shall be added immediately after paragraph 5.05.E of the General Conditions which is to read as follows:

5.05.F. Information on Drawings and any statements of the Contract Documents referring to the conditions under which the work is to be performed or the existence of utilities or other underground structures are not guaranteed to be correct or to be complete representation of all existing data with reference to conditions affecting the work. Efforts have been made however, to make this information complete and accurate on the basis of all data and information which could be procured by Engineer. If, in the opinion of Engineer, permanent relocation of a utility not otherwise provided for, is required, he shall direct the Contractor, in writing, to perform the work. Work, so directed, will be paid as provided in Article 11 of the General Conditions.

5.05.G. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law, Chapter 30, Section 39N.

6.0 BONDS AND INSURANCE CONTRACTOR'S (AND SUBCONTRACTOR'S) PUBLIC LIABILITY, PROPERTY DAMAGE AND VEHICLE LIABILITY INSURANCE

The following shall be added to 6.0.

A. The liability limits for the insurance required by the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

The Contractor shall purchase and maintain such insurance as will protect him for claims set forth herein which may arise out of or result from the Contractor's operations be by himself or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them are liable.

1. Claims under workman's compensation, disability benefit and other similar employee benefit and other similar employee benefit acts;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and

5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

B. The required insurance shall be written for not less than the following limits of liability, or as required by law, whichever is greater.

The work shall be entirely at the contractor's risk until the same is fully completed and accepted, and he will be held liable to the amount of the City's interest in the same as shown by payments account.

The contractor shall, during the progress of the work, maintain insurance on all work included in the contract until the final or conditional acceptance of the work**. The City shall be named as an additional insured on all insurance.** Failure to provide and continue in force such insurance as specified shall be deemed a material breach of the contract and shall operate as an immediate termination thereof.

A contractor shall not commence work under any contract until he has obtained all insurance required, nor shall the contractor allow any subcontractor to commence work on a sub-contract until all similar insurance required has been obtained.

1. Workmen's Compensation Insurance

   The contractor will maintain, during the life of the contract, the statutory Worker's Compensation and Employer's Liability for all employees to be engaged in work on the project under the contract and in case any such work is sublet. The contract shall require the sub-contractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all employees engaged in the project.

2. Automobile Bodily Injury and Property Damage

   There shall be provided insurance for not less than $1,000,000 for injuries, including wrongful death, to any one person, $3,000,000 aggregate. Any one accident shall be covered to a limit of $1,000,000 bodily injury each

occurrence, $3,000,000 aggregate. There shall be property damage insurance provided to the amount of $1,000,000 on account of any one accident and included owned, hired and non-owned automobiles.

3. Comprehensive General Liability

   The contractor shall purchase and maintain such insurance as required to protect the owner's interest for the duration of the contract and until acceptance of the work.

   Comprehensive General Liability Coverage covering bodily injury and property damage with limits of $1,000,000 each occurrence, $3,000,000 aggregate, shall include coverage for premises, operations XCU included, products completed operations, contractual insurance, brand form property damage, independent contractor's personal injury coverages.

4. Property Coverage

   For materials and supplies being transported by the contractor.

5. Umbrella Liability

   $3,000,000/occurrence, $3,000,000 aggregate.

C. The Contractor shall procure and maintain Owner's Protective Liability Insurance as herein specified.

6. In addition to the Owner the Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

7. Said policy shall provide that the coverage afforded thereby, shall be primary coverage to the full limit of liability state in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

8. The original and one certified copy of the policy specified shall be forwarded to the Engineer for the Owner prior to commencement of any work.

9. The limits of Owner's Protective Liability Insurance shall be not less than One Million Dollars ($1,000,000) on account of any one accident and Three Million Dollars ($3,000,000) on account of all accidents.

D. The Contractor's and Subcontractor's insurance shall provide adequate protection against the following special hazards:

1. Blasting or explosion

2. Collapse of trench walls and underground damage
3. Use of all equipment and tools

E. The Contractor shall not commence work under this Contract until he has obtained all insurance required hereunder and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required of subcontractor has been so obtained and approved. Approval of insurance required under this article shall be kept in force during the life of the Contract.

1. Certificates in triplicate of all General Contractor's policies specified shall be filed with the Engineer for the Owner. Any certificates filed with the Engineer which shall be found to be incomplete or not according to form will be returned as unsatisfactory. Rejected certificates of insurance and copies of policies shall be corrected as necessary and resubmitted until approved.

F. Each and every policy shall contain an endorsement stating that the Insurance Company will to, prior to completion of project or any policy expiration date shown on policy and certificate, whichever occurs first, terminate policy or change any coverage therein without first mailing by registered mail, written notice of such action at least fifteen (15) days prior to termination or change, to Owner at whose request policy and certificates are issued.

G. Delete paragraph 6.05 of the General Conditions in its entirety.

H. Delete paragraph 6.06 of the General Conditions in its entirety.

I. Delete paragraph 6.07 of the General Conditions in its entirety.

J. The following new paragraphs shall be added immediately after paragraph 6.07 of the General Conditions which is to read as follows:

6.08. The Contractor may purchase and maintain excess liability insurance in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the general conditions in the form of a certificate indicating the policy numbers and limits of liability of all underlying insurance. The umbrella liability insurance shall have a combined single limit of not less than $3,000,000. Such insurance shall contain a provision that the coverage afforded will not be cancelled or materially changed until at least thirty days prior written notice has been given to Owner.

6.09. If the aggregate limits of liability indicated in the Contractor's insurance provided in accordance with above limits is not sufficient to cover all claims for damages arising from his operations under this contract and from any other work performed by him or if policies of insurance do not provide that the aggregate limits of liability for bodily injury and property damage apply to each

contract or project separately, Contractor shall have such policies amended so that the aggregate limits of liability required by this Contract will be available to cover all claims for damages due to operations under this Contract.

6.10 PROOF OF CARRIAGE OF INSURANCE

Policies shall contain a clause automatically extending date of expiration to coincide with any extended date of completion granted under the Contract.

6.11 OWNER'S PROTECTIVE LIABILITY INSURANCE

The Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

Said policy shall provide that the coverage afforded thereby shall provide that the coverage afforded thereby shall be primary coverage to the full limit of liability stated in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

7 CONTRACTOR'S RESPONSIBILITIES

A. The following new paragraphs shall be inserted immediately after paragraph 7.02.B of the General Conditions.

C. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or subcontractor contracting for any part of the work shall require or permit any laborer or mechanic to be employed on the work in excess of eight hours in any calendar day or in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such work week, as the case may be.

D. Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by the Owner's governing body or other duly designated official.

E. The Contractor shall employ only competent men to do the work and whenever the Owner shall notify Contractor, in writing, that any man on the work appears to be incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such man shall be removed from the project and shall not again be employed on it except with the consent of the Owner.

F. The Contractor and all subcontractors shall, insofar as practicable, give preference in the hiring of workers for the project to qualified local residents

with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

G. The Contractor and all subcontractors shall pay to all laborers and mechanics employed for the construction covered by this contract the minimum rates of pay as determined by the Secretary of Labor in accordance with the Act of March 3, 1931, as amended, known as the Davis-Bacon Act (40 U.S.C. 276a through 276a-7). Furthermore, the Contractor and subcontractors shall adhere to the stipulations and provisions published by the Secretary of Health, Education, and Welfare in "Labor Standards (Federal Water Pollution Control Act)". The Wage Rate Schedule as prepared by the Secretary of Labor and the "Labor Standards" are part of this Contract and are included in Part II of these Supplementary Conditions.

H. The Contractor and all subcontractors shall comply with the Regulations of the Secretary of Labor made pursuant to the Anti-Kickback Act of June 30, 1940 (40 U.S.C. 276c) and all amendments or modifications thereto. The Contractor and all subcontractors shall furnish the Owner with weekly Statements of Compliance. In case of subcontracts, the Contractor shall cause appropriate provision to be inserted in all subcontracts for the work which he may let to insure compliance with said Anti-Kickback Act by all subcontractors subject thereto, and Contractor shall be responsible for the submission of all Statements of Compliance required by subcontractors by said Anti-Kickback Act except as the Secretary of Labor may specifically provide for reasonable limitations, variations, and exemptions from the requirements thereof. These Regulations are part of this Contract and are included in Part II of these Supplemental Conditions.

B. Paragraph 7.06.A of the General Conditions shall be deleted in its entirety and insert the following in its place:

7.06.A The Contractor shall not employ any subcontractor, supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Acceptance of any subcontractor, other person or organization by the Owner shall not constitute a waiver of any right of Owner to reject defective work. The Contractor shall not be required to employ any subcontractor, other person or organization against whom the Contractor has reasonable objection.

C. The following language shall be added at the end of paragraph 7.09 of the General Conditions:

7.09.B. Except as required otherwise by Massachusetts General Law Chapter 149, Section 44F.

The materials and supplies to be used in the work of this contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. The Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of Chapter 14 of the Acts of 1966 and any amendments thereto.

F. The following language shall be added at the end of paragraph 7.12.G of the General Conditions:

7.12H. In the event of temporary suspension of the work, or during inclement weather, or whenever the Engineer may direct; the Contractor shall, and shall cause Subcontractors, to protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

J. A new paragraph shall be added immediately after paragraph 7.19.E of the General Conditions which is to read as follow:

7.19.F The Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records. This requirement primarily provides for the Contractor to maintain for at least six years after final payment books, records, and accounts in reasonable detail, available for examination. This requirement further provides for the Contractor to document and submit descriptions and reasons for any changes in record keeping methods, and to prepare and submit annual financial statements.

10.0 ENGINEER'S STATUS DURING CONSTRUCTION

A new paragraph shall be added immediately after paragraph 10.09 of the General Conditions which is to read as follows:

10.10 The Engineer's interpretations will be made in accordance with Massachusetts General Law Chapter 30, Section 39P which is included in Part II of the ADDITIONAL ARTICLES.

15.0 PAYMENTS TO CONTRACTORS AND COMPLETION

A new Paragraph 15.09 of the General Conditions shall be added after 15.08.

15.09 Progress Payments will be made in accordance with Massachusetts General Law, Chapter 30, Section 39G. Retainage shall be 5%, in accordance with M.G.L., Chapter 30, Section 39G.

15.10. If, after 60 days following submission of a monthly payment estimate for pipe and fitting items, the pipe and fittings for which payment is requested has not been successfully tested, the Owner may withhold up to 10% of the amount requested for such pipe and fitting items until the pipe has been so tested, however, in the case of a major (pipe diameter 24 inches or greater) pipe and fitting instillation, sums retained by the Owner pursuant to this paragraph shall not exceed two percent (2%) of the costs of such pipe items. This retainage shall be in addition to any other retainage required by this Contract.

The Contractor shall make payments to subcontractors in accordance with Massachusetts General Law, Chapter 30, Section 39F which is included in ADDITIONAL ARTICLES.

15.11. If, on the basis of the Engineer's observation of the work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation – all as required by the Contract Documents, Engineer is satisfied that the work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Engineer will indicate in writing his recommendation of payment and present the Application to the Owner for payment. Thereupon the Engineer will give written notice to the Owner and the Contractor that the work is acceptable subject to the provisions of paragraph 14.16. Otherwise, the Engineer will return the Application to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application. If the Applications and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Massachusetts General Law, pay Contractor the amount recommended by Engineer.

15.12. Final payment will be reduced by excessive costs of plant inspection of pipe; the Contractor shall have no claim thereto. Excessive inspection costs are defined as the costs of inspection of that amount of pipe which exceeds 125 percent of the aggregate length of each type installed.

16.0 SUSPENSION OF WORK AND TERMINATION

Paragraph 16.01 of the General Conditions shall be deleted in its entirety and insert the following in its place:

16.01. The Owner may order, at any time and without cause, suspension of the work in accordance with Massachusetts General Law, Chapter 30, Section 39O.

17.0 DISPUTE AND RESOLUTION

Article 17 of the General Conditions shall be deleted in its entirety.

18.0 MISCELLANEOUS

A new paragraph shall be added immediately after paragraph 18.08 of the General Conditions which is to read as follows:

18.09. Both the address given in the Bid Form upon which this Agreement is founded, and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters, and other communications to the Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, if any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor: and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor, and delivered to the Owner and shall be deemed to preclude or render inoperative the service of any notice, letter, or other communications upon the Contractor personally.

WAGE RATES

The following 4 new paragraphs shall be added immediately after paragraph 18.09 of the General Conditions:

18.10. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be part of these Contract Documents. Copies of the wage schedule are included in Section 00820. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such approved minimum rate shall be paid at not less than such rates as shall be determined by the officials administrating the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the Owner of his intention to employ persons in trades or occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations.

A. The schedules of wages referred to above are minimum rates only, and the Owner will not consider any claims for additional compensations made by the Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be adjusted by Contractor.

B. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the

work. Minimum Wage Rates as determined by the Commissioner of the Department of Labor and Industries, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who are not covered by this schedule of wage rates, but who may be employed for the proposed work under this Contract.

C. State schedules of minimum wage rates are included in Section 00820 – ADDITIONAL ARTICLES. Where rates differ, the higher rates shall apply as a minimum for that trade.

PART 2 ADDITIONS TO GENERAL CONDITIONS

None this Contract

PART 3 STATE AND FEDERAL GOVERNMENT PROVISIONS

State and Federal Government Provisions are included in Section 00820 and selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contact shall be deemed to be also inserted in herein.

1.0. COMMONWEALTH OF MASSACHUSETTS AND FEDERAL PROVISIONS
1.1. The Owner and Contractor agree that the following Commonwealth of Massachusetts and Federal Provisions apply to the Work to be performed under this Contract and that these provisions of this Contract and that these provisions supersede any conflicting provisions of this Contract.
1.2. Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program.
1.3. Massachusetts General Laws
1.3.1. Chapter 30, Section 39F
1.3.2. Chapter 30, Section 39G
1.3.3. Chapter 30, Section 39M
1.3.4. Chapter 30, Section 39N
1.3.5. Chapter 30, Section 39O
1.3.6. Chapter 30, Section 39P
1.3.7. Chapter 30, Section 39R
1.3.8. Acts of 1983 Chapter 353
1.4. All documents in section 00500 – Agreement and additional Contract Documents

END OF SECTION

SECTION 00821

PERMITS

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

A. The general provisions of the Contract, including General and Supplemental Conditions and General Requirements, apply to the work specified in this section.

1.02 PERMITS

A. The Contractor shall be responsible for obtaining and complying with all permits required of his equipment, work force, or particular operations (such as blasting and fuel storage permits, etc.) in the performance of the Contract. All City required permitting fees will be waived.

B. If included as part of this project, The Contractor shall be responsible for complying with requirements of the Local Conservation Commission and the Cambridge Watershed Protection District. All costs associated with complying with the conditions will be included in the price of the work.

C. The Contractor shall be responsible for obtaining and complying with the requirements of the Street Opening and Trench Permits required by the City Department of Public Works in the performance of the Contract. All costs associated with complying with the conditions of the permits will be included in the price of the work. All costs associated with obtaining permits will be waived by the City.

END OF SECTION

DIVISION 1

CITY OF WALTHAM

WALTHAM, MASSACHUSETTS

TECHNICAL SPECIFICATIONS

FOR

WEST END AREA 13/14-B-1

SEWER AND MANHOLE REHABILITATION

SEPTEMBER 2018

REVISED: JANUARY 2019

Mayor
Jeannette A. McCarthy

City Engineer
Stephen A. Casazza, PE

COMMONWEALTH OF MASSACHUSETTS
STEPHEN A. CASAZZA
CIVIL
No. 33198
REGISTERED
PROFESSIONAL ENGINEER

Stephen A. Casazza 1.30.19

Wright-Pierce
600 Federal Street, Suite 2151
Andover, MA 01810

SUMMARY OF WORK

PART 1 - GENERAL

1.1 LOCATION:

A. Work under this contract includes, but is not limited to, locations within the right-of-ways on the following streets and easements in the City of Waltham, Massachusetts.

1. Andrea Road
2. Auburn Street
3. Bedford Street
4. Boynton Street
5. Cabot Street
6. Eddy Street
7. Everett Street
8. Pearl Street
9. South Street
10. Vernon Street
11. Weston Street
12. Winthrop Street
13. Various easements

1.2 DESCRIPTION OF WORK

A. The purposes of this Contract is to perform rehabilitation on a portion of the Area 13/14-B sewer system. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.

B. The construction sequence is described further in Part 3.3 of this Section. **All work including final roadway restoration shall be completed by October 31, 2019.**

C. The work to be performed under this Contract includes but is not limited to:

1. Furnishing and installing new sanitary sewer pipes including the following components:
   a. Gravity sanitary sewers
   b. Sewer and water service laterals
   c. Sewer manholes
   d. Removal and disposal or abandonment of existing sewer manholes, sewers and laterals
   e. Disposal of demolition and excess materials
   f. Trench dewatering
   g. Excavation and backfill
   h. Post-CCTV inspection and testing of new sanitary sewer pipes
   i. Appurtenant work
2. Existing flow management and bypass pumping for installation of new sanitary sewer pipes and manholes. The existing sanitary sewer pipes diameters range from 6-inches to 24-inches.
3. Inspection of certain sewer pipes and sewer manholes. This includes locating and raising frame and cover to grade. Refer to Tables 1 and 2 below and Appendix B.
4 Sewer system pipe and manhole rehabilitation and replacement. Refer to Tables 3 and 4 below and Appendices A and C.
5. Locating and replacing certain sanitary sewer services.
6. Testing of sanitary sewer pipes and manholes for proper installation and performance.
7. Locating and replacing certain water services.
8. Testing and disinfecting water services for proper installation and performance.
9. Sump pump discharge relocation.
10. Site work including curbing and landscaping.
11. Pavement restoration work including daily temporary paving; permanent trench paving; sidewalk and driveway paving; and full-width mill and overlay. Refer to Table 5 for the roadway restoration per street. Refer to the Figure in Appendix D for paving limits for project area.
12. Other miscellaneous work shown in the Specifications for a complete and operational system.

D. The work is shown and described in the following locations:

1. Sewer pipe and manhole rehabilitation – Specifications and Appendices A and C.
2. Sewer pipe and manhole inspections – Specifications and Appendix B.
3. Water and sewer service replacement – Specifications and Appendix C
4. Full-width mill and overlay of streets – Specifications and Appendix D.

E. The Contractor shall comply with all applicable performance and safety requirements specifically related to the work under this Contract. In addition, all things not expressly

mentioned in these Specifications but involved in carrying out their intent are required by these Specifications, and the Contractor shall perform the same as though they were specifically delineated and described.

F. It is the Contractor's responsibility to verify physical conditions and components of the work at each specific location of Work.

G. Work performed under this contract is mainly located on property owned by the City of Waltham, but there is some work on private ways and private properties.

TABLE 1 – SEWER PIPES TO BE INSPECTED

Upstream Manhole	Downstream Manhole	Location	Pipe Length (ft)	Pipe Diameter (in)
R58_03035	R58_11645	Weston Street	48	24
R58_06625	R58_03030	Weston Street	112	8
R58_06630	R58_06625	Weston Street	64	8
R58_06630	R58_03035	Weston Street	70	10
R58_03035	R58_03030	Weston Street	90	24
R58_03040	R58_03035	Eddy Street	275	24
R67_07651	R67_07670	South Street	259	8
R67_07670	R67_07680	South Street	260	8

TABLE 2 – MANHOLES TO BE INSPECTED

Manhole ID	Location
R58_06625	Weston Street
R58_06635	Weston Street
R58_11705	Winthrop Street
R67_07855	South Street
R68_07880	Curtis Street

TABLE 3– MANHOLES TO BE REHABILITATED

ID	Location	Replace Manhole	Replace Frame & Cover	Point Repair	Clean / Root Removal	Line	Grout	Seal Frame	Remove Cross Bore
R58_03025	Vernon St					X	X		
R58_03030	Vernon St			X			X		
R58_06635	Weston St	X							
R58_07615	Vernon St			X					
R58_07625	Winthrop St	X							
R58_07630	Winthrop St	X							
R58_07635	Winthrop St	X							
R58_07640	Winthrop St	X							
R58_07645	Pearl St	X							X
R58_11565	Weston St								X
R58_11585	Weston St	X							
R58_11610	Vernon St	X							
R58_11615	Auburn St	X							
R58_11620	Auburn St	X							
R58_11630	Auburn St	X							
R58_11635	Auburn St	X							
R58_11645	Cabot St			X					
R58_11650	Cabot St				X				
R58_11660	Winthrop St	X							
R58_11665	Winthrop St	X							
R58_11670	Cabot St	X							
R58_11675	Cabot St	X							
R58_11700	Winthrop St	X							
R58_11705	Winthrop St	X							
R59_02995	South St							X	
R67_07655	Bedford St	X							
R67_07660	Bedford St	X							

TABLE 3– MANHOLES TO BE REHABILITATED (CONT.)

ID	Location	Replace Manhole	Replace Frame & Cover	Point Repair	Clean / Root Removal	Line	Grout	Seal Frame	Remove Cross Bore
R67_07665	Bedford St	X							X
R67_07670	South St							X	
R67_07735	South St			X					
R67_07745	Drew St	X							
R67_07750	South St			X					
R67_07751	South St			X				X	
R67_07770	South St	X							
R67_07780	Shakespeare Rd	X							X
R67_07800	Wheelock Rd			X					
R67_07815	South St			X				X	
R67_07820	South St		X	X					
R67_07825	South St					X			
R67_07840	South St	X							
R67_07860	South St				X		X		
R67_11680	Cabot St	X							
R67_11710	Boynton St	X							
R67_11715	Boynton St	X							
R67_11720	Boynton St	X							
R67_11725	Boynton St	X							
R67_11740	Andrea Rd	X							
R67_25995	South St						X		

TABLE 4 - SEWER PIPES TO BE REHABILITATED

Pipe ID	Location	Pipe Dia. (in)	Pipe Material	Pipe Length (ft)	Replace Pipe	Point Repair (Replace	Structural Liner	Cut Roots/ Heavy Clean
R58_03025_R58_03020	Vernon St	24	ACP	244			X	
R58_03030_R58_03025	Vernon St	24	ACP	199			X	
R58_07620_R58_07615	Weston St	10	VCP	114		X		
R58_07630_R58_07625	Winthrop St	6	VCP	300	X			
R58_07635_R58_07630	Winthrop St	6	VCP	200	X			
R58_07640_R58_07635	Winthrop St	6	VCP	112	X			
R58_07645_R58_07635	Pearl St	6	VCP	150	X			
R58_09995_R58_06635	Everett Street	6	VCP	82	X			
R58_11565_R58_11560	Weston St	8	VCP	239			X	
R58_11580_R58_07620	Weston St	10	VCP	58			X	
R58_11590_R58_11585	Eddy Street	6	VCP	222	X			
R58_11615_R58_11610	Auburn St	6	VCP	203	X			
R58_11620_R58_11615	Auburn St	6	VCP	187	X			
R58_11630_R58_11620	Auburn St	6	VCP	87	X			
R58_11635_R58_11630	Auburn St	6	VCP	216	X			
R58_11650_R58_11645	Cabot St	10	n/a	170			X	
R58_11655_R58_11650	Cabot St	10	n/a	106			X	
R58_11665_R58_11660	Winthrop St	6	VCP	160	X			
R58_11675_R58_11670	Cabot St	8	VCP	151	X			
R58_11695_R58_11690	Boynton St	8	VCP	150		X	X	X
R58_11705_R58_11700	Winthrop St	6	VCP	125	X			
R67_07660_R67_07655	Bedford St	8	VCP	217	X			
R67_07665_R67_07660	Bedford St	6	VCP	268	X			
R67_07815_R67_07810	South St	8	VCP	124			X	
R67_07825_R67_07820	South St	8	VCP	82			X	
R67_07840_R67_07825	South St	8	VCP	137			X	
R67_11680_R58_11675	Cabot St	8	VCP	120	X			
R67_11710_R58_11700	Boynton St	8	VCP	337	X			
R67_11715_R67_11710	Boynton St	8	VCP	128	X			
R67_11720_R67_11715	Boynton St	8	VCP	116	X			
R67_11725_R67_11720	Boynton St	8	VCP	120	X			

TABLE 5
SUMMARY OF PAVEMENT RESTORATION METHODS
Refer to Appendix E for Mill & Overlay limits

Street	Pavement Restoration Method	
	Temporary Pavement	Permanent Pavement
Andrea Road	Yes	Mill and Overlay
Auburn Street	Yes	Mill and Overlay
Bedford Street	Yes	Mill and Overlay
Boynton Street	Yes	Mill and Overlay
Cabot Street	Yes	Mill and Overlay
Eddy Street	Yes	Mill and Overlay
Everett Street	Yes	Mill and Overlay
Pearl Street	Yes	Mill and Overlay
South Street	Yes	Mill and Overlay
Vernon Street	Yes	Mill and Overlay
Weston Street	Yes	Mill and Overlay
Winthrop Street	Yes	Mill and Overlay

TABLE 6 – WATER & SEWER SERVICE WORK

Street	Number	Sewer Replace	Water Replace	Sewer Test Pit	Water Test Pit
Andrea Road	17		Y		
Andrea Road	21	Y	Y		
Andrea Road	27	Y	Y		
Andrea Road	30		Y	Y	
Andrea Road	31	Y	Y		
Andrea Road	36	Y	Y		
Andrea Road	37	Y			
Auburn Street	9-15	Y*			
Auburn Street	10-12	Y*	Y		
Auburn Street	16	Y*			
Auburn Street	18		Y	Y	
Auburn Street	20				Y
Auburn Street	23			Y	Y
Auburn Street	41			Y	Y

TABLE 6 – WATER & SEWER SERVICE WORK (CONT.)

Street	Number	Sewer Replace	Water Replace	Sewer Test Pit	Water Test Pit
Auburn Street	43		Y		
Auburn Street	47			Y	
Auburn Street	48		Y	Y	
Auburn Street	52			Y	Y
Auburn Street	58		Y	Y	
Bedford Street	88			Y	
Bedford Street	89				Y
Bedford Street	93	Y*			Y
Bedford Street	99-101	Y*	Y		
Bedford Street	100	Y	Y		
Bedford Street	106-108	Y*	Y		
Bedford Street	121	Y			
Bedford Street	127	Y*	Y		
Bedford Street	128	Y*			Y
Bedford Street	130	Y*			Y
Bedford Street	132	Y*			
Boynton Street	4	Y			Y
Boynton Street	18			Y	Y
Boynton Street	22			Y	Y
Boynton Street	25			Y	Y
Boynton Street	26			Y	Y
Boynton Street	29		Y	Y	
Boynton Street	33			Y	Y
Boynton Street	36			Y	Y
Boynton Street	42	Y*	Y		
Boynton Street	55	Y*	Y		
Boynton Street	56	Y*			Y
Boynton Street	61	Y*	Y		
Boynton Street	62	Y*	Y		
Boynton Street	63	Y*	Y		
Boynton Street	66	Y*	Y		
Boynton Street	75	Y*	Y		
Boynton Street	76	Y*			Y
Boynton Street	77				Y
Boynton Street	85	Y			
Cabot Street	12			Y	Y
Cabot Street	13			Y	Y
Cabot Street	15			Y	Y
Cabot Street	16		Y	Y	
Cabot Street	20			Y	Y

TABLE 6 – WATER & SEWER SERVICE WORK (CONT.)

Street	Number	Sewer Replace	Water Replace	Sewer Test Pit	Water Test Pit
Cabot Street	21		Y	Y	
Cabot Street	25			Y	Y
Cabot Street	26			Y	Y
Cabot Street	29			Y	Y
Cabot Street	30			Y	Y
Cabot Street	47		Y		
Cabot Street	54	Y*			Y
Cabot Street	55	Y*	Y		
Cabot Street	56	Y*			Y
Cabot Street	59	Y*	Y		
Cabot Street	60	Y*			
Cabot Street	62	Y*			
Cabot Street	76			Y	Y
Cabot Street	77	Y	Y		
Cabot Street	83	Y			
Cabot Street	89	Y	Y		
Cabot Street	90	Y	Y		
Eddy Street	8-10	Y*			
Eddy Street	11-13	Y*			
Eddy Street	14-16	Y*			
Eddy Street	15-17	Y*			
Eddy Street	18-20	Y*			
Eddy Street	19-21	Y*			
Eddy Street	22-24	Y*			
Pearl Street	1-3	Y*			
Pearl Street	7	Y*			Y
Pearl Street	14-16	Y*			Y
Pearl Street	15-17	Y*			Y
Pearl Street	18-20	Y*			Y
Pearl Street	19	Y*			Y
South Street	225			Y	Y
South Street	247		Y		

TABLE 6 – WATER & SEWER SERVICE WORK (CONT.)

Street	Number	Sewer Replace	Water Replace	Sewer Test Pit	Water Test Pit
South Street	269		Y		
Vernon Street	98	Y*			
Vernon Street	104			Y	Y
Vernon Street	108			Y	Y
Vernon Street	138			Y	Y
Weston Street	76		Y		
Weston Street	85	Y*			
Winthrop Street	2-8	Y*			
Winthrop Street	3-9	Y*			
Winthrop Street	10-12	Y*			
Winthrop Street	13-15	Y*			
Winthrop Street	14-16	Y*			
Winthrop Street	17-19	Y*			
Winthrop Street	18-20	Y*			
Winthrop Street	21-23	Y*			
Winthrop Street	22-24	Y*			
Winthrop Street	29	Y*			
Winthrop Street	30	Y*	Y		
Winthrop Street	33	Y*			
Winthrop Street	34	Y*			
Winthrop Street	35	Y*	Y		
Winthrop Street	39-41	Y*			
Winthrop Street	43-49	Y*			
Winthrop Street	52	Y*			
Winthrop Street	56	Y*	Y		
Winthrop Street	60	Y*			
Winthrop Street	68	Y*			
Winthrop Street	70		Y		
Winthrop Street	76		Y		
Winthrop Street	80		Y		
Winthrop Street	84	Y*			
Winthrop Street	93	Y*			
Wheelock Road	6		Y		

*Note: Sewer services connected to pipe segments and manholes called out for full replacement shall be replaced from the main to the edge of the right-of-way unless otherwise directed by the Engineer. These sewer service replacements are not shown in Appendix C.

1.3 VISITS TO THE SITE

A. Before submitting a bid, the Contractor shall visit the various sites, examine their conditions and thoroughly acquaint himself with the conditions for performing the work. He shall also study the drawings and compare the same with the information gathered during his examination of the sites, as no extra compensation will be authorized for extra work caused by his unfamiliarity with the sites and/or drawings or the conditions peculiar to this job.

1.4 PERSONNEL REQUIREMENTS

A. The Contractor (and any subcontractor) shall furnish sufficiently trained and competent personnel to perform the Work required of the Contractor under this Contract.

B. The Contractor shall provide adequate contract orientation for all staff to be assigned on a permanent, temporary, or call-in basis. This shall include familiarization of equipment type and the respective locations of work. All staff involved in executing this Contract should be familiar with their contractual responsibilities pertaining to security, safety, inspection guidelines, and activities around all work locations.

C. If any Contractor's personnel is deemed unsatisfactory or does not perform the services to be furnished hereunder in a proper manner and satisfactory to the Owner, or in the determination of the Owner has taken action which constitutes a conflict of interest or which is inconsistent with the highest level of honesty, ethical conduct or public trust or which the Owner determines is adverse to the public interest or to the best interest of the Owner, the Contractor shall remove any such personnel and replace them with personnel satisfactory to the Owner within twenty-four (24) hours following the Contractor's receipt of a request for such replacement.

1.5 PERMITS, FEES AND BONDS

A. The Contractor shall obtain and comply with all required permits, pay all fees and provide all bonds necessary to complete the work asspecified.

1.6 FIELD LAYOUT

A. The Engineer shall be responsible for the initial layout of control (if required). The Contractor shall be responsible for layout of the proposed work and appurtenances as shown on the drawings. Site and grading adjustments may be made in the field, subject to review and approval by the Engineer.

1.7 SAFETY

A. The Contractor shall be responsible for compliance with all applicable regulations ofOSHA.

1.8 TRAFFIC DETOURS AND ROAD ACCESSIBILITY

A. Traffic Management Plan -The Contractor shall prepare and submit a Traffic Management Plan for approval that shows the routing of traffic during construction. The detailed plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates. The plan shall include all the requirements contained in the City of Waltham Policy on Street Opening Permits.
   1. The Traffic Management Plan shall be created on a computer. Hand marked up sketches are not acceptable.

B. The Contractor shall contact the responsible heads of the Fire, Police, Highway, Sewer, School and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic

control, alternate vehicular access routes, etc. Wherever detours are permitted the size, construction and location of signs shall conform to local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to his route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.

C. When Work is performed along roadways, all operations shall be planned so as to cause minimum interference with traffic and with maximum precautions at all times.

D. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic and shall not open up Work to the prejudice or detriment of Work already started. When it is required under the Contract that traffic be detoured around the Work, the Contractor shall provide and maintain suitable detours in accordance with the Contract Documents, and as approved by the City.

E. The Contractor shall be responsible for the maintenance of traffic over, through or around the Work during the life of the Contract, and whether or not work thereon has been suspended temporarily. The Contractor shall take all precautions for preventing injuries to persons or damage to property in or about the Work. The Contractor shall provide and maintain temporary bypasses as may be necessary to accommodate traffic on the roadway under construction or repair.

F. All Work sites and adjacent areas shall be adequately protected. Roadways shall be closed to traffic only as approved by the Owner. Whenever the closing of any lane is permitted by the City, the Contractor shall comply with all pertinent provisions of the Contract Documents.

G. All personnel shall observe safety rules and regulations and shall wear suitable safety equipment, at all times. Personnel who disregard safety regulations will be barred from the Work by the Owner and the Contractor shall be without recourse.

H. All vehicles and construction equipment shall be properly registered and comply with the City's Rules and Regulations. All vehicles shall be equipped with such safety devices as flags, markings, beacons, strobes, and lights, in good working order. No separate compensation will be allowed for this work or equipment.

I. At the end of each work day, the Contractor shall remove its equipment from the roadway, and if applicable, shall store such equipment in areas as approved by the Owner. No equipment shall be stored on the roadway during non-work periods. Construction or repair materials shall not be stored on the roadway, except as approved by the City.

J. The Owner will not provide lay down areas for the Contractor.

1.9 PUBLIC SAFETY - POLICE DETAILS AND FLAGGERS

A. In general, local police details will be required on all local streets for public safety and for maintaining two-way traffic during construction.

B. The use of police details shall be at the sole discretion of the City. The need for uniformed police officers will be made by the City prior to the start of w o r k .

C. The Contractor is solely responsible for coordinating, scheduling, and canceling the police details.

1.10 HOURS OF WORK

A. No work shall be started before 7:00 A.M and this include idling of construction equipment. No work shall be performed on restricted roads between the hours of 7:00 A.M. and 9:00 A.M. and between 4:00 P.M. and 6:00 P.M. Also, no construction vehicles shall be parked waiting to perform work during these hours on restricted roads.
   The following roads located within the project limits of work are classified as restricted roads:
   1. Weston Street
   2. South Street
B. No work shall be done on Saturday, Sunday, and holidays observed by the City of Waltham.
C. On the day before a City observed holiday and on Friday before a City observed holiday when the holiday falls on Sunday or Monday, all work for the day shall be completed by 12:00 P.M. These hours include time for clean-up and restoration of the roads to normal traffic flow.
D. All work shall be completed by the time stipulated by the Owner. These hours include the time for clean-up of the site and restoration of the roads to normal traffic flow.
E. The work areas are located in close proximity to private homes. The Contractor will need to pay particular attention to noise generation during early and late times of day, traffic flow, erosion control and dust generation to abutting properties, and the removal of soils, placement of stockpiles, etc. in order to maintain access through the work area. Any detours, if required, must be arranged through the local Police and Fire Departments.

1.11 SCHEDULE

A. Prior to beginning operations, the Contractor shall submit a schedule of the proposed work for review and approval. The schedule shall show the work broken down into logical and specifically executable tasks necessary to meet the completion date.
B. All tasks shall include estimated time duration and be shown on a timeline type chart. In addition, tasks shall be depicted in terms of their relationship to tasks before and after.
C. The schedule shall be developed in Microsoft Project format or other approved schedule software and shall be submitted in either electronic or hardcopy form.
D. The schedule shall be updated weekly every Friday and updated more frequently whenever the project schedule changes. In addition, the schedule shall be submitted with the monthly payment requisition.
E. The Contractor shall submit a written schedule to the Engineer and Owner by 12:00pm every Friday detailing the anticipated work for the following week.
F. The Contractor may deviate from the above sequence provided he can demonstrate to the Engineer that the continuity of the project will not be adversely affected.

1.12 DIG SAFE

A. Prior to commencing excavation work, the Contractor shall notify Dig-Safe (1- 800-322-4844), City of Waltham Water and Sewer Department (1-781-314-3820), and City of Waltham Wires Department (1-781-314-3175) to have all existing public and private utility lines and underground structures marked out. The City of Waltham is not part of Dig Safe; and therefore, the Contractor shall also notify City of Waltham Water and Sewer Department.

1.13 OPERATION OF EXISTING WATER INFRASTRUCTURE

A. The Contractor shall not operate any hydrants, valves, curb stops or corporations, nor shall they draw any water from the system without specific approval of the City of Waltham Water and Sewer Department's Superintendent. Only City personnel will operate valves, hydrants

corporations and curb stops unless otherwise directed by the City. Should operation of such items be necessary, the Contractor shall contact the City a minimum of 48 hours in advance of such facility to coordinate this work.

B. The Contractor shall distribute door hanger notices to all residents/businesses 48-hours before any planned disruption of services. The City's Water and Sewer Department shall provide the Contractor with these notice, and the Contractor shall fill out the notices and distribute.

1.14 HANDLING OF ASBESTOS PRODUCTS

A. If the Contractor should encounter asbestos products during construction, the Contractor shall conform to all applicable provisions of OSHA, Federal, State and Local Regulations regarding the handling and/or disposing of asbestos products.

1.15 SOILS MANAGEMENT PLAN

A. The Contractor shall prepare and submit prior to the start of work, a SOILS MANAGEMENT PLAN detailing the contractor's procedures for handling suitable and unsuitable materials transported to and from the work area(s). Refer to Section 02080 – Soil and Waste Management and Section 02095 – Transportation and Disposal of Soil and Waste.

B. Excess soil, fill, and materials shall be managed, transported, and disposed of in accordance with all local, state, and federal regulations. Contractor shall take all reasonable efforts to reuse excavated soils within the project in accordance with 310 CMR 40.0000 Massachusetts Contingency Plan.

1.16 REMOVALS, RELOCATIONS AND REARRANGEMENTS

A. Examine the existing site for the work of all trades which will influence the cost of the work under the general bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the finished project. The Contractor is responsible for all coordination in this regard.

B. Include all removals, relocations, rearrangements and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.

1.17 RESTORATION OF DISTURBED AREAS

A. The Contractor is responsible for the restoration of all areas disturbed by the work to an equal or better condition than that encountered prior to construction. This requirement is especially important to the Owner and will be enforced.

1.18 EXISTING UTILITIES, MAINTAINING SERVICE AND ACCESS

A. The Contractor is advised that protection of the existing utilities in the vicinity of the project, and the assurance of uninterrupted service during the contract period is of the essence. Existing utilities must remain in service throughout the entire project, except in the case of tying in services and/or making connections to existing equipment. This is particularly critical in the case of cutting over existing utilities.

B. Interruptions in service will be allowed only during scheduled shutdowns approved in advance.

C. The Contractor shall distribute door hanger notices to all residents/businesses 48-hours before any planned disruption of services. The City's Water and Sewer Department shall provide the Contractor with these notice, and the Contractor shall fill out the notices and distribute.

D. The location and size of some existing underground facilities such as sewers, drains, culverts, water mains, gas mains, cables, service pipes, etc., are shown on the plans, based on results of surveys and existing records, and are shown as approximate only. The plans do not show the exact location and depth of all utilities, nor do they show all utilities that may be encountered.

E. The Contractor shall assume that there are existing underground utility connections to each and every building or structure along the line of work, whether they appear on the drawings or not. The Contractor shall notify the proper utility companies and obtain and preserve the locations as marked for all existing gas, electric and other utilities that may be encountered along the line of work, until such time as such markings are no longer required.

F. Experimental trench excavations are to be made prior to commencing pipe laying operations. The experimental trench locations shall be where requested by the Contractor and/or as directed by the Engineer, and shall be paid for under the applicable bid item.

G. The Contractor shall dig by hand in advance of the trenching machinery to determine the exact location and depth of each utility to be encountered. Excavating machinery shall be stopped at least two feet away from each side of the utility to be crossed and the Contractor shall tunnel by hand under these utilities after he has ascertained their exact location and depth.

H. The use of steel plates will be permitted by the Owner but for limited areas. Should the Contractor choose to use steel plates to cover trenches during the daytime or at night, the plates must be keyed into the surrounding pavement and the edges secured with spikes.

1.19 BLASTING IS NOT PERMITTED.

A. Blasting is not permitted during this project.

1.20 TRASH REMOVAL

A. The Contractor shall arrange to dispose of all liquid and solid refuse in a lawful, safe and efficient and anti-pollutant manner subject to the prior approval of the Owner.

B. The Contractor shall remove daily from the Location(s) of Work by means provided by the Contractor, all garbage, debris, and other waste materials (whether solid or liquid) arising out of or in connection with its operations hereunder, and any such garbage, debris and other waste materials not immediately removed shall be temporarily stored in a clean and sanitary condition, approved by the Owner, in suitable garbage and waste receptacles, also approved by the Owner and shall be kept covered except when filling and emptying them.

C. The Contractor shall exercise care in removing such garbage, debris and other waste materials from the Location(s) of Work. The manner of such storage and removal shall always be subject in all respects to the continual approval of the Owner. No equipment or facilities of the Owner shall be used in such removal unless prior written consent is given by the Owner. No such garbage, debris, or other waste materials shall be or be permitted to be thrown, discharged or disposed into or upon waters or bounding the Location(s) of Work.

1.21 CHANGES IN AMOUNT OF WORK

A. The Owner reserves the right to increase or decrease the amount of any item of the work listed as may be found desirable or necessary during the carrying out of this contract and the unit prices quoted in the Proposal shall apply without change to such variation in the quantity of each of the Items.

1.22 SEQUENCE OF CONSTRUCTION

A. For the protection of life and property all backfill operations shall follow closely behind pipe laying. The Contractor shall insure that no excavation be left open, unguarded, or water filled during any period of time when work is not actually in progress. It is the purpose and intent

that all excavations and backfill, including consolidation operations, the installation of service connections and temporary surfacing and pavements within an area be accomplished expeditiously before proceeding to other work areas. Construction scheduling and methods will be discussed at the pre-construction conference.

B. The Owner reserves the right to schedule the Contractor to construct at any locations within the project area. At the same time the Owner may order the suspension of construction at any location. Construction in seasonally heavily traveled roads shall be avoided during the peak traffic periods.

1.23 PROGRESS OF WORK

A. The Contractor shall promptly start pipe installation and continue actual construction work under this contract with the necessary crews and equipment to properly execute and complete this contract in the specified time. No cessation of Contractor's operations will be allowed without the approval of the Owner. The rate of progress shall be satisfactory to the Owner.

B. The Contractor shall not pave the roadways after October 31, unless written approval from the Owner is obtained.

1.24 TECHNICAL SPECIFICATIONS

A. All technical specifications such as ASTM, AWWA, AASHTO, etc., referred to in these specifications refer to the latest revision of such technical specifications.

1.25 STATE AND LOCAL HIGHWAY BOUNDS AND PROPERTY MARKERS

A. When encountered, the Contractor shall engage a Massachusetts Professional Land Surveyor to provide permanent reference points for all bounds and private property markers along the line of the work, which in the opinion of the Engineer, may be disturbed during construction. The Contractor shall submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the site. Any bounds or markers disturbed by the Contractor shall be replaced utilizing the services of a Massachusetts Professional Land Surveyor. The cost of replacing markers negligently disturbed shall be at the Contractor's expense.

1.26 TWENTY-FOUR (24) HOUR EMERGENCY SERVICE

A. The Contractor shall maintain a 24-hour, 7-day a week telephone service and a local facility to handle emergency requirements such as settled trenches, clogged drains, rain damage, etc. The Contractor's emergency personnel shall be able to respond to emergency calls within thirty minutes. A list of the personnel and their telephone numbers shall be submitted to the Engineer and Owner. This requirement shall apply during the entire length of the project.

B. This list shall be submitted on the Contractor's letterhead and shall state that should an emergency arise during the implementation of this project, these people are to be contacted. The Contractor shall submit this letter at the Pre-Construction Conference.

1.27 CONTRACTORS LAYDOWN/STORAGE

A. The Contractor is responsible for securing property for his operations including storage of materials and equipment. The City will **not** be responsible for providing the Contractor a staging area. The City of Waltham will **not** permit the storage of any materials, equipment or vehicles within any City right-of-way, which includes roadways and sidewalks.

PART 2 – PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Utility location and coordination shall be the responsibility of the Contractor. Dig Safe, City of Waltham Water and Sewer Department, and City of Waltham Wires Department shall be contacted prior to the layout or excavation of anywork.

B. The Contractor shall coordinate his schedule such that construction does not affect local school bus schedules. If it is expected that a construction event may impact the ability of the school bus to maintain their schedule, the Contractor shall notify the School Department 48 hours prior to the event.

C. The Contractor shall contact the responsible heads of the Fire, Police, and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, and other requirements. Wherever detours are permitted, traffic plans, procedures and signage shall conform with local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to the primary route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.

3.2 WORK CONDITIONS

A. Contractor shall utilize extreme care to prevent any contamination when working in proximity to natural water bodies. No oil, fuel, solvents, chemicals, or other type of potential liquid contaminants shall be stored on site. All equipment shall be checked daily for any type of fluid leak. Contractor shall immediately notify Owner and Engineer of any type of leak or spill. Contractor shall take all necessary measures to contain and clean up any type of leak or spill.

3.3 CONSTRUCTION SEQUENCE

A. **All work including final pavement and site restoration shall be completed no later than October 31, 2019.** Final completion shall be within **210 calendar days** after the date of the Notice to Proceed.

B. The Contractor shall submit to the Engineer for review and acceptance a complete schedule of his proposed sequence of construction operations prior to commencing any work. This schedule shall include the Contractor's plans for doing the work. In general, the following sequence of construction is suggested:

1. Perform the pipe and manhole inspections.
2. Furnish and install sewer and manhole replacement and rehabilitation and utility service work including temporary pavement restoration.
3. Perform the trenchless rehabilitation work to the sewers and manholes.
4. Pavement restoration (mill and overlay / permanent trench patch).
5. Perform site restoration.

C. The Contractor shall provide temporary facilities required for flow management and/or bypass pumping in order to maintain flows during installation of new sanitary sewers. The Contractor shall include the cost of all temporary facilities required to maintain operations during the construction period in his bid price. The cost shall include the cost for all labor, tools, equipment and materials necessary.

D. The Contractor shall maintain and pave the pipe trenches each day unless otherwise approved by the Owner. Contractor shall be responsible to make repairs to surface restoration.

E. The following items must be reflected in the Contractor's proposed sequence of construction operations:

1. Access to all residences and businesses must be maintained at all times. To the maximum extent practicable, the Contractor will work to limit the area impacted and time required his work while on public ways.
2. Residents must have access to potable water service at all times.
3. Garbage collection and mail services must be able to be maintained to residences and businesses at all times. Contractor will need to coordinate his efforts with these services to ensure access.
4. Bus routes must be maintained to schools at all times. Contractor may need to coordinate efforts with local school district to ensure access. Contractor may need to temporarily stop work to allow for school buses to pass through the work area.
5. Contractor shall provide one lane for the passage of traffic within any work zone unless approved by the Owner.

3.4 MAINTAIN EXISTING WORKS

A. Continuous Operations Criteria:

1. The Contractor shall conduct his operations in such a manner and sequence, which shall neither result in a disruption of, nor interfere with, the functional workings of any existing utilities/facilities.
2. The Contractor shall furnish, install and operate any piping, equipment and appurtenances necessary to provide the temporary services, facilities, and bypasses required during construction including, but not limited to, bypass pumping, flow barriers and diversions. Temporary facilities, if required, shall have pumping capacity equal to or greater than the existing maximum capacity of the piping as determined by their size and slope. The Contractor must submit a temporary by-pass plan to, and receive approval from, the Owner prior to conducting any bypassing.
3. The Contractor shall notify and coordinate with the Owner for all temporary modifications required for construction of, or interfacing with, the existing utilities. The Contractor shall be responsible for the operation and maintenance of all facilities constructed as part of the contract until such time as they are accepted by the Owner.
4. Contractor shall provide temporary connections of equivalent capacity or greater capacity when work is not active.
5. The Contractor shall submit all sewer bypass documentation to the Engineer a minimum of five business days prior to the required approval of bypass plans.

B. Minimize Interference

1. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing utilities, bus routes, or emergency entrance/exits.
2. Work of connecting with, cutting into and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. Before starting work, which will interfere with the operation of existing utilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.
3. The Contractor shall be aware of possible work by other utility companies in the project area.

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included - This section establishes general requirements pertaining to cutting, excavating, coring, fitting, and patching of the Work required to:
   1. Make alterations to existing structures.
   2. Make the parts fit properly.
   3. Replace work not conforming to requirements of the Contract Documents.
   4. Contractor is responsible for all cutting, coring, and rough and finish patching. Contractor shall coordinate the work of any and all subcontracting trades performing the work.
   5. Contractor is responsible for reviewing with the Owner and Engineer and receiving permission to proceed prior to cutting and coring and patching.

B. Quality Assurance:
   1. Perform all cutting, coring and patching in strict accordance with pertinent requirements of these Specifications, and in the event no such requirements are determined, in conformance with the Engineer's written direction.

C. Submittals:
   1. Provide a shop drawing submittal to include the following information:
      a. Identification of coring and cutting subcontractor including: Company name, business address contact information, or if by Contractor indicated as such.
      b. List of type of coring and cutting equipment proposed to be used with equipment cuts of the equipment.
      c. Schedule indicating the: location of the core or cut, size and any potential obstructions or embedded conduits and wiring.
      d. Key plan indicating the location of anticipated cores and cuts.
   2. Request for the Engineer's consent:
      a. Prior to cutting which affects structural safety, submit written request to the Engineer for permission to proceed with cutting.
      b. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Engineer and secure his written permission prior to proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for replacement of work shall be equal to those of adjacent construction and shall comply with the pertinent sections of these Specifications.

PART 3 - EXECUTION

3.1 CONDITIONS

A. Inspection:
   1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, coring, backfilling, and patching.
   2. After uncovering the work, inspect conditions affecting installation of new work.

B. Discrepancies:
   1. If uncovered conditions are not as anticipated, immediately notify the Engineer and secure needed directions.
   2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION PRIOR TO CUTTING AND CORING

A. Provide all required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the work.

B. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

C. All holes cut through concrete shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by him.

3.3 CORING

A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.

B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

E. Work area (e.g., adjacent pipes, etc.) shall be cleaned to remove splash residues from coring operation.

3.4 CUTTING

A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.

B. Provide for control of slurry generated by sawing operation on both sides of wall.

C. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.

E. Provide equipment of adequate size to remove cut panel.

F. Slurry or tailings resulting from cutting operations shall be vacuumed or otherwise removed from the area following drilling. Slurry or tailings shall not be allowed to enter floor drains.

G. Work area (e.g., adjacent pipes, etc.) shall be cleaned to remove splash residues from cutting operation.

3.5 PERFORMANCE

A. Perform all required excavating and backfilling as required under pertinent sections of these specifications. Perform cutting, coring and demolition by methods which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and/or new work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.

B. Coring or cutting which exposes cut surfaces of reinforcing steel or structural steel shall be coated. Coating shall be 10 mil (dry film thickness) applied in two 5 mil (dry film thickness) coats of a single component moisture cured coal tar urethane or two part coal tar epoxy corrosion barrier. Alternately the exposed steel can be cut back two inches from the surface and a non-shrink grout applied over the steel flush to the concrete core or cut surface.

C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown.

D. Finish patching shall match existing surfaces as approved.

END OF SECTION

SECTION 01050

COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.

B. Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

C. The Contractor shall coordinate construction under this Contract with homeowners, utilities and roadway owners.

D. All work shall be in accordance with the Standards of the City of Waltham, Massachusetts and shall meet all state and local standards.

E. A minimum of 48 hours advanced notice is required for all coordination.

1.2 COORDINATION WITH OTHERS

A. City of Waltham:

1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Waltham Police Department. The Contractor shall notify Waltham Police, Fire Department and Rescue Squad at least 48 hours in advance of any street closings or detours.
2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
3. The Contractor shall not operate any hydrants, valves, curb stops and corporations without specific approval of the City of Waltham Water and Sewer Department.

B. Waltham Water and Sewer Department

1. Contractor shall be responsible for coordinating all work in the vicinity of water lines, sewer lines and drain lines with the Waltham Water and Sewer Department. Contractor shall bear all costs for the Waltham Water and sewer Department's inspection requirements, temporary facilities, utility adjustments and other requirements.
2. Contact is Gerard Shaughnessy, Superintendent, gshaughnessy@city.waltham.ma.us
   Non-emergencies during office hours (8:30 am to 4:30 pm): 781-314-3810
   Emergencies during 7:00 am to 3:00 pm: 781-314-3855
   After hour emergencies: 781-585-0557

C. Waltham Wires Department

1. Contractor shall be responsible for coordinating all work in the vicinity of underground wires and traffic light wires/cables with the Waltham Wire Department. Contractor shall bear all costs for the Waltham Wire Department's inspection requirements, temporary facilities, utility adjustments and other requirements.

2. Contact is:

Non-emergencies during office hours (8:30 am to 4:30 pm): 781-314-3175
Emergencies during 7:00 am to 3:00 pm: 781-389-6044
After hour emergencies: 781-314-3855

D. Eversource Electric:
   1. The Contractor shall be responsible for coordinating and providing power to all construction sites both temporary and permanent services. The Contractor shall be responsible for coordinating all work in and around Eversource facilities with Eversource and bear all costs for Eversource inspection, temporary facilities relocation and all other requirements.

E. National Grid Gas:
   1. The Contractor shall be responsible for coordinating all work around gas mains and gas services with National Grid Gas. The Contractor shall bear all costs for National Grid inspection, temporary facilities relocation and all other requirements.

F. Verizon
   1. The Contractor shall also be responsible for coordinating all work around Verizon facilities with Verizon and shall bear all costs of inspection requirements, temporary facilities relocation and all other requirements.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF SECTION

SECTION 01070

ABBREVIATIONS & SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AGMA	American Gear Manufacturers Association
AIEE(IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
amp	Ampere 125-16
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class l25 (ASA Bl6 ll960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
c.f.	Cubic Foot
c.f.m.	Cubic Foot Per Minute
c.f.s.	Cubic Foot Per Second
CI	Cast Iron
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
c.y.	Cubic Yards
DC	Direct Current
DEP	Department of Environmental Protection
DI	Ductile Iron
DOT	Department of Transportation
EDR	Equivalent Directional Radiation
EPA	U.S. Environmental Protection Agency
fps	Feet Per Second
ft.	Feet
gal.	Gallons

gpd	Gallons Per Day
gpm	Gallons Per Minute
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
in.	Inches
inter.	Interlock
ISA	Instrument Society of America
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
max.	Maximum
MCB	Master Car Builders
MGD	Million Gallons Per Day
Min.	Minimum
NASSCO	National Association of Sewer Service Companies
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
rpm	Revolutions Per Minute
RUS	Rural Utility Service
s.f.	Square Foot
STL. W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	Square yard
TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01105

RODENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies rodent control and general pest control requirements within project areas, and bordering areas as designated by the Owner and Engineer. This work is to be performed prior to demolition, excavation, and site preparation and throughout the Contract, so that rodents and other pests do not disperse from or infest the project area.

B. The Contractor shall develop and implement an Integrated Pest Management (IPM) approach. As part of that approach, the Contractor shall maintain a cooperative dialogue with appropriate agencies and management/representatives of neighboring properties.

C. The Contractor shall perform the rodent control tasks described in this Scope of Work and also respond to other pest control needs when directed by the Owner.

1.2 SUBMITTALS

A. Submit to the Engineer copies of pesticide applicator certifications and licenses within ten (10) days of the start of Rodent Control activities and ten (10) days prior to their issuance or renewal for the duration of this Contract.

B. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

C. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

1. Weekly - Submit data sheets with locations of sites treated, amounts and types of pesticide used, number and types of traps set, survey and inspection results, sanitation conditions, complaint calls investigated, and any problem that occurred.
2. Monthly - Submit a written summary that includes determinable results of the IPM program and recommendations.
3. Quarterly - Submit a map that shows bait stations, manholes, and catch basins where rodent baits are being maintained.

1.3 QUALIFICATIONS

A. The Contractor shall perform this work at all times in accordance with the following minimum standards and as acceptable to the Owner and Engineer.

1. The Contractor and key personnel shall have experience with commercial and residential accounts and construction projects; have experience and technical training in vertebrate pest management and integrated pest management; have experience with various rodent control techniques, equipment, and strategies; have training and experience with insect control; and have knowledge of and experience with techniques to reduce non-target hazards.

2. The supervisor shall be licensed and certified by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41) and Vertebrate Pest Control (category 44). The supervisor shall have specific training and experience in vertebrate pest management, commercial rodent control, general pest control, and integrated pest management.
3. Applicators shall be licensed by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41). Applicators shall have specific training and experience in commercial rodent control and integrated pest management.

1.4 COORDINATION

A. Perform this Work in cooperation with the other Work performed under the Contract.
B. Initiate the work on or before field mobilization begins for the Contract and with adequate timing to achieve control before environmental disruptions. Provide a maintenance program until Contract is completed and all equipment and materials are removed.
C. Perform the Work according to the preliminary schedule described in this section and as accepted or revised by the Owner and Engineer. Estimated durations and start dates may be changed by the Owner or Engineer to suit changes in construction schedules and field conditions. The Work could potentially require performance any day of the week and any hour of the day or night, regardless of weather.
D. Perform this work in such a manner that toxicant or other control tools do not pose a hazard to persons, domestic animals, or non-target wildlife.

1.5 PERMITS

A. Obtain and maintain in coordination with the Contractor appropriate permit(s) from city or state agencies for pest control activities associated with this Work.
B. Obtain and maintain in coordination with the Contractor all right of entry permits required for the performance of this Work. This includes all utilities and private properties to which entrance is required.

PART 2 - PRODUCTS

A. Furnish and use only pesticide formulations registered by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Food and Agriculture, where appropriate according to label directions and as acceptable to the Engineer.
B. Furnish and use devices and supplies (e.g., traps and bait stations) to facilitate the management and effectiveness of the pest control program, where appropriate and as acceptable to the Engineer.

PART 3 - EXECUTION

3.1 MEETINGS

A. Before proceeding with the Work, all pest control personnel shall attend a Work Shop held by the Contractor and Engineer to discuss planned pest control methods and coordination.
B. The supervisor shall meet with the Contractor and Engineer weekly to discuss pest control activities.

3.2 SURVEY

A. Prior to baiting, survey the proposed construction area and accessible or observable bordering areas and record signs of rodent activity and sanitation conditions. Closely inspect all embankments, edge areas, and properties within and abutting the construction area. Maintain survey records in the manner described in Paragraph 3.7 below.

B. Thoroughly inspect construction area and accessible or observable bordering areas and any nearby areas designated by the Owner or Engineer, for rodent activity and sanitation deficiencies weekly throughout the duration of this Contract and in accordance with the work schedule. Maintain inspection records in the manner described in Paragraph 3.7 below.

C. Plan the control program and allocate resources based on survey and inspection data and as acceptable to the Owner.

3.3 APPLICATION FOR RODENT CONTROL

A. Apply rodenticide in strict accordance with EPA-approved label directions and the Rules and Regulations of the Massachusetts Department of Food and Agriculture. Maintain records of all bait placements in the manner described in Paragraph 3.7 below.

B. Where appropriate, especially for surface placements of rodent baits, use properly secured and tamper-resistant bait stations consistent with EPA regulation. Individually number and properly identify all bait stations.

C. Surface Applications

1. Initial Surface Baiting. Rid the construction area of all detectable rodents before construction begins, or as acceptable to the Owner. Bait all observable rodent burrows. Install and secure bait stations at regular and appropriate intervals and locations, and document rodent activity (burrows, droppings, bait consumed, and dead rodents). Replenish bait and shift bait stations as necessary to ensure complete control of rodent populations. Bait edge and accessible bordering areas as necessary to ensure that rodents will not be dispersed by construction activities and that rodents will not infest work areas.

2. Maintenance Surface Baiting. Establish a maintenance baiting program prior to mobilization by the Contractor, including construction areas and accessible bordering areas, as acceptable to the Owner. Check bait placements weekly. Use survey and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute bait and bait stations as appropriate to ensure continued control.

D. Subsurface Applications

1. General. For situations involving underground construction/demolition, utility relocation, or utility construction, and for other situations when determined necessary by the Owner or Engineer, initiate subsurface baiting and rid underground environments of all detectable rodents before construction begins. Assign an identifying number to each manhole and catch basin where bait is placed so that locations of bait placements can be identified and rodent activity (droppings, bait consumed, dead rats) can be documented. Conduct bait applications during off- peak traffic hours unless otherwise directed by the Engineer. Access manholes according to the requirements of appropriate agencies and utility companies. Coordinate the Work with appropriate municipal agencies and utility companies.

2. Initial Subsurface Baiting. Apply appropriate baits to control rodent populations in manholes and catch basins. This will involve suspending and securing bait using

noncorrosive wire (e.g., 24-gauge plastic coated). Place bait in all accessible manholes and catch basins within the construction work area. In addition, bait an appropriate set of manholes and catch basins in the blocks bordering the work area and as acceptable to the Owner. Identify all baited manholes and catch basins with a standardized paint mark on the street and a numbered tag to be attached to the suspending wire. Approximately seven days after completion of the first baiting, check all manhole and catch basin baits and record estimates on the amount of bait consumed. Replenish or increase the amount of bait applied according to the amount consumed or as acceptable to the Owner and Engineer. Repeat this process again approximately fourteen days later and until there is little or no bait consumed. Check manholes and catch basins weekly when they repeatedly have 100 percent of the bait consumed.

3. Maintenance Subsurface Baiting. Prior to mobilization by the Contractor, establish a maintenance baiting program appropriate for the rodent infestation patterns identified during initial subsurface baiting. This program shall ensure continued control and shall be performed in a manner acceptable to the Owner and Engineer. Maintain bait in manholes and catch basins that have rodent activity and those that had activity during initial baitings. Check each bait according to rodent activity levels. This could range from weekly to approximately every three months, depending upon the recent history of bait consumption. Use utility maps and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute baiting locations as necessary to ensure adequate interception points for controlling immigrating rodents.

E. Cleanup

1. Remove visible rodent carcasses and dispose of them daily consistent with the pesticide label directions and applicable codes, laws, and regulations.
2. Upon completion of any pest control operations at the site, remove remaining bait and dispose of it according to the pesticide label and applicable codes, laws, and regulations. Also remove all wires used for subsurface baiting and any bait stations or traps.

3.4 SANITATION

A. Prior to construction and throughout the duration of this Contract, identify and document harborage and food sources available to rodents on the construction site and in observable bordering areas. This includes any littering or improper or insufficient use of trash receptacles in construction areas. It also includes any bordering areas with sanitation conditions or structural deficiencies that violate City or State sanitation codes.

B. Maintain records of sanitation conditions in the manner described in Paragraph 3.7 below.

3.5 COMPLAINT CALLS

A. During construction, respond to pest-related complaints from the "adjacent" neighborhood (i.e. within 200 feet of the project limits) within 12 hours when directed by the Owner or Engineer. Inspect the particular premises and adjacent areas for sanitation and structural deficiencies and also signs of historic and recent pest activity. Provide sanitation and structural maintenance information to the property owner or manager. Use pesticides or traps as necessary and appropriate to resolve the complaint when there is a relationship between the pest infestation and construction activities, or when directed by the Owner or Engineer.

B. Maintain records of all complaints investigated, including location, contact person, inspection results, and actions taken. Document the relatedness of the pest infestation to construction activities.

3.6 GENERAL PEST CONTROL

A. When directed by the Owner or Engineer, the Contractor shall determine appropriate methods for any pest control task not specifically identified above and shall submit them in writing to the Owner and Engineer for approval in advance. Such pest control tasks would relate to unanticipated pest control needs within construction areas or adjacent areas. This could include control of insects or vertebrates other than rats and mice.

B. Maintain records of general pest control activities and results in the manner described in Paragraph 3.7 below.

3.7 RECORD KEEPING

A. Use standardized data sheets acceptable to the Owner and Engineer to maintain accurate records of date, placement, type, and amount of pesticides or other control tools (e.g., traps) applied. Similarly, maintain records of surveys, inspections, changes in pest activity, sanitation conditions, and complaint calls. Submit data in a format acceptable to the Owner and Engineer and as required under Paragraph 1.3 (C) above.

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. For lump sum items, payment shall be made to the Contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual workcompleted.

B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by finalmeasurements.

1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the work day.
3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.

B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work and until its final acceptance by the Engineer, and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the Work as herein authorized.

C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

A. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

A. Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

1.6 PAYMENT FOR MATERIAL DELIVERED

A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment, which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.

B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

A. After final measurements are made by the Engineer, the Contractor will prepare a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:
   1. Attending pre-construction and monthly progress meetings
   2. Pre-Construction photographs and videos.
   3. Project record documents.
   4. Clean-up and restoration of property.
   5. Restoration of fences and other structures.
   6. Utility crossings and relocations, unless otherwise paid for.
   7. Restoration of property, and replacement of fences, curbs, structures, sign posts, guard rails, rock wall, mail boxes, traffic loop detectors and other minor items disturbed by the construction activities.

8. Trench boxes, steel and/or wood sheeting as required, including that left in place.
9. Maintenance of all existing sewer flows and repair of existing sewer pipes.
10. Dewatering as necessary.
11. Dust control.
12. Quality assurance testing.
13. Final cleaning of sewers.
14. Earthwork (except ledge).
15. Compaction testing of backfill and aggregate base.
16. Pipe bedding, backfill, and aggregate base.
17. Clearing, grubbing and stripping.
18. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications and other submittals required by the Contract Documents.
19. Repair and replacement of water lines, water mains, culverts, underdrains, and rock lined drainage trenches in streets and other utilities damaged by construction activities and corresponding proper disposal of removed materials unless otherwise paid for.
20. Temporary construction necessary for construction sequencing and other facilities not permanently incorporated into the work.
21. Weather protection.
22. Permits not otherwise paid for or provided by the Owner.
23. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
24. All excavation except the test pits specifically shown or ordered by the Engineer to establish sewer line and water line locations, earth excavation below grade and rock excavation.
25. Contract administration and insurance.
26. Test pits to establish in place field soils density, groundwater conditions, or requirements for dewatering.
27. Utility crossings and relocations, unless payment is otherwise made.
28. Pipe markings.
29. Pavement markings.
30. Removal and disposal of existing surface pavement, existing sidewalks, and curbs.
31. Removal and disposal of existing sanitary sewer structures and existing non-asbestos cement sanitary sewer pipes as shown and where indicated in the figures.

1.9 DESCRIPTION OF PAY ITEMS

A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.

B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

Sanitary Sewer and Storm Drain Work

(1, 2, 3, and 4) – Sanitary Sewer Pipe, all depths

A. Method of Measurement: Sanitary sewer pipe measured for payment shall be the number of linear feet installed measured along the center line of the pipe as laid including fittings as indicated in the Contract Documents or as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole Pipe installed into the manhole will not be measured for payment.

B. Basis of Payment:

1. The contract unit price per linear foot for gravity sanitary sewer shall be full compensation for all labor, materials, and equipment necessary to complete this work including saw cut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of non-AC pipe where required; dewatering, bedding; furnishing and installing pipe and fittings, including, but not limited to wyes, tees, bends; and backfill including 12 inches of dense grade aggregate roadway base; compaction; connection to existing piping as required; light cleaning pipes prior to each CCTV inspection; pre-CCTV and post-CCTV inspection; providing DVD of video and written logs of CCTV inspection; testing; site restoration; and all else incidental thereto for which payment is not provided under other items.
2. Payment for this work on interim requisitions shall be according to the following percentages:
   a. Sanitary sewer pipes in place and backfilled - 90 percent.
   b. Sanitary sewer pipes successfully cleaned, tested, and CCTV - 10 percent.
3. Contractor will not be paid any additional costs under this item resulting from improper removal activities that result in soil contamination.

5) – Sanitary Service Connection, all diameters

A. Method of Measurement: Sanitary sewer building connections measured for payment shall be the number of linear feet installed from sanitary sewer service pipe (all diameters) as directed by the Engineer and as determined in the field. Measurement shall be from the top of the tee or wye in the trunk line to the edge of the reconnection. This will be measured vertically for chimney connections and horizontally for service connections along the centerline of the pipe.

1. Existing diameter of service connection shall be used unless upsizing is directed by the Engineer. Majority of the sewer connections are 4-inch diameters, but some may be larger.

B. Basis of Payment:

1. The contract unit price per linear foot shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of non-AC pipe where required; dewatering; bedding; furnishing and installing pipe, tees, wyes, HDPE sleeve, and other fittings; connection to existing service; backfilling including aggregate base; compaction; site restoration; and all else incidental thereto for which payment is not provided under other items.
2. If directed by Engineer, sewer services may be relocated from manhole to the sewer trunk line. This work shall be paid for under this bid item.

(6a and 6b) –Diameter Manhole for Sewer or Drain

A. Method of Measurement: Sanitary sewer or drain manholes accepted for payment shall be the actual vertical feet of structures installed and accepted complete in place, from the lowest invert to finish grade as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment:

1. The contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of existing manhole where required; removal and deliver existing cover and frame to City DPW at 165 Lexington Street, Waltham or dispose of existing cover and frame at Owner's request; dewatering; 12" crushed stone bedding; furnishing and installing precast concrete sections, frame, cover, masonry materials, and waterproofing; constructing inverts; backfilling including 12 inches of dense grade aggregate roadway base ; compaction; cleaning; testing; adjustment of frame and cover to final grade; and all else incidental thereto for which payment is not provided under other items.
2. Payment for this item shall be as follows:
    a. 90 percent of the unit price upon installation of manholes.
    b. 10 percent of the unit price upon successful completion of cleaning and manhole testing.

(7) – Inside Manhole Drop Pipe Connection

A. Method of Measurement: Inside Manhole Drop Bowl Connections measured for payment shall be the actual vertical feet of pipe furnished and installed measured from the invert of inlet pipe to the lowest manhole invert as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including furnishing and installing pipe, wyes, tees, fittings and pipe supports; constructing inverts; and all else incidental thereto for which payment is not provided under other items.

(8) – Sewer or Drain Structure Rebuild or Remodel

A. Method of Measurement: Structures remodeled and accepted for payment shall be the actual vertical feet of structures installed and accepted complete in place, measured vertically from the bottom of the remodel/rebuild to finish grade.

B. Basis of Payment: The Contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of existing structure where required, dewatering, bedding, furnishing and installing precast sections, furnishing and installing masonry materials, furnishing and installing frames and grates at proper grade; furnishing and installing curb inlet where required; furnishing and installing hoods, backfilling including 12 inches of dense grade aggregate roadway base , compaction, cleaning sumps, adjustment of frame and grate to final grade; site restoration; and all else incidental thereto for which payment is not provided under other items.

(9) – Catch Basin – Replace Frame and Grate

A. Method of Measurement: Frames and grates replaced accepted for payment shall be for the actual number of catch basins rehabilitated with new frame and grate as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each catch basin frame and grate replaced shall be full compensation for all labor, materials and equipment necessary to complete the work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removal and deliver existing grate and frame to City DPW at 165 Lexington Street, Waltham or dispose of existing grate and frame at Owner's request; furnishing, installing and grouting new frame and grate; backfill including 12 inches of dense grade aggregate roadway base; compaction; cleaning catch basin; adjustment frame and grate to final grade; site restoration; and all else incidental thereto for which payment is not provided under other items.

(10) – Catch Basin – Replace Curb Inlet Frame and Grate

A. Method of Measurement: Curb inlet frames and grates replaced accepted for payment shall be for the actual number of catch basins rehabilitated with new curb inlet frame and grate as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each catch basin curb inlet frame and grate replaced shall be full compensation for all labor, materials and equipment necessary to complete the work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removal and deliver existing grate and frame to City DPW at 165 Lexington Street, Waltham or dispose of existing grate and frame at Owner's request; furnishing, installing and grouting new curb inlet frame and grate; backfill including 12 inches of dense grade aggregate roadway base; compaction; cleaning catch basin; adjustment frame and grate to final grade; site restoration; and all else incidental thereto for which payment is not provided under other items.

(11) – Temporary Sewer Bypass Pumping

A. Method of Measurement: Payment of the lump sum amount for temporary sewer bypass pumping shall be full compensation for preparation, submittal of bypass plan, installation, testing, operation, maintenance and removal as required to maintain sewer service.

B. Basis of Payment: Temporary sewer bypass pumping shall be paid for as a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for all labor,

materials, tools and equipment necessary to complete this work including but not limited to: preparing and submitting sewer bypass plan; maintaining existing flows; providing temporary sewer system for mainlines and services including force mains, fittings, manhole plugs, pumps that can pump the maximum capacity of the existing gravity sewer pipes; all setups and relocations of temporary bypass systems necessary for the work; and removing all temporary bypass systems upon acceptance of the permeant sewers and manhole structures; connection to existing sewer manholes and pipes; sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); backfill; compaction; providing temporary binder pavement; site restoration; and all else incidental thereto for which payment is not provided under other items. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of bypass pumping completed to date or as determined by the engineer.

Manhole Rehabilitation

(12) – Manhole – Seal Frame

A. Method of Measurement: Sealing frame accepted for payment shall be the actual number of sanitary manholes that have a frame sealed within the structure (not the number of repairs) and accepted complete in place, as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Payment for Sealing Frame shall be made for at the unit bid price in the Bid Schedule. The unit price per point shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning, disposal of materials removed, preparing surface including any primers, furnishing and applying polymer seal to the frames; testing; and all else incidental thereto for which payment is not provided under other items.

(13) – Manhole – Point Repair of Chimney

A. Method of Measurement: Chimney point repair accepted for payment shall be the actual number of sanitary manholes that have a point repair of the chimney within the structure (not the number of repairs) and accepted complete in place, as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Payment for Point Repair of Chimney shall be made for at the unit bid price in the Bid Schedule. The unit price per point shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning, disposal of materials removed, patching chimney with bricks and mortar, and all else incidental thereto for which payment is not provided under other items.

(14) – Manhole – Point Repair of Wall

A. Method of Measurement: Wall point repair accepted for payment shall be the actual number of sanitary manholes that have point repairs of the wall within the structure (not the number of repairs) and accepted complete in place, as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Payment for Point Repair of Wall shall be made for at the unit bid price in the Bid Schedule. The unit price per point shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning, disposal of materials removed, patching wall with bricks and mortar, and all else incidental thereto for which payment is not provided under other items.

(15) – Manhole – Point Repair of Bench

A. Method of Measurement: Bench point repair accepted for payment shall be the actual number of sanitary manholes that have point repairs of the bench within the structure (not the number of repairs) and accepted complete in place, as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Payment for Point Repair of Bench shall be made for at the unit bid price in the Bid Schedule. The unit price per point shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning, disposal of materials removed, patching bench with bricks and mortar, and all else incidental thereto for which payment is not provided under otheritems.

(16) – Manhole – Replace Frame and Cover

A. Method of Measurement: Frames and covers replaced accepted for payment shall be for the actual number of manholes rehabilitated with new frame and cover as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each manhole frame and cover replaced shall be full compensation for all labor, materials and equipment necessary to complete the work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removal and deliver existing cover and frame to City DPW at 165 Lexington Street, Waltham or dispose of existing cover and frame at Owner's request; furnishing, installing and grouting new frame and cover; backfill including 12 inches of dense grade aggregate roadway base; compaction; cleaning manhole; adjustment frame and cover to final grade; site restoration; and all else incidental thereto for which payment is not provided under other items.

(17) – Manhole – Remove Cross Bore

A. Method of Measurement: Removal and relocation of cross bore pipe shall be paid for at the actual number of manholes that had cross bores removed (not the number of cross bores) as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each manhole frame and cover replaced shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning; disposal of materials removed; patching holes; sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of cross bore pipe; dewatering; bedding; furnishing and installing pipe and fittings to relocate cross bore pipe; backfilling including 12 inches of dense grade aggregate roadway base ; compaction; connection to existing piping as required; testing; site restoration; and all else incidental thereto for which payment is not provided under other items.

(18) – Manhole – Clean

A. Method of Measurement: Removal of sediment and debris from the manhole measured for payment shall be the number of manholes cleaned as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The contract unit price per manhole cleaning shall be full compensation for all labor, materials, and equipment necessary to complete this work including cleaning manhole; disposal of material removed from the manhole; and all else incidental thereto for which payment is not provided under otheritems.

(19) – Manhole – Line

A. Method of Measurement: Manhole accepted for payment shall be for the actual vertical feet of structures rehabilitated with cementitious and epoxy lining from the lowest invert to finish grade as indicated in the Contract Documents or as directed bythe Engineer.

B. Basis of Payment: The contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cleaning and preparation of structure for lining; patching holes; cementitious and epoxy lining of structure; testing; and all else incidental thereto for which payment is not provided under other items.

(20) – Manhole – Grout

A. Method of Measurement: Manholes grouted accepted for payment shall be per vertical foot of manholes, measured from the lowest grouting hole to highest grouting hole, whose leaks are sealed with injection grouting, grouting of open joints, and other similar methods at the locations within the structure (not number of repairs) indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each manhole grouted shall be full compensation for all labor, materials and equipment necessary to complete the work including power wash cleaning and preparation of structure; drilling holes for injection grouting; injection of grout to seal leaks; patching grout holes; grouting and sealing around leaking pipe connections or other defects; and all else incidental thereto for which payment is not provided under other items.

(21) – Manhole – Root Removal

A. Method of Measurement: Mechanical removal of roots inside manholes measured and accepted for payment shall be the number of manholes where roots are removed by mechanical methods (not the number of roots removed) as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment:

1. The root removal shall be paid for at the Contract unit price per each stated in the Bid Schedule. Said unit price shall include compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work including light cleaning manhole prior to root removal; removal of roots by mechanical means; disposal of material removed from the manhole; and all appurtenant work as needed to complete the work

Sanitary Sewer Pipe Rehabilitation

(22) – Sanitary Sewer Pipe– Root Removal

C. Method of Measurement: Mechanical removal of roots inside sanitary sewer pipe joints measured and accepted for payment shall be the number of joints where roots are removed by mechanical methods as indicated in the Contract Documents or as directed by the Engineer.

D. Basis of Payment:

1. The root removal shall be paid for at the Contract unit price per each stated in the Bid Schedule. Said unit price shall include compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work including light cleaning sanitary sewer prior to root removal; removal of roots by mechanical

means; disposal of material removed from the sanitary sewer; pre-CCTV and post CCTV inspection of the sewer for verification of root removal; providing video DVDs and written logs; and all appurtenant work as needed to complete the work

(23) – Sanitary Sewer Pipe – Point Repair (Replace 5'-10')

A. Method of Measurement: Point replacement of sewer pipe accepted for payment shall be the actual number of replacement point repairs and accepted as complete as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Pipe Replacement point repairs shall be paid for at the Contract unit price per each stated in the Bid Schedule, at length not to exceed 10 feet but not less than an appropriate amount to cover the repair. Said unit price shall include compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of pipe where required (except AC pipe); furnishing and installing pipe and fittings; backfill including 12 inches of dense grade aggregate roadway base; compaction; testing; light cleaning prior to each CCTV inspection; pre-CCTV and post-CCTV inspection of the sewer; disposal of material removed from the sewer; providing DVD of video and written logs of CCTV inspection; reconnection of non-capped sewer services where required; and all else incidental thereto for which payment is not provided under other items.

(24) – Sanitary Sewer Pipe – Cut Intruding Lateral

A. Method of Measurement: Cutting intruding lateral of sanitary sewer pipe accepted for payment shall be the actual number of intruding laterals cut and accepted as complete as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Cutting intruding laterals shall be paid for at the Contract unit price per each stated in the Bid Schedule, and said unit price shall include compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work including light cleaning prior to each CCTV inspection; pre-CCTV and post-CCTV inspection of the sewer; disposal of material removed from the sewer; providing DVD of video and written logs of CCTV inspection; cutting and removing intruding sewer lateral; grouting around the lateral; removing excess grout; testing; and all else incidental thereto for which payment is not provided under other items.

(25 and 26) – Sanitary Sewer Pipe - Line

A. Method of Measurement: Lining of sewer pipe measured and accepted for payment shall be the number of linear feet lined measured along the center line of the pipe as indicated in the Contract Documents or as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole. Pipe lined into the manhole will not be measured for payment.

B. Basis of Payment:

1. The pipe lining shall be paid for at the Contract unit price per linear foot stated in the Bid Schedule. Said unit price shall include compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work including light cleaning sewer prior to each CCTV inspection; disposal of material removed from the sewer; pre-CCTV and post CCTV inspection of the sewer; providing video DVDs and written logs; furnishing and lining the sanitary sewer; sealing around liner in manholes; testing; delivering written notices to abutters prior to lining work; and all appurtenant work as needed to complete the work
2. Payment for this work on interim requisitions shall be according to the following percentages:
    a. Sewer pipe acceptably lined - 90 percent.
    b. Sewer pipe successfully tested and post CCTV inspected – 10 percent.

(27) – Reinstatement of Sewer Service after Lining

A. Method of Measurement: Reinstatement of sewer services after lining accepted for payment shall be the actual number of services reinstated and accepted as complete as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The contract unit price for reinstatement of a sewer service after lining shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including, light cleaning sewer prior to each CCTV inspection; disposal of material removed from the sewer; pre-CCTV and post CCTV inspection of the sewer; providing video DVDs and written logs; cutting of the liner at each active service; polishing the cut hole; grout and seal of each service connection; removal of excess grout; verification of sewer service reinstatement with CCTV inspection; site restoration and all else incidental thereto for which payment is not provided under other items.

(28) – Sanitary Sewer Pipe – Grout

A. Method of Measurement: Grouting of sewer pipe joints measured and accepted for payment shall be the actual number of pipe joints grouted and accepted as complete as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The contract unit price for grouting of sewer pipe joints shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including, light cleaning sewer prior to each CCTV inspection; disposal of material removed from the sewer; pre-CCTV and post CCTV inspection of the sewer; providing video DVDs and written logs; grouting and sealing pipe joint; removing excess grout; testing the joint after grouting using packer equipment; site restoration; and all else incidental thereto for which payment is not provided under other items.

(29) – Inspection of Manhole, all depths

A. Method of Measurement: Inspection of manholes measured for payment shall be the number of manholes inspected as indicated in the Contract Documents (Appendix C) or as directed by the Engineer.

B. Basis of Payment: The contract unit price per each manhole inspected shall be full compensation for all labor, materials, and equipment necessary to complete this work including locating the manhole; raising frame and cover to grade; inspecting manholes per NASSCO MACP standards for Level 2 inspection; providing CD-ROM/DVD of photographs, database, and written logs of manhole inspection within 60 days of contract times commence to run; and all else incidental thereto for which payment is not provided under other items.

(30) – CCTV Inspection of Sanitary Sewer Pipe, alldiameters

A. Method of Measurement: CCTV inspection of sanitary sewer pipes measured for payment shall be the number of linear feet inspected measured along the center line of the pipe as indicated in the Contract Drawings (Appendix C) and as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole.

B. Basis of Payment: The contract unit price per linear foot for CCTV inspection of sanitary sewers shall be full compensation for all labor, materials, and equipment necessary to complete this work including light cleaning sewer prior to CCTV inspection; disposal of material removed from the sewer; providing video DVDs, database, and written logs within 60 days of contract times commence to run; site restoration; and all else incidental thereto for which payment is not provided under otheritems.

C. This bid item is only for pipes that have not previously been inspect by the Engineer and is not the same as pre-CCTV and post-CCTV inspections associated with pipes that shall be replaced or repaired as part of this Contract.

(31) – Heavy Cleaning of Pipe Prior to Work, all diameters

A. Method of Measurement: Removal of sediment and debris from the sanitary sewers measured for payment shall be the number of linear feet heavy cleaned measured along the center line of the pipe including fittings as indicated in the Contract Documents or as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole.

B. Basis of Payment: The contract unit price per linear foot for sanitary sewer pipes heavy cleaned shall be full compensation for all labor, materials, and equipment necessary to complete this work including heavy cleaning of sewer; disposal of material removed from the sewer; and all else incidental thereto for which payment is not provided under other items.

1. Work under this bid item shall meet the definition established by NASSCO for heavy cleaning to qualify for payment.

Water Work

(32 and 33) – Copper Service Pipe

A. Method of Measurement: Copper service pipe measured for payment shall be the actual length in linear feet as measured along the center line of the pipe as laid from the water main to the property line as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment:

1. Service pipe shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removing and disposing of existing non-AC pipe where required; furnishing and installing service pipes and fittings; trench dewatering; cleaning, testing, and disinfecting; connection to existing water main including connection to, reaming or preparing of existing corporation stops; backfill including 12 inches of dense grade aggregate roadway base; compaction; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under other items.
2. Contractor will not be paid any additional costs under this item resulting from improper removal activities that result in soil contamination.

(34 and 35) – Corporation Stops

A. Method of Measurement: Corporation stops and taps measured for payment shall be the actual number furnished and installed for service connections as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Corporation stops and taps shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); furnishing and installing corporation stop; tapping the main; dewatering; backfill including 12 inches of dense grade aggregate roadway base; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(36) – Abandoning of Existing Corporation Stops

A. Method of Measurement: Abandoning of water corporation stops measured for payment shall be per each corporation stop abandoned and accepted by Engineer as indicated in the Contract Documents or as directed by the Engineer.

B. At the discretion of the engineer the Contractor may be required to furnish and install a Ford's Abandon Corporation Cap (FACC), or approved equal, over existing corporations. Compensation for furnishing and installing FACC will be included in the unit price under this Item.

C. Basis of Payment: The Contract unit price for abandoning water corporation stops shall be full compensation for all labor, materials and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; closing the corporation stop; furnishing and installing FACC; bedding; backfilling including 12 inches of dense grade aggregate roadway base; compaction; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(37 and 38) – Curb Stop and Box

A. Method of Measurement: Curb stops and boxes measured for payment shall be the actual number furnished and installed for service connections as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Curb stops and boxes shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); furnishing and installing curb stop and box; for connection of the homeowner's existing service pipe to the curb stop; dewatering; backfill including 12 inches of dense grade aggregate roadway base; adjustment of box and cover to final grade; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(39) – 8-inch Ductile Iron Water Main

A. Method of Measurement: Water main measured for payment shall be the actual length in linear feet as measured along the center line of the pipe as laid including all fittings and valves as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment:

1. The contract unit price per linear foot of water main shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removing and disposing of existing non-AC pipe where required; dewatering; bedding; furnishing and installing pipes and fittings; laying, setting and jointing all pipes and fittings; backfill including 12 inches of dense grade aggregate roadway base and subbase material; compaction; thrust blocks for restraining joints; cleaning and flushing; testing; disinfecting; connecting to the existing water mains; temporary taps and fittings required for testing; site restoration; and all else incidental thereto for which payment is not provided under other items.
2. Payment for this work on interim requisitions shall be according to the following percentages:
   a Water main acceptably set in place and backfilled - 90percent.
   b. Water main successfully tested, chlorinated, and ready to be incorporated into the existing system - 10 percent.

(40) – Gate Valve

A. Method of Measurement: The quantity of 6-inch or 8-inch gate valves to be paid for under this item shall be the actual number of valves and valve boxes installed complete in place as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Gate valves shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removing and disposing of existing non-AC pipe where required; furnishing, installing, setting, and jointing valves and valve boxes; restraining joints; backfill including 12 inches of dense grade aggregate roadway base and subbase material; compaction; testing all valves and valve boxes; providing one T-handle operator wrench per each valve diameter; site restoration; adjusting of valve box and cover to final grade; and for all other work and expenses incidental thereto for which payment is not provided under other items.

Site Restoration Work

(41) – Removal And Resetting of Granite Curb

A. Method of Measurement: The quantity of granite curb and concrete curb to be paid for under this item shall be the linear feet of granite curb and concrete curb removed, stored and reset within the payment limits defined in the Documents and directed by the Engineer. Curb removed for the convenience of, or damaged by the Contractor is not covered by this bid item.

B. Basis of Payment: Resetting of granite curb and concrete curb shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); backfill including 12 inches of dense grade aggregate roadway base; compaction; removing and storing existing curb, resetting of existing vertical or sloped curb, placing concrete to anchor the granite curb, repair of loam and seed behind curb as necessary, and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining granitecurb.

(42) – Concrete Sidewalks Wheelchair Ramps (6-inch thick)

A. Method of Measurement: Concrete Sidewalk Wheelchair Ramps accepted for payment shall be the actual number of square yards of wheelchair ramps installed and accepted complete in place.

B. Basis of Payment:
Contract Unit Price per square foot of detectable warning device installed shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including excavation (except ledge excavation); placement of base course; placement and installation of 3/4-inch aggregate, 4000 psi rated, fiber reinforced concrete; detectable warning devices; site restoration; and all else incidental thereto for which payment is not provided under other items.

(43) – Concrete Sidewalk (4-inch thick)

A. Method of Measurement: The quantity of concrete pavement to be paid for under this item shall be for at the unit price per square yard of concrete sidewalk hand-placed at the direction of the Engineer, calculated as described below.

B. Basis of Payment: Pavement shall be paid for at the Contract unit price per square yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment necessary to complete this work including sawcut, management, removal and disposal of surface concrete sidewalk; excavation (except ledge excavation); preparation of base material, placement and installation of 3/4-inch aggregate, 4000 psi rated, fiber reinforced concrete sidewalk; repair of loam and seed behind sidewalk as necessary, and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining concrete sidewalk.

1. Payment shall be based on the amount of sidewalk accepted by the Engineer that does not exceed the payment limits for both width and thickness.

(44) – Concrete Sidewalks, Walkways,and Driveway Aprons (6-inch thick)

A. Method of Measurement:
   1. The quantity of concrete sidewalks to be paid for under this item shall consist of the number of square yards of 6-inch thick sidewalk, walkways and driveway aprons placed at the direction of the Engineer within the payment limits shown on the drawings.
   2. Actual widths will be used in computing area wherever the width of bituminous or Portland cement concrete pavement removed and replaced is less than the above specified limits.

B. Basis of Payment:
   1. Pavement shall be paid for at the Contract Unit Price per square yard stated in the Bid Schedule.
   2. Said unit price shall be full compensation for furnishing all materials, labor, equipment necessary to complete this work including sawcut, management, removal and disposal of surface concrete sidewalk; excavation (except ledge excavation); preparation of base material, placement and installation of 3/4-inch aggregate, 4000 psi rated, fiber reinforced concrete sidewalk; repair of loam and seed behind sidewalk as necessary, and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining concrete sidewalk.

(45) – Granite Curb - Vertical

A. Method of Measurement: Vertical granite curb measured for payment shall be the actual linear footage of vertical granite curb installed within the payment limits defined in the Documents and directed by the Engineer. Curb installed for the convenience of, or damaged by the Contractor is not covered by this biditem.

B. Basis of Payment: Basis of Payment: Installation of granite curb shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment and tools required for the sawcut, management, removal and disposal of granite curb; excavation (except ledge excavation); placement of new granite curb; backfill including 12 inches of dense grade aggregate roadway base; placing concrete to anchor the granite curb; repair of loam and seed behind curb, and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining granite curb.

(46) – Bituminous Concrete Curb/Berm

A. Method of Measurement: The quantity of bituminous concrete curb/berm to be paid for under this item shall be the linear feet of bituminous concrete curb/berm furnished and installed measured along the center line of the curb/berm as indicated in the Contract Documents or as directed by the Engineer.
   1. The conversion factor to change linear foot of bituminous concrete pavement measured in place to tons will be 0.0183 tons per linearfoot.

B. Basis of Payment: Bituminous concrete curb/berm shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); backfill including 12 inches of dense grade aggregate roadway base material;

compaction; placement of new bituminous concrete curb/berm, restoration of loam and seed behind; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining bituminous curb.

(47) – Milling

A. Method of Measurement:
   1. The quantity of milling pavement to be paid for under this item shall consist of the number of square yards of area ground to the thickness as indicated in the Contract Documents or as directed by the Engineer.
   2. Actual pavement dimensions will be used in calculating area wherever the width and/or the length of pavement removed differs than the limits shown on the Drawings.

B. Basis of Payment: Milling shall be paid for at the Contract unit price per square yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment necessary to complete this work including milling existing asphalt pavement to a depth of 1.5 to 3 inches as directed by Engineer; removal and disposal of millings; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(48 a & b) – Binder Course Pavement

A. Method of Measurement:
   1. The quantity of bituminous concrete pavement to be paid for under this item includes the number of square yards of 4.5-inch HMA binder course placed as shown on the Contract Drawings or at the direction of the Engineer within the payment limits shown on the Drawings.
   2. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.
   3. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch ofthickness.
   4. When fixing blowouts after milling operations, measurements shall be the actual square yards excavated and patched with 4.5-inch HMA binder course as measured in the field by the Engineer and shall be paid for under Item 51b.

B. Basis of Payment: Pavement shall be paid for at the Contract unit price per square yard stated in the Bid Schedule. Payment shall be based on the amount of pavement accepted by the Engineer that does not exceed the payment limits for both width and thickness. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the sawcut, management, removal and disposal of existing surface pavement; excavation of existing soil to allow for placement to be flushed with the milled surface, if necessary; preparation of base material; application of tack coat; placement and compaction of pavement; installation of temporary thermoplastic pavement markings; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining bituminous concretepavement.

(49 and 50) – Leveling/Shim Course Pavement and Surface Course Pavement

A. Method of Measurement:
   1. The quantity of bituminous concrete pavement to be paid for under this item includes:

a. Leveling/shim Pavement - The number of tons of leveling/shim pavement placed at the direction of the Engineer, calculated as described below, within the payment limits as indicated in the Contract Documents or as directed by the Engineer.

b. Surface Course Pavement (Standard Top) - The number of tons of surface course pavement placed at the direction of the Engineer, calculated as described below, within the payment limits as indicated in the Contract Documents or as directed by the Engineer.

2. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the ContractDrawings.

3. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch ofthickness.

B. Basis of Payment: Pavement shall be paid for at the Contract unit price per ton stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the sawcut, management, removal and disposal of existing surface pavement; preparation of base material; placement of pavement to repair milling blowouts; application of tack coat; placement and compaction of new pavement; installation of permanent thermoplastic pavement markings replacing those removed during milling operations regardless of existing condition; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining bituminous concrete pavement.

(51) – Bituminous Concrete Driveway/Sidewalk Pavement

A. Method of Measurement:

1. The quantity of bituminous concrete pavement to be paid for under this item includes the number of square yards of 4.5-inch HMA binder course placed as shown on the Contract Drawings or at the direction of the Engineer within the payment limits shown on the Drawings.

2. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.

3. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch ofthickness.

4. Finish and installation of 8-inch aggregate base ifnecessary.

B. Basis of Payment: Pavement shall be paid for at the Contract unit price per square yard stated in the Bid Schedule. Payment shall be based on the amount of pavement accepted by the Engineer that does not exceed the payment limits for both width and thickness. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the sawcut, management, removal and disposal of existing surface pavement; furnishing and installing 8-inches of aggregate base, if necessary; preparation of base material; application of tack coat; placement and compaction of pavement; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining bituminous concrete pavement.

(52) – Raise Existing Structure Frame and Cover

A. Method of Measurement: Frame and cover rim adjustments measured for payment shall be for the actual number of existing structures (manholes, catch basins, valves, etc.) frames and covers raised as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The unit price per each shall be full compensation for all labor, materials and equipment necessary to complete the work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); bedding; backfilling including 12 inches of dense grade aggregate roadway base and subbase; compaction; furnishing and setting precast concrete or metal risers or brickwork and mortar to meet final elevation; masonry materials; setting frame and cover; cleaning; site restoration; and for all other work and expenses incidentalthereto.

(53) – Loam and Seed

A. Method of Measurement: Loam and seed measured for payment shall be the number of square yards of area disturbed during the project and requiring re-vegetation as denoted by the Engineer. The loam material shall be 6-inches deep.

B. Basis of Payment: The Contract unit price per square yard for loam and seed shall constitute full compensation for all labor, equipment and materials necessary to complete this work including providing, spreading and raking loam, providing fertilizer, lime, seed, water and mulch; and all else incidental thereto for which payment is not provided under other items. Contractor shall include in his unit price compensation for mowing seeded areas twice. Areas disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.

(54) – Rodent Control

A. Method of Measurement: Rodent Control shall be paid for at the lump sum unit price as stated in the Bid Schedule.

B. Basis of Payment: The lump sum price stated in the Bid Schedule for Rodent Control shall be considered full compensation for furnishing all labor, supervision, materials, and equipment necessary to provide comprehensive and professional rodent control at all project locations including providing the services of a Massachusetts state licensed, experienced, rodent control person; development and implementation of an Integrated Pest Management (IPM) approach; baiting; elimination of sources of harborage; making recommendations that may be necessary in controlling and/or eliminating rodent activity; biweekly inspections of the site and implemented rodent control measure; written documentation of his/her activity and note the activity levels of rodents within the project area; submit the written documentation to the Owner and/or Engineer; and all else incidental thereto to complete the work within this item.

(55) – Loop Detectors and Lead-in Wires

A. Method of Measurement:
Measurement for loops furnished, installed and accepted by the OWNER shall be the nominal length of the loop detector and lead-in, not the length of wires as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment:
Payment for loop detectors and lead-in wires shall be made as determined above at the contract unit price for ITEM 58 as set forth in the Bid. Said price and payment shall be full compensation for furnishing and installing all detectors, lead-ins, and all appurtenances; all testing of detectors after installation; and all else incidental thereto to complete the work within this item.

Management of Contaminated Materials

(56) – Management of Excess Soil, Fill, and Material

A. Method of Measurement: Management of excess soil, fill, and materials measured for payment shall be based on the lump sum price stated in the Bid Schedule.

B. Basis of Payment: Management of excess soil, fill, and materials shall be paid for at the lump sum price stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for managing soil, fill, and materials; segregating, handling, staging, testing, and characterization of all soil and fill material as well as the costs associated with characterizing the destination site as required to assess background conditions; all controls necessary to maintain compliance with regulatory requirements relative to handling contaminated soils and materials; submittal and approval of all required and specified Plans; analytical testing and characterization of all excavated soil and fill material handled; health and safety equipment; securing a staging area for stockpiling soil pending analytical testing, reuse, or disposal; protecting the excavation and stockpile areas; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; and all other requirements specified in other sections of the Contract Documents; and any other work not covered by other bid items. All costs related to transporting soils, fill and materials to the staging area shall be included for payment in this item. All costs related to transporting soil, fill, and materials from the staging area back to the project area for reuse in the trench shall be included for payment in this item.

C. Management, transportation, and disposal of surface roadway materials are not included in this item and shall be paid for under other items.

D. Costs for transportation of soil, fill, and materials to be disposed of offsite shall be paid for under another item.

(57) – Removal and Disposal of Excess Soil and Waste Material

A. Method of Measurement: Removal and disposal of excess soil and waste materials, including ABC material, shall be paid based on the Contractor's actual costs based on actual invoices submitted plus a markup of 15% for the final transport and disposal of excess soil and waste materials. The amounts submitted will be paid from this Bid Item.

B. Basis of Payment: Payment from this bid item amount for the final transport of excess soil and waste material shall be full compensation for all labor, equipment, and materials necessary to complete the work including environmental controls to safely handle the material, transportation of material, and disposal of the material offsite in accordance with all federal, state, and local regulations. Contractor shall take all reasonable efforts to reuse excavated soils within the project in accordance with 310 CMR 40.0000 Massachusetts Contingency Plan.

C. Management, transportation, and disposal of surface roadway materials are not included in this item and shall be paid for under other items.

D. Contractor will not be paid any additional increate in quantity or costs under this item resulting from improper soil management activities that result in soil contamination. Disposal of material excavated outside of the pay limits as defined elsewhere in the Contract Documents shall be done at the Contractor's expense, at no additional cost to the Owner.

(58) – Removal and Disposal of Asbestos Cement Pipe, all diameters and all depths

A. Method of Measurement: Removal and disposal of asbestos cement pipe accepted for payment shall be the actual number of linear feet of asbestos cement pipe (all diameters) removed and disposed of in accordance with local, State and Federal Regulations, as measured along the center line of the pipe as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The Contract unit price per linear foot for removal and disposal of asbestos cement pipe shall be full compensation for all labor, subcontractors, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); segregating, handling, staging, testing, and storage of all asbestos pipe and soil suspected of containing asbestos as well as the costs associated with all controls necessary to maintain compliance with regulatory requirements relative to handling asbestos materials; submittal and approval of all required and specified plans; health and safety equipment; all costs related to transporting and disposal asbestos material from the staging area to an approved disposal facility shall be included for payment in this item; air monitoring; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; coordination with regulatory agencies and Owner; all other requirements specified in other sections of the Contract Documents; and all else incidental thereto for which payment is not provided under other items.

General Project

(59) – Test Pit Excavation

A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of test pits performed as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Test pit excavations shall be paid for at the unit price per each test pit as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, tools, and equipment for excavation by machine and/or hand labor, sawcut, management, removal and disposal of surface pavement; backfilling; subbase; and compacting; placing and compacting binder pavement; repairing damaged utilities; providing written copies of the test pit result information to the Engineer; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(60) – Test Pit Excavation for Locating Water and Sewer Services

A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of test pits performed to locate water services and/or sewer services as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: Test pit excavations shall be paid for at the unit price per each test pit as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, tools, and equipment for excavation by machine and/or hand labor, sawcut, management, removal and disposal of surface pavement; locating and measuring pipe diameter and determining pipe material; backfilling; subbase; and compacting; placing and compacting binder pavement; repairing damaged utilities; providing written copies of the service pipe information to the Engineer; site restoration; and for all other work and expenses incidental thereto for which payment is not provided under otheritems.

(61) – Flowable Fill for Backfill

A. Method of Measurement: Quantity to be paid for under this item shall be the number of cubic yards of flowable fill used as backfill as authorized by the Engineer. The payment limit for this item shall be between vertical planes that are a distance apart equal to a maximum of 6-feet and extending to a depth and length as directed by the Engineer.

B. Basis of Payment: Backfill with flowable fill shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, equipment, and tools necessary for excavation; furnishing installing and compacting flowable fill, coordination with utility companies, and for all other work and expenses incidental thereto for which payment is not provided under otheritems.

(62) – Ledge Excavation and Disposal

A Method of Measurement:

1. Ledge excavation measured for payment shall be the number of cubic yards removed during construction. This quantity shall be determined by profiling. Excavation and backfill of the earth overburden shall be considered incidental, and no separate payment shall be made therefore.
2. The payment limit for trench width shall be between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal outside diameter of pipe which is to be installed in the trench (min. of 3 feet) and extending from the top of the ledge surface to a depth of 6 inches below the invert grade of the pipe. Where two pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 3-feet plus the sum of the pipes nominal outside diameter plus 18 inches. Where three pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 4.5 feet plus the sum of the pipes nominal outside diameter plus 18inches.
3. Ledge excavation for structures (including manholes) shall be measured as 18 inches outside the structure and extending to a depth of 6 inches below the base of the structure indicated on the Drawings.
4. Rocks or boulders greater than two cubic yard volume shall be considered as ledge excavation. Volume of rocks shall be determined from their average length, width, and depth as measured by the Engineer.

B. Basis of Payment:

1. The contract unit price per cubic yard for rock excavation shall be full compensation for all labor, tools, materials and equipment necessary to complete the excavation including, drilling; excavating; removal and off-site disposal of all excess A-1 soils/materials; suitable replacement backfill; and all else incidental thereto for which payment is not provided under other items.
2. Not all the potential ledge locations are identified on the Drawings and ledge could be encountered anywhere within the limits of work. Such ledge, if encountered, is not considered a Differing Subsurface or Physical Condition. The unit price in the bid form shall apply to all ledge encountered and removed.

(63) – Unsuitable Earth Excavation below Grade and Replacement Backfill

A. Method of Measurement: Earth excavation below grade (below the bottom of the bedding layer by order of the Engineer) and replacement backfill below grade (below the bottom of the bedding layer) accepted for payment shall be the actual number of cubic yards installed and accepted complete in place.

B. Basis of Payment:

1. The Contract unit price per cubic yard for earth below grade and replacement backfill below grade furnished and installed shall be full compensation for labor, materials, tools and equipment necessary to complete this work including; excavation and disposal of unsuitable materials including muck, crib work, trees, stumps and all other buried refuse; furnish, install and compact replacement suitable fill; furnish and install filter fabric; dewatering; and all else incidental thereto for which payment is not provided under other items.
2. The depth of unsuitable material in pipe trenches to be paid shall be measured from 2 feet below the invert of the pipe to the depth of excavation. The width of unsuitable material in pipe trenches to be paid shall be as detailed in the Typical Trench Detail included with the Contract Drawings.
3. The depth of unsuitable material in structure excavations to be paid shall be measured from 12 inches below the bottom of the structure slab to the depth of excavation. The width of unsuitable material in structure excavations shall be based on a 1:1 slope from the edge of the bottom of the structure to the top of the acceptable material.

1. Material excavated below pipe bedding grade that could have, in the opinion of the Engineer, remained in place through the use of adequate dewatering efforts shall be replaced by the Contractor at no additional cost to the Owner.

(64) – Trench Pipe Insulation

A. Method of Measurement: Pipe trench insulation accepted for payment shall be the actual linear feet of trench insulation installed and accepted complete in place as indicated in the Contract Documents or as directed by the Engineer.

B. Basis of Payment: The contract unit price per linear foot for pipe trench insulation shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including furnishing and installing the insulation, bedding, backfill, compaction and all else incidental thereto for which payment is not provided under other items.

(65) – Relocation of Existing Water Line

A. Method of Measurement: Relocation of existing water lines (sizes 2" and larger and all depths) measured for payment shall be the actual linear feet of relocated water line installed and accepted complete in place as a result of direct conflict with existing or new sanitary sewer lines and/or existing or new sewer manhole. Waterlines repaired or replaced as a result of Contractor error or negligence, or not in direct conflict with new sanitary sewers or manholes will not be considered for payment.

B. Basis of Payment: The contract unit price per linear foot for replacement of existing water lines shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement and sidewalks; excavation (except rock excavation); bedding; furnishing and installing pipe, adaptors, fittings, valves, thrust blocks, joint restraints; dewatering; backfill; sub base; and compaction to the satisfaction of the City's Water department; testing;

disinfection; site restoration; and all else incidental thereto for which payment is not provided under other items.

(66) – Erosion and Sedimentation Control

A. Method of Measurement: Erosion and sedimentation control shall be paid for at the lump sum unit price as stated in the Bid Schedule.

B. Basis of Payment: Erosion and sedimentation control shall be paid for a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for installation, maintenance and removal of the type and quantity of erosion control devices as required including but not limited to a minimum of 300 linear feet of silt fence and a minimum of 30 silt sacks; and all else incidental thereto for which payment is not provided under other items. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(67) - Traffic Control

A. Method of Measurement: Traffic regulation and control shall be paid for at the lump sum unit price as stated in the Bid Schedule.

B. Basis of Payment: Traffic control shall be paid for a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for furnishing all labor, supervision, materials, and equipment necessary to provide comprehensive and professional traffic regulation and control at all project locations including providing and sumbitting a traffic control plan; coordinating and scheduling with City of Waltham Police Department for police detail for the work; coordinating and submitting any required permits with MassDOT for work within their right-of-way; temporary pavement markings for traffic re-routing and pedestrian safety; maintaining all traffic signals including but not limited to traffic lights and traffic light loops; restoring all traffic signal systems; repairing all damage to traffic signal systems; MUTCD signage and traffic barriers; furnishing and installing up to fifteen custom MUTCD traffic signage with specific street names as directed by City of Waltham Police Department; and all else incidental thereto for which payment is not provided under other items. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

1. This lump sum item does not include the cost for police detail. There is an allowance for the cost of police detail.

(68) - Portable Changing Message Board Sign

A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of weeks (7 calendar days per week) per each portable changeable message board sign that are used as directed by the Engineer.

B. Basis of Payment: Portable Changeable Message Signs shall be paid for each message sign at the unit price per week per message sign stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including furnishing, operating, and maintaining the portable changeable message board sign per week (7 calendar days); all necessary moves of the sign; and all else incidental thereto for which payment is not provided under otheritems.

(69) – Utility Support and Coordination

A. Method of Measurement: Utility support and coordination shall be paid for at the lump sum price as stated in the Bid Schedule.

B. Basis of Payment: Utility support and coordination shall be paid for as a lump sum price stated in the Bid Schedule. Said allowance price shall be full compensation for furnishing all labor, supervision, coordination with utility owner, materials, and equipment necessary to work with the utilities (gas, electric, power, cable, telephone, sewer, water, wires, etc.) including but not limited to: timely communication and consultation with utility companies, public entities and agencies; contacting Dig-Safe and City of Waltham Water & Sewer Department and Wires Department to mark utilities; supporting and bracing buried utilities; contacting and paying utility companies for their services including but not limited to utility bracing and utility relocation; utility inspection; working around utility prior to their relocations; and all else incidental thereto for which payment is not provided under other items. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(70) – Mobilization and Demobilization

A. Method of Measurement: Mobilization and demobilization shall be paid for at the lump sum unit price as stated in the Bid Schedule. The amount bid for this item shall not exceed five percent (5%) of the Base Bid excluding the total amount of all of the allowance bid items and the sump pump discharge relocation bid items.

B. Basis of Payment:

1. Mobilization and demobilization shall be paid for a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including mobilization of equipment to begin construction; the submittal and acceptance of the pre-construction photographs and videos by the Engineer; demobilization of all equipment; and all incidental work associated with mobilization and demobilization.
2. Payment for this work on interim requisitions shall be according to the following percentages:
    a. Mobilization of equipment; the submittal and acceptance of the pre-construction photographs and videos by the Engineer – 80 Percent.
    b. Demobilization – 20 Percent.

(71) – Uniformed Police Officers for Traffic Control Allowance

A. Method of Measurement: Uniformed police officers for traffic control shall be paid based on the number of hours the uniformed police officers and/or police cruisers worked on the contract.

B. Basis of Payment: Uniformed police officers for traffic control shall be paid through a cash allowance stated in the Bid Schedule. Said allowance shall be full compensation for fees associated with providing uniformed police officers and/or police cruisers in accordance with the requirements of the City of Waltham Police Department. Adjustment to the final cost for this item shall be made as follows: prior to final payment, Contractor shall present all receipts for this work (if not previously presented to the Engineer), and the amount due will be deducted from the allowance. There will be no markup on the uniformed police officers nor cruisers fees. No additional payment will be made to the Contractor if he fails to adequately cancel a requested uniform police officer detail.

Price Adjustments

(72) - Price Adjustments

A. Pay Items:
   1. Pay Item 72a: Diesel Fuel Price Adjustment
   2. Pay Item 72b: Gasoline Fuel Price Adjustment
   3. Pay Item72c: Liquid Asphalt Price Adjustment
   4. Pay Item 72d: Cast-in-Place Portland Cement Concrete Price Adjustment

B. Method of Measurement: The method of measurement for the price adjustment items is as described in Section 01151.

C. Basis of Payment: The Contract Price will be adjusted for each respective unit price adjustment as full compensation for the unit price adjustment. The amount of the price adjustment shall be calculated as described in Section 01151.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01151

SPECIAL PROVISIONS – PRICE ADJUSTMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. In accordance with Massachusetts General Law (MGL) Chapter 30, Section 38A, contracts for water and sewer projects awarded under MGL Chapter 30 Section 39M shall include price adjustment clauses for fuel (both diesel and gasoline), liquid asphalt and Portland cement contained in cast-in-place concrete.

B. The work under this Contract includes price adjustments for hot mix asphalt, Portland cement, diesel fuel, and gasoline. Base Prices for hot mix asphalt, Portland cement, diesel fuel, and gasoline under this Project are defined as the Price presented on the Massachusetts Department of Transportation (MassDOT)website.
MassDOT posts Price Adjustments on their Highway Division's website at http://www.massdot.state.ma.us/Highway/ under the following linksequences:

Website: massdot.state.ma.us
Tab1: Highway
Link1: Doing Business with Us
Link2: Construction
Link3: Price Adjustments

Prices may not be available for the month in which the project is Bid at the time the project is advertised for Bid. The Base Price will be confirmed after Contract Award and before the first monthly payment requisition. For this project, the recent Base Price History for the specified items is presented within Table 1.

Table 1. Base Prices for the Contract

Adjustment Period	Diesel	Gasoline	Liquid Asphalt	Portland Cement
	Gallon	Gallon	Ton	Ton
June 2018*	$ 2.53	$ 1.97	$ 527.50	$ 125.00

*Published prices as of December 2018.

1.2 MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE

A. Method of Measurement: The Bid Form does not include a specific Work Item for fuel consumption; fuel consumption is considered incidental to the work. However, in order to comply with the MGL, compensation for fluctuations in fuel prices will be made based on monthly quantities of the designated work items completed during the payment period and the Fuel Use Factors presented in Table 5.

B. Basis of Payment: The Contract includes an allowance to be used for all price adjustments including price adjustments for diesel fuel and gasoline. The Price Adjustment will be based on the variance in price for diesel fuel and gasoline from the Base Price to the Period Price only. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price

Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.

1. Base Price: The Base Price of diesel fuel and gasoline will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid, which includes State Tax.
2. Period Price: The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month as posted on the MassDOT website.
3. The adjustment will be based on fuel usage factors for various items of work developed in the National Cooperative Highway Research Program Report 744 (Transportation Research Board, 2013) and modified to correspond to Federal Highway Administration Technical Advisory T5080.3 (1980) and Highway Research Board Circular 158 (1974). These factors will be multiplied by the quantities of work completed under the designated Work Item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.
4. The fuel Price Adjustment will apply only to the items of work listed in Table 5 at the fuel factors shown and for the quantities of those work items during that month.
5. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
6. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

1.3 MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT MIXTURES

A. Method of Measurement: The quantity of the hot mix asphalt (HMA) mixtures will be measured under the respective Bid Item(s) in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.

B. Basis of Payment: The Contract Price of the hot mix asphalt (HMA) mixtures will be paid under the respective Bid Item(s) in the Contract. The Contract includes an allowance to be used for all price adjustments including price adjustments for Hot Mix Asphalt Mixtures. The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price only. The adjustment shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period isavailable.

1. Base Price: The Base Price of Hot Mix Asphalt Mixtures will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid, which includes State Tax.
2. Period Price: The MassDOT website lists two sets of period prices. The "New Asphalt Period Price Method" applies to this Contract.
3. The "New Asphalt Period Price Method" presents the Period Price of liquid asphalt for each monthly period as determined by MassHighway using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt

Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. MassHighway will post this Period Price on their website within two business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassHighway the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

4. The Contract Price of the hot mix asphalt mixture will be paid under the respective item in the Contract. The Price Adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the Price Adjustment Allowance in the Payment Application.
5. The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Contract Documents and as measured for the Hot Mix Asphalt Work Item.
6. The Price Adjustment will be determined using the following formula; the quantity of tons of hot mix asphalt mixture placed during each monthly period multiplied by the liquid asphalt content percentage multiplied by the variance in price between Base Price and Period Price of liquid asphalt. The liquid asphalt content, for the purpose of this adjustment, will be 5.5% (0.055) for each ton of bituminous concrete mixture regardless of percentages established in the Massachusetts Job Mix Formula (M3.11.03) of the Standards.
7. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
8. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

1.4 MONTHLY PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

A. Method of Measurement: The quantity of the Portland Cement Concrete Mixes will be measured under the respective items in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.

B. Basis of Payment: The Contract Price of the Portland Cement Concrete Mixes will be paid under the respective item(s) in the Contract. The Contract includes an allowance to be used for all price adjustments including price adjustments for Portland Cement Concrete Mixes. The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price only. It shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.

1. Base Price: The Base Price of Portland cement will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid, which includes State Tax.
2. The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the Construction Economics section of ENR Engineering News-

Record magazine or at the ENR website http://www.enr.com under Construction Economics. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

3. The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the Price Adjustment Allowance in the PaymentApplication.
4. The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnaceslag.
5. The Price Adjustment will be determined using the following formula; the quantity of cubic yards of Portland cement concrete placed during each monthly period multiplied by the Portland cement content percentage multiplied by the variance in price between the Base Price and Period Price of Portlandcement.
6. This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
7. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by theOwner.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PREPARATION OF MONTHLY PAYMENT APPLICATION

A. Payment Applications shall be submitted monthly. Table 2 presents an example calculation for determining Price Adjustments for the specified items.

Note: In this example, the Payment Application for June will be submitted at the end of June or early in July and shall include all of the work performed during the month of June and Price Adjustments for the work performed in May.

For this example, 1,000 linear feet of 12-inch diameter water main was installed and 400 tons of full-width final bituminous pavement over 1,000 feet of roadway were completed in May. No concrete was installed during the Month of May.

Table 2 – Example Project Related Prices				
Description	Unit	Base Price	May 2013	June 2013
Diesel Fuel	per gallon	$3.25	$3.50	N/A
Gasoline	per gallon	$3.00	$3.20	N/A
Hot Mix Asphalt	per ton	$600.00	$625.00	N/A
Portland Cement	per ton	$100.00	$90.00	N/A

Based on the example Prices in Table 2, an assessment of whether or not Price Adjustments will be paid for this example is presented in Table 3.

Table 3 – Example Price Adjustment Assessment					
Item	Base Price	Period Price	Price Difference	% Change	Price Adjustment Required
Diesel Fuel	$3.25	$3.50	$0.25	7.7%	Yes, >5%
Gasoline	$3.00	$3.20	$0.20	6.7%	Yes, >5%
Hot Mix Asphalt	$600.00	$625.00	$25.00	4.2%	No, <5%
Portland Cement	$100.00	$90.00	-$10.00	-10%	Yes, >5%

As indicated in Table 3, Price Adjustments for this example would be required for Diesel Fuel, Gasoline and Portland cement if work items were performed during the Month of May.

Table 4 presents the Price Adjustment calculations for this example.

Table 4 – Example Diesel Fuel and Gasoline Price Adjustment					
Work Item	Quantity	Unit	FUF[1]	Price Difference	Price Adjustment
12-inch Water Main					
Diesel Fuel	1,000	L.F	0.610	$0.25	$152.50
Gasoline	1,000	L.F	0.261	$0.20	$52.20
Asphalt Hauling/Placement					
Diesel Fuel	400	Ton	1.104	$0.25	$210.40
Gasoline	400	Ton	0.502	$0.20	$40.16
TOTAL PRICE ADJUSTMENT					**$455.26**

1. FUF = Fuel Use Factor

Note: The example indicates that a Price Adjustment will be applied for the payment period for fuel associated with asphalt hauling and placement, but no Price Adjustment would be applied for Hot Mix Asphalt Mixtures as the Price difference for the material was less than 5%. Also, no Price Adjustment is included for Portland cement as no quantity of concrete was completed during the pay period. If concrete had been installed, it would have resulted in a negative Price Adjustment or deduction.

B. Table 5 presents the Fuel Use Factors to be used for this project.

Table 5 – Fuel Use Factors				
Item #	**Description**	**Units**	**Diesel Fuel Use Factor**	**Gasoline Fuel Use Factor**
1, 2, 3, 4, 5, 6, 7	PVC Pipes	LF	0.610	0.261
8a, 8b, 9	Manholes and Catch Basins	VF	1.830	0.785
35, 36, 42, 68	Water Mains	LF	0.610	0.261
49	Bituminous Concrete Curb/Berm	TON	0.191	0.082
51, 52, 53, 54	Pavement Courses: Daily Temporary, Binder, Leveling/Shim, Surface, and Driveway/Sidewalk	TON	0.191	0.082
61	Removal and Disposal of Asbestos Cement Pipe	LF	0.514	0.000
65	Ledge Excavation, Disposal and Replacement Backfill	CY	0.326	0.140
66	Earth Excavation below grade and replacement backfill	CY	0.223	0.096

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.

B. Related work described elsewhere: The Contractor's relations with his subcontractors and materials suppliers and discussions relative thereto, are the Contractor's responsibility and are not part of project meetings content.

1.2 QUALITY ASSURANCE

A. Persons designated by the Contractor to attend and participate in the project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

A. Agenda items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of project meetings regarding all items to be added to the agenda.

B. Minutes: The Engineer will compile minutes of each project meeting and will furnish a copy to the Contractor. The Contractor may make and distribute such other copies as he wishes.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, project meetings will be held monthly. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

A. Meetings will be held at a mutually agreeable location.

3.3 PRECONSTRUCTION MEETING

A. Preconstruction meeting will be scheduled within twenty days after the Effective Date of the Agreement, but before the Contractor starts work at the site. Provide attendance by authorized representatives of the Contractor and all major subcontractors. The Engineer will advise other interested parties and request their attendance.

B. Minimum agenda: Distribute data on, and discuss:

1. Identification of key project personnel for Owner, Engineer, Contractor, funding/regulatory Agencies.
2. Responsibilities of Owner, Engineer, Resident Project Representative, Contractor.
3. Channels and procedures for communications.
4. Construction schedule, including sequence of critical work.
5. Easements, permits.
6. Contract Documents, including distribution of required copies of original documents and revisions.
7. Processing of Shop Drawings and other data submitted to the Engineer for review.
8. Processing of field decisions and Change Orders.
9. Rules and regulations governing performance of the Work, including funding/regulatory Agency requirements.
10. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.

3.4 PROJECT MEETINGS

A. Attendance: To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work. The Superintendent shall attend. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the Work are involved.

B. Minimum agenda:
   1. Review, revise as necessary, and approved minutes of previous meeting.
   2. Review progress of the Work since last meeting, including status of submittals for approval.
   3. Review schedule of work to be accomplished prior to next meeting.
   4. Discuss monthly partial payment request.
   5. Review status of change order requests and Work Directive Changes.
   6. Identify problems which impede planned progress.
   7. Develop corrective measures and procedures to regain planned schedule.
   8. Complete other current business.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.

B. Form of Schedules:
   1. Narrative: Completely describe the construction methods to be employed.
   2. Network Analysis System:
      a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
      b. Present in chronological order the beginning of each trade or operation showing duration and float time.
      c. Scale: Identify key dates and allow space for updating and revision.
   3. Mathematical Analysis:
      a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
      b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.

C. Content of Schedules:
   1. Provide complete sequence of construction by activity:
      a. Shop Drawings, Project Data and Samples:
         1) Submittal dates.
         2) Dates reviewed copies will be required.
      b. Decision dates for:
         1) Products specified by allowances.
         2) Selection of finishes.
      c. Estimated product procurement and delivery dates.
      d. Dates for beginning and completion of each element of construction.
   2. Identify work of separate phases and logically grouped activities.
   3. Show the projected percentage of completion for each item of work as of the first day of each month.
   4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.

D. Updating:
   1. Show all changes occurring since previous submission.
   2. Indicate progress of each activity, show completion dates.
   3. Include:
      a. Major changes in scope.
      b. Activities modified since previous updating.
      c. Revised projections due to changes.
      d. Other identifiable changes.
   4. Provide narrative report, including:
      a. Discussion of problem areas, including current and anticipated delay factors.

b. Corrective action taken, or proposed.
c. Description of revisions that may affect schedules.

1.2 SUBMITTALS

A. Submit updated schedules with each progress payment request.
B. Submit 4 copies of initial and updated schedules to the Engineer.
C. Submit schedules in electronic format and hard copy as follows:
   1. Prior to start of work
   2. Weekly – every Friday for the upcoming work week
   3. When there are changes in the schedule
   4. With each progress payment request

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 01320

SAFETY AND HEALTH PLAN

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within (10) days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
   a. Provide documentation that Contractor's hazardous communication program is up to date.
   b. Provide documentation that Contractor's safety training is up to date.
   c. Prepare a project specific Safety and Health Plan addressing construction safety issues, including but not limited to excavations, fall protection and egress, as well as provisions for construction in hazardous environmental conditions at the wastewater treatment facility. The hazardous environmental conditions at the wastewater treatment facility include, but are not limited to, confined space entry, electrically-classified spaces, and chemical storage and handling areas, to name a few.
2. Safety provisions for confined space entry shall follow General Industry Standard CFR Title 29 Part 1910.146 and will be incorporated into the Safety and Health Plan.
   a. The Owner has provided Table 1 at the end of this section listing confined space locations which may be encountered during the execution of this Contract. Spaces listed as Permit Required Confined Space may only be entered with a permit, alternate procedures (1910.146 (c) (5)), or reclassification to non-permit required confined space (1910.146 (c) (7)). The Contractor is required to perform a site evaluation to identify all hazards and potential hazards in work areas whether included in Table 1 or not, prior to control of site.

b. The Contractor shall be responsible for all aspects of construction site safety including development of appropriate confined space entry procedures. The plan shall include, but not necessarily be limited to, the following:
   - Definitions
   - Confined Space Evaluations
   - Equipment Selection
   - Confined Space Entry Training Documentation
   - Permit Required Confined Space Entry Requirements
   - Testing (Monitoring) and Ventilation
   - Confined Space Entry Permit Form
   - Rescue and Emergency Procedures
   - Emergency Contact Information

c. The Contractor shall inform the Owner and Engineer's representative whenever work will be performed in a confined space and the permit space program that the Contractor will follow.

d. The Contractor shall inform the Owner and Engineer's representative of any hazards confronted or created during entry operations, either through a briefing or during the entry operation.

e. The Contractor will coordinate entry operations with the Owner when both Owner personnel and Contractor personnel will be working in or near permit spaces.

f. The Owner, Engineer, their representatives, independent testing laboratories and government agencies, when inspecting the site, shall be supplied by the Contractor proper safety equipment when entry into a confined space is required.

3. The Owner has provided Table 2 at the end of this section listing electrically- classified spaces where the Contractor may be required to carry out work tasks. The Contractor is required to perform a site evaluation to identify all hazards and potential hazards in work areas whether included in Table 2 or not, prior to control of site. Contractor shall implement appropriate safety precautions and/or construction practices to comply with classification requirements. Contractor shall ensure that all employees and subcontractors working in these areas have received appropriate training and are properly equipped in accordance with Contractor's Safety and Health Plan.

4. The Owner has provided Table 3 at the end of this section listing chemical storage and handling spaces where the Contractor may be required to carry out work tasks. The Contractor is required to perform a site evaluation to identify all hazards and potential hazards in work areas whether included in Table 2 or not, prior to control of site. Contractor shall ensure that all employees and subcontractors working in these areas have received appropriate training and are properly equipped in accordance with Contractor's Safety and Health Plan.

C. Updating:

1. Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

1.2 SUBMITTALS

A. Contractor shall be responsible for all aspects of construction site safety. Provide 3 copies of the Contractor's site-specific Safety and Health Plan to the Engineer. The Safety and Health Plan is provided for information only to inform the Owner, Engineer (and Resident Project Representative) of the project specific safety program requirements. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) at the beginning of the project, and subsequently when the safety plan is updated.

B. Provide updated Safety and Health Plans as necessary during the course of the project.

C. Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

1.3 ON-SITE COORDINATION MEETINGS

A. Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.

B. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.

C. Contractor shall hold weekly on-site coordination meetings with Resident Project Representative and Owner to ensure that Owner's staff is aware of key Safety and Health Plan requirements of the current phase of construction.

1.4 SITE-SPECIFIC INFORMATION

A. Refer to Tables 1 and 2 below.

TABLE 1
WATER, SANITARY SEWER AND STORMWATER SYSTEMS
CONFINED SPACE LISTING

Confined Space Location	Hazard Description
Water, Sanitary Sewer, and Stormwater Systems	Possible lack of oxygen or presence of explosive or hazardous gases - Hydrogen Sulfide.

Note: This list has been provided by the Owner based upon their knowledge of the site and may not include all site hazards. Its intent is to aid the Contractor in determining the magnitude of effort needed to fulfill the safety and health requirements of this Contract.

TABLE 2
WATER, SANITARY SEWER AND STORMWATER SYSTEMS
ELECTRICAL HAZARD LISTING

Location	Electrical Classification
Water, Sanitary Sewer, and Stormwater Systems	Class 1, Division 1

Note: This list has been provided by the Owner based upon their knowledge of the site and may not include all site hazards. Its intent is to aid the Contractor in determining the magnitude of effort needed to fulfill the safety and health requirements of this Contract.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF SECTION

SECTION 01330

STORMWATER POLLUTION PREVENTION PLAN

PART I – GENERAL

1.1 DESCRIPTION

A. Construction activities to be performed under this Project have been determined to require coverage under the National Pollutant Discharge Elimination System (NPDES) stormwater program that applies nationwide. The Environmental Protection Agency (EPA) has ***not*** delegated its authority to administer this program to the Commonwealth of Massachusetts. The program provides that certain discharges are not allowed unless they are licensed, and the EPA is licensing certain discharges of stormwater from construction activities when the requirements of the Dewatering General Permit (DGP) are met. The EPA requires both the Owner (or his/her authorized Applicant) and Contractor to submit a Notice of Intent (NOI) and a Notice of Termination (NOT).

1.2 WORK INCLUDED

A. The Contractor shall obtain a "National Pollution Discharge Elimination System" (NPDES) Notice of Intent that governs the discharge of storm water from the construction site for the entire construction period that has been filed (two days prior to construction).

B. The Contractor shall be responsible for conducting the stormwater management practices in accordance with the NPDES permit requirements and for any enforcement action taken or imposed by Federal or State agencies, including the cost of fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of the NPDES permit requirements.

C. The Contractor will be responsible for preparing, monitoring and execution of the "Stormwater Pollution Prevention Plan" (SWPPP). The SWPPP shall be updated as necessary and revised copies shall be provided to the Owner, Engineer and RPR.

D. The Contractor shall provide additional stormwater pollution measures as required to minimize pollution from stormwater discharges.

E. As a requirement of the permitting agency, each Contractor and Subcontractor shall execute a Contractor's Certification form, which is included at the end of this Section.

1.3 REFERENCES

A. Guidance Manual - "Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R-005).

B. Summary of Guidance Manual- "Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA).

C. Storm Water Policy Handbook, MA DEP, March 1997.

1.4 SUBMITTALS

A. Completed Stormwater Pollution Prevention Plan/Document

1. SWPPP shall include in Plan/Documents a construction schedule, and a 1" = 40' Stormwater Management Plan (staging areas, etc.).
2. Revised versions of the SWPPP

B. "Contractor's Certification" (for Contractor and each Subcontractor).
C. Maintenance Inspection Reports in a timely manner.

1.5 INSPECTIONS

A. The Contractor shall inspect the site at least once per week and within 24 hours of a storm of 0.5 inches or greater. A maintenance inspection report shall be prepared after each inspection.

1.6 STORMWATER POLLUTION PREVENTION PLAN

A. NOTIFICATION PHASE:
   1. Submit a Notice of Intent (NOI)
      a. The Notice of Intent (NOI) for the DGP is a form filed with the EPA and MassDEP. A NOI must be filed if a project results in a total land disturbance of less than one acre of land, where those discharges enter surface waters of the Commonwealth. Additionally, a NOI must also be filed when a construction activity designated by the EPA shows the potential for contribution to an excursion of a water quality standard or for significant contribution of pollutants to waters of the Commonwealth. The NOI must be filed and approved by EPA ***prior*** *to* any soil disturbance or construction. The NOI form provides information including, but not limited to, Operator (Contractor), Owner, Operator (Contractor) address, Project location, the size of the disturbed area and a brief description of the project. By signing the NOI, the Operator certifies that the information is true and agrees to meeting the requirements of the DGP, including standards for erosion and sedimentation control; inspection and maintenance of any stormwater control practices; and “housekeeping" (ex. preventing fuel spills and controlling dust on the construction site). Specific standards for these activities are found in the DGP. The NOI must be signed by the owner and/or of the facility. The Authorized Representative for the Owner is the City’s Mayor and he/she authorize the Applicant to submit the NOI. The Operator signing for a corporation must be a principal executive officer of at least the level of vice president. In signing the plan, the Operator certifies that the information is true. Refer to the NPDES General Permit for Dewatering Activity Discharges for additional information. The completed, signed NOI and attachments can be submitted by email or mailed to the EPA and MassDEP. More information on filing can be found at the following website:

         http://www3.epa.gov/region1/npdes/dewatering.html

      b. All NOI forms must be accompanied by a Stormwater Pollution Prevention Plan (SWPPP). At least one SWPPP must be developed for each construction project covered by the DGP and such SWPPP must be prepared in accordance with good engineering practices. The SWPPP must identify all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges from the construction site. Additionally, the plan must describe practices to be used to reduce pollutants in stormwater discharges from the construction site and assure compliance with the terms and conditions of the permit.
      c. The EPA has developed a suggested format to be used by Operator (Contractor) of construction activities when they submit a NOI. The form indicates all the

information required and must be used in order for the NOI to be processed correctly.

B. PERFORMANCE PHASE
   1. The Applicant (Contractor) must continue to comply with the Basic Performance Standards until:
      a. They no longer meet the definition of the Applicant (Contractor) of a construction activity; or
      b. the construction activity is complete, all disturbed soils have been finally stabilized, and temporary erosion and sediment controls have been removed. The Applicant (Contractor) then needs to submit a Notice of Termination (NOT) to inform the EPA that permanent erosion control measures have been installed and are functioning properly.

C. PERMANENT STABILIZATION AND TERMINATION PHASE
   1. Submit Notice of Termination (NOT) - The EPA has developed a suggested format to be used by Operator (Contractor) of construction activities when they submit a NOT. The NOT form provides information including, but not limited to, Operator (Contractor), Owner, Operator (Contractor) address, telephone number, Project location and terminating coverage, photographs of the completed site, the EPA number, an indication of why coverage under the permit is being terminated; and a signed certification statement. Signed and completed NOT forms and attachments must be submitted to the EPA and MassDEP.
   2. Instruction for the NOT format and filing can be found at *http://www3.epa.gov/region1/npdes/dewatering.html*
   3. The NOT must be completed and submitted within 30 days of permanent cessation of the discharge(s) authorized by the DGP.
   4. Retention of Records - Following the termination of construction activities the Applicant must keep copies of the SWPPP and records of all data used to complete the Notice of Intent for a period of at least three years following final stabilization. The record retention period may be extended by EPA's request.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.1 GENERAL

A. Erosion control devices shall be constructed as shown on the Drawings and as specified in these specifications.

3.2 STORMWATER POLLUTION PREVENTION PRINCIPLES

A. The Contractor shall use these general principles to develop the SWPPP, and the SWPPP shall be followed by the Contractor during the construction phase:
   1. Protect and maintain existing vegetation wherever possible.
   2. Minimize the area of disturbance and time disturbed areas are unstabilized.
   3. Install mitigation devices as early as possible in the sequence.
   4. Maintain siltation control devices in proper condition.

B. SWPPP shall include and sufficiently describe all, but not limited to, the following items:
   1. Project name and location
   2. Owner name and address
   3. Project description
   4. Project schedule
   5. Erosion and sediment controls
   6. Stormwater management
   7. Waste (general, sanitary, and hazardous) disposal
   8. Offsite vehicle tracking
   9. Timing of controls/measures
   10. Compliance with federal, commonwealth/state, and local regulations
   11. Maintenance/inspection procedures
   12. Inventory for pollution prevention
   13. Spill prevention (material management practices, product specific practices, spill control practices)
   14. Contractor, subcontractor and Owner certifications. Samples are provided in this Section.
   15. Inspection and maintenance report forms. Samples are provided in this Section.

STORMWATER POLLUTION PREVENTION PLAN CERTIFICATION

I certify that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information it is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Owner Authorized Representative Signature:

_____

Name: _____

Title: _____

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the Stormwater Pollution Prevention Plan in accordance with the National Pollutant Discharge Elimination System (NPDES) permit authorizing storm water discharges associated with construction activity from the site identified herein.

Signature	Company	Pollution Prevention Responsibilities
General Contractor:		
_____	_____	
Title: _____		_____
Date: _____	_____	_____
	_____	
Subcontractor:		
_____	_____	
Title: _____		_____
Date: _____	_____	_____
	_____	
Subcontractor:		
_____	_____	
Title: _____		_____
Date: _____	_____	_____
	_____	
Subcontractor:		
_____	_____	
Title: _____		_____
Date: _____	_____	_____
	_____	
Subcontractor:		
_____	_____	
Title: _____		_____
Date: _____	_____	_____
	_____	

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND/OR WITHIN 24 HOURS OF
A RAINFALL EVENT OF 0.5 INCHES OR MORE

SITE STABILIZATION

Inspector:_____ Date:_____

Days Since Last Rainfall:_____ Amount of Last Rainfall: Inches

Area	Date since last disturbed	Stabilized? (yes/no)	Stabilized with	Condition

Contractor's Superintendent:_____ Date: _____

Stabilization Action Required:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Performed by:_____ On or Before: _____

STORMWATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM
SILT FENCE:

Inspector:_____ Date: _____

Depth of along silt fence	Condition of landfill side slopes	Any evidence of overtopping of the silt fence?	Condition of drainage swales

Contractor's Superintendent: _____ Date: _____

Maintenance action required for silt fence:

_____
_____
_____
_____
_____

Performed by:_____On or Before: _____
_____

ACCESS ROAD:

Inspector:_____Date: _____
_____

Does much sediment get tracked on to road	Is the gravel clean or is it filled with sediment?	Does all traffic use the stabilized entrance to leave the site?	Are culverts in ditch working?

Contractor's Superintendent:_____ Date: _____

Maintenance action required to stabilize access road:

_____
_____
_____
_____
_____

Performed by:_____On or Before: _____

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

Inspector:_____ Date: _____

Contractor's Superintendent: _____

Changes required to the Construction Pollution Prevention Plan:

_____
_____
_____
_____
_____
_____
_____
_____

Reasons for changes:

_____
_____
_____
_____
_____
_____
_____
_____

I certify that the foregoing statements are, to the best of my knowledge, true and accurate.

Inspector
Signature:_____ Date: _____

Contractor's Superintendent
Signature:_____ Date: _____

END OF SECTION

SECTION 01340

SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Submit all shop drawings, operations and maintenance manuals, Manufacturers' certificates, project data, and samples required by the Specifications.

B. Related Work Specified Elsewhere:
   1. Construction Schedules: Section 01310
   2. Project Record Documents: Section 01720
   3. General Conditions: Section 00700.

C. Submittals: This project shall utilize:
   1. Submittals – Electronic via FTP with Hard Copy for Record
      a. The Contractor shall submit to the Engineer an electronic submittal of shop drawings and O&M Manuals in portable document format (PDF) transmitted via file transfer protocol (FTP). The Engineer shall return an electronic PDF of the submittal review comments to the Contractor for distribution to subcontractors, suppliers and manufacturers. The electronic submittals shall serve as the electronic record of the project.
      b. In addition, completed shop drawings and completed operations and maintenance (O&M) manuals shall be provided in hard copy (paper) format, for the record, in accordance with the following requirements.
         i. Shop drawings and O&M manuals shall be considered "completed" once an action code of "0" or "1" has been attained, as specified below, unless otherwise directed by the Engineer.
         ii. Once completed, the Contractor shall provide three hard copy sets (for Owner, Engineer and Resident Project Representative, respectively).
         iii. Hard copy submittals shall be updated on a monthly basis, for those submittals completed during the preceding month.

1.2 SHOP DRAWINGS

A. Shop Drawings are required for each and every element of the work.

B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, his subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.

C. The Contractor shall provide a completed Contractor Submittal Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of every shop drawing and signed by the Contractor and Manufacturer (where applicable). Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. 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 the work.

D. Shop Drawings shall be submitted as a complete package by specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information,

materials and samples associated with each specification section be included as a single submittal for the Engineer's review. Any deviation from this requirement, shall be requested in writing with an anticipated shop drawing breakdown/schedule prior to any associated submittal.

E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.

F. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.

H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. Shop drawings shall be formatted to standard paper sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 11 inches by 8-1/2 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left-hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for resubmittal without being reviewed.

I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, 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. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.

J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in the transmittal. Shop Drawings that contain significant deviations that are not brought to the attention of the Engineer may be subject to rejection.

K. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.

L. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer

Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion. Resubmittals for the sole purpose of providing written responses to review comments will not be considered a resubmittal counting towards the two submission limit.

M. Shop Drawings that include drawings or other material that is illegible or too small may be returned without review.

1.3 SAMPLES

A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available. Submittals of “samples” shall be documented through the electronic submittal process by including a photograph of the item(s) and indicating the date the sample was mailed and/or delivered.

1.4 MANUFACTURER'S CERTIFICATES

A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.

B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.

1.5 SUBMISSION REQUIREMENTS

A. Accompany submittals with a transmittal cover sheet, containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. The sequential shop drawing number for each shop drawing, project data and sample submitted shall be:
      a. Specification Section number followed by a dash and then a sequential number beginning with 01 (e.g., 16000-01).
      b. Under limited situations when additional different pieces of equipment are submitted under the same specification section, those submittals shall be numbered sequentially (e.g. 05500-01, 05500-02, 05500-03, etc.).
      c. Resubmittals shall include decimal point and an alphabetic suffix after the corresponding sequential number (e.g., 16000-01A).
      d. O&M submittals shall be numbered with the Specification Section number followed by a dash, the letters “OM”, another dash, and then a sequential number beginning with 01 (e.g. 16000-OM-01). Resubmittals of O&Ms shall include an alphabetic suffix after the corresponding sequential number (e.g. 16000-OM-01A).
   5. Notification of deviations from Contract Documents.
   6. Other pertinent data.

B. A completed Contractor Submittal Certification Form shall be attached to each electronic PDF of each shop drawing and must include:
   1. Project name
   2. Specification Section and sequential number with alphabet suffix for resubmittal

3. Description
4. Identification of deviations from Contract Documents.
5. Contractor's stamp, initialed or signed, certifying review of the submittal, verification of field measurements and compliance with Contract Documents.
6. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
7. Where specified, manufacturer's guarantee.

C. Additional Requirements for Electronic Submittals:
1. Each individual shop drawing or O&M submittal shall be contained in one PDF.
2. The first page of the PDF shall be the Contractor Submittal Certification Form as described above.
3. The electronic PDF shall be **exactly** as submitted in the hardcopy.
4. The electronic PDF shall include an electronic table of contents that is bookmarked for each section of the submittal.
5. The electronic PDF shall be configured such that is fully searchable.
6. PDF versions of 24x36 drawings shall be converted to 24 x 36 PDFs so as not to lose the clarity of the original drawing.
7. Electronic PDF submittals that are not submitted in accordance with the requirements stated above will not be reviewed by the Engineer.
8. Electronic submittals shall be transmitted via the protocol established in Part 1 above.

1.6 RESUBMISSION REQUIREMENTS

A. Revise initial submittals as required and resubmit as specified for initial submittal.

B. Indicate on submittals any changes which have been made other than those required by Engineer. All renumbering of shop drawings, relabeling of individual pieces or assemblies or relocating of pieces or assemblies to other Drawings within the submittal shall be clearly brought to the attention of the Engineer. If relabeling of individual pieces or assemblies has taken place, the labels from the previous submittal shall be indicated to assist in comparing the original and resubmitted shop drawing.

C. All resubmittals shall include a summary of the previous submittal review comments with the vendors' written response as to how the previous comments were addressed.

1.7 ENGINEER'S REVIEW

A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

B. The Engineer's review comments will be summarized on a Submittal Review Form, which includes an action code. A description of each action code is provided below.
1. No Exceptions Taken (Status 0 on shop drawing log). The shop drawing complies with the Contract Document requirements. No changes or further information are required. Where appropriate, the submittal review form will be used to alert the Contractor, Owner and Field personnel of remaining items within that specification section that still needs to be submitted.
2. Make Corrections Indicated (Status 1 on shop drawing log). The shop drawing complies with the Contract Document requirements except for minor changes, as

indicated. Engineer requires that all comments will be addressed by the Contractor, unless otherwise notified in writing prior to execution of the relevant work.

3. Conditional to Remarks (Status 2 on shop drawing log). The shop drawing potentially complies with the Contract Document requirements, contingent upon satisfactory resolution of review comments. Remarks will explicitly list what information needs to be resubmitted. Resubmittal from the Contractor should include a cover letter or summary which indicates how each review comment has been addressed. **This action code will not be used, or will be sparingly used, for electronic submittals.**

4. Revise and Resubmit (Status 3 on shop drawing log). The shop drawing does not comply with the Contract Document requirement as submitted, but may with changes indicated and/or submission of additional information. The entire package must be resubmitted with the necessary information and a cover letter which indicates how each review comment has been addressed and where to find the information in the resubmittal.
5. Rejected (Status 4 on shop drawing log). The shop drawing does not comply with the Contract Document requirements, for the reasons indicated in the remarks, and is unacceptable.
6. In Review (Status 5 on shop drawing log). The shop drawing is currently under review.
7. For Information Only (Status 6 on shop drawing log). The shop drawing review was for information only.

CONTRACTOR SUBMITTAL CERTIFICATION FORM

PROJECT:_____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR:_____ENGINEER'S PROJ. NO: _____

ENGINEER: _____

SHOP DRAWING NUMBER:	_____ - _____
	SPECIFICATION SECTION OR DRAWING NO:
	SEQUENTIAL NUMBER (& ALPHA SUFFIX FOR RESUBMITTAL)

DESCRIPTION: _____

MANUFACTURER:_____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

☐ NO DEVIATIONS

or

☐ A COMPLETE LIST OF DEVIATIONS AS FOLLOWS[a]:

_____

_____

By:_____By:_____

Contractor[b]

Manufacturer[c]

Date:_____ Date: _____

a Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

b Required on all submittals

c When required by specifications Page____of ____

General Contractor's Stamp

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Pre-Construction Record: Contractor shall utilize digital photographs and video to obtain a visual record of the project area; copies of same shall be given to the Engineer and Owner.
2. Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at his option, observe.

1.2 QUALITY

A. Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, etc. can be readily determined.

1.3 SUBMITTAL OF PRINTS

A. Pre-Construction Record: Submit hard copy prints and electronic files on CD-ROM, and video electronic files on DVD to the Engineer and Owner a minimum of 2-weeks prior to any construction work.

B. The quality of the photos and video are subject to approval by the Engineer prior to the start of construction work in the areas shown by the photos.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. General Quality Control.
B. Workmanship.
C. Manufacturer's Instructions.
D. Manufacturer's Certificates.
E. Manufacturer's Field Services.
F. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

A. Section 00700 - General Conditions: Inspection and testing required by governing authorities.
B. Section 01340 - Submittals: Submittal of Manufacturer's Instructions.
C. Section 02200 - Earthwork.

1.3 QUALITY CONTROL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
B. Perform work by persons qualified to produce workmanship of specified quality.
C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

A. Comply with instructions in full detail, including each step-in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

A. When required by individual Specifications Section, submit manufacturer's certificate that products meet or exceed specified requirements.

1.7 MANUFACTURERS' FIELD SERVICES

A. When specified in respective Specification Sections, require supplier and/or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.
B. Representative shall submit written report to Engineer listing observations and recommendations.

1.8 TESTING LABORATORY SERVICES

A. Contractor will employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services wherever an Independent Testing Laboratory is required by individual specification sections listed in paragraph 1.2 above, unless otherwise indicated. The Testing Laboratory shall be fully certified in Massachusetts and shall be approved by the Owner and Engineer.

B. Services will be performed in accordance with requirements of governing authorities and with specified standards.

C. Reports will present observations and test results and indicate compliance or non-compliance with specified standards and with Contract Documents. Independent Testing Laboratory will submit one copy of each report directly to each of the following: Engineer, Resident Project Representative, Owner, and Contractor. Reports will be mailed within 5 days of obtaining test results. If test results indicate deficiencies, Independent Testing Laboratory shall telephone or FAX results to Engineer, Resident Project Representative, Owner, and Contractor within 24 hours.

D. Contractor shall cooperate with Independent Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.

E. Contractor shall coordinate all testing work and shall notify Engineer and Independent Testing Laboratory at least 24 hours prior to performing work requiring testing services. If scheduled tests or sampling cannot be performed because the work is not ready as scheduled, testing costs associated with the delay will be determined by Engineer and invoiced by Owner to Contractor. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price. If adequate notice is not provided, Contractor shall suspend work on that portion of the Project until testing can be performed. Such suspension will not be grounds for a claim against the Owner for delay, nor will it be an acceptable basis for an extension of time.

F. Independent Testing Laboratory services shall be considered incidental to the overall contract. No separate payment will be made for these services.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Contractor shall provide temporary ventilation during construction as required to ensure a safe working environment. The temporary ventilation systems shall address the following conditions, including but is not limited to: removal of hazardous fumes from explosion-proof rated spaces (Class 1, Division 1 rated spaces), and other potentially toxic conditions associated with the contractor's activities, and ventilation of confined spaces, in compliance with all OSHA and State safety requirements.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards, fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.
2. Use new or used materials adequate in capacity for the purposes intended.
3. Materials must not create unsafe conditions or violate the requirements of applicable codes.

4. Conductors:
   a. Wire, cable or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
   b. Use only UL approved wire.
5. Conduit:
   a. Rigid steel, galvanized: ANSI C80.1.
   b. Electrical metallic tubing: ANSI C80.3.
   c. Other material approved by NEC.
6. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
7. Temporary power shall be based upon the following minimum requirements:
   a. Lighting - 300 watt per 1,000 square feet of floor area.
   b. Receptacles - One 15 ampere duplex for 1,000 square feet of floor space.
   c. Special Construction Equipment - Provide one 30-amp, 2-pole fused switch for equipment connection. The cost for cables and connection from switch to the special equipment will be borne by the Sub-Contractor requiring same.
8. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of temporary wiring of a special nature for light and power required, other than that above mentioned.
9. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.

B. Water and Sanitary:
1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at his own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for his employees.
4. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.
5. Relocate temporary toilet facilities as required to facilitate the construction.
6. Remove all temporary facilities at completion of work when directed by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Electrical:

1. Provide electrical energy to:
   a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
   b. Construction site offices.
   c. Lighting as required for safe working conditions at any location on the construction site.
   d. Night security light.
   e. When applicable, Owner's present facilities during the changeover of electrical equipment.
2. Maintain electrical energy throughout the entire construction period.
3. Capacity:
   a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.
   4. Installation:
   a. Install all work with a neat and orderly appearance.
   c. Have all installations performed by a qualified electrician.
   d. Modify service as job progress requires.
   e. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.

B. Water:

1. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.

C. Sanitary Accommodations:

1. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.
2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.1 DESCRIPTIONS

A. Work Included:
   1. Furnish and apply water or calcium chloride on the road surfaces within the construction site, when required to control dust and when directed by the Engineer.
   2. 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 MATERIALS

A. Water for Sprinkling:
B. Clean, free of salt, oil, and other injurious matter.
C. Calcium Chloride:
   1. Meet the requirements of AASHTO M144.

PART 3 - EXECUTION

3.1 APPLICATION

A. Water:
   1. Apply water by methods approved by the Engineer.
   2. Use approved equipment including a tank with gauge equipped pump and spraybar.
B. Calcium Chloride:
   1. Apply at a rate sufficient to maintain a damp surface but low enough to assure non-contamination of water courses.
   2. Apply water prior to calcium chloride addition.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
   2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
   3. Do not close roads or streets to passage of the public without the permission of the proper authorities.

B. The local police department will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage.

C. Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.

D. The Waltham Chief of Police or his designee, will assign Uniformed Police Officers from his department in the quantity and at the location(s) as determined to be necessary by the Chief of Police and as Uniformed Police Officers are available.
   1. The Contractor shall make all arrangements with the Officer in Charge for the services of Uniformed Police Officers. If, in the opinion of the Chief of Police, Uniformed Police Officers are required for the protection of persons and control of traffic, the Contractor shall be responsible for making all arrangements as may be required.
   2. The Contractor will pay the police charges if he fails to adequately cancel a requested detail.

E. The Contractor shall coordinate with MassDOT and complete any required permits for rehabilitation or replacement of sewer pipes and manholes within MassDOT right-of-way.

F. Develop a project specific traffic control plan that meets the requirements of Manual of Uniform Traffic Control Devices (MUTCD) and any local and state requirements. The Proposed Traffic Control Plan shall indicate signs/locations to be used and all proposed detours or road closures. The Traffic Control Plan shall be submitted to Owner and Waltham Police Department for approval. The Traffic Control Plan submittal to the Engineer will be for general information only.

G. The Contractor's designated traffic control representative shall respond to all traffic safety complaints and be available to direct traffic control subcontractors the entire time work is occurring on site. If the designated representative is not on site for a period of time, another on site representative shall be designated by the Contractor for that period.

1.2 SCHEDULING WORK

A. The Contractor shall make all arrangements and schedule the services of Uniformed Police Officers at the worksite by notifying the Waltham Police Department (WPD) dispatch at telephone number (781) 314-3604. The WPD requires notification the Friday before following week for when detail officers are needed. Under certain circumstances, notification can occur no later than 24 hours before a detail officer is needed. The

Contractor shall be responsible for all arrangements and scheduling a sufficient number of detail officers at the worksite to maintain the orderly flow of traffic and pedestrian safety during the Contractor's operations.

1. The Contractor shall also be responsible for the cancellation of the police detail ordered for a particular work day if the Contractor decides not to work for any reason. The Contractor shall follow the cancellation procedures established by the Chief of Police. Failure on the Contractor's part to properly cancel an ordered police detail in accordance with the Police Department procedures that results in duty officers reporting for duty and entitled to pay shall be paid for by the Contractor at no expense to the Owner.
2. The next day's requirement shall be coordinated with the Police Department each day before the end of the work day.

B. During the Project Preconstruction Meeting, one Contractor representative will be designated as the coordinator between the City Police Department and subcontracted traffic control.

C. Variable Message Signs notifying the public of pending road closure and/or construction must be in place seven days prior to road closure or as required by Owner.

D. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.

E. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour.

F. Do not start work in any new location without the permission of the Engineer.

G. Notify all police and fire departments of all scheduled detours and when streets are reopened.

1.3 TRAFFIC CONTROL REQUIREMENTS

A. Prior to beginning construction, the Contractor shall meet with the Engineer, Highway Superintendent, and Police Chief to establish construction traffic control requirements.

B. The Contractor shall be responsible for traffic control at all times.

1. The traffic control shall be in accordance with all Local, State, and Federal regulations including but not limited to MUTCD and Massachusetts Addendum to the MUTCD.

C. The Contractor shall maintain access to local residents and businesses at all times.

D. No trenches are to be open overnight. The Contractor shall place temporary pavement in the trenches on a daily basis.

E. The Contractor shall be prepared to open the street immediately to all emergency vehicles should any emergency occur. The Contractor shall keep the Police and Fire Departments constantly notified of the status of street access should an unusual construction situation occur which blocks the streets.

F. The Contractor shall be responsible for completely re-opening all streets each night to all traffic at the end of the normal work day to the Engineer's satisfaction.

G. Roadway clean-up shall be accomplished in sufficient time before the end of the work day and to place all proper warning devices including working flashing lights to the Engineer's satisfaction before the Contractor departs the work area for the day.

H. The Contractor shall maintain safe and continuous access to all pedestrian routes (sidewalks, cross walks, ramps, etc.) in accordance with ADAAG requirements during construction. In the event construction activities require closure of a route, Contractor shall provide a temporary route. Where construction takes place within the route of the existing cross

walk, the Contractor will be required to provide a temporary route beyond the construction limits. All temporary cross walks will be constructed in accordance with the City of Waltham requirements, ADA and MUTCD.

I. The Contractor is required to return each roadway to its normal configuration at the end of each work day including placing temporary pavement in all trenches. Temporary maintenance of parking and parking regulatory signs may remain in place until the work is completed.

J. The Contractor shall be responsible for public outreach. Prior to commencement of work, the Constructor shall notify (through local papers) to the community seven days in advance of streets which will require displacement of parking, lane reductions, detours and/or street closings. The Contractor shall post signs a minimum of 48 hours in advance, on streets where on-street parking will be displaced during construction. The signs shall indicated "NO PARKING" and specify which days of the week the parking ban will be ineffect.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

A. Traffic control (plans, methods and devices) shall be as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as published by U. S. Department of Transportation, and any local and state requirements.

B. Provide adequate warning signs, barricades, signal lights, flaggers/uniformed police officers, and take other necessary precautions for the safety of the public.

C. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.

D. Provide digital message boards at appropriate locations as determined by the local police department to maintain safe passage of traffic and work zone.

E. Provide barricades of substantial construction and painted with a finish that increases visibility at night, as outlined in the MUTCD.

F. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.

G. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.

H. Contractor shall make periodic inspection throughout the day of the traffic control patterns, methods, signs and other devices to ensure that they are properly placed.

2.2 PORTABLE CHANGEABLE MESSAGE SIGNS

A. Portable changeable message signs (PCMS) sign panel shall consist of three lines of displace with a minimum of seven characters per line. Characters shall be a minimum of 18 inches high. All messages shall be legible at 900 feet orgreater.

B. PCMS signs shall be self-contained units, including sign assembly, flashing lights and power supply specifically constructed to operate as a trailer-mounted sign.

C. Sign assembly shall be shown in the Massachusetts Highway Department Construction Sign Standards.

D. Each unit shall be equipped with two mono-directional flashing lights with amber lenses and reflectors, which are visible through range of 120 degrees when viewed facing the sign. The lights, either strobe, halogen, or incandescent lamps, shall be visible for a minimum distance

of one mile under daylight conditions and shall have a minimum flash rate of 40 flashes per minute. AN "ON" indicator light shall be mounted on the back of the signs, which is visible for at least 5000 feet to provide confirmation that the flashing lights are operating.

E. Power shall be either full batter power with solar panel charging (capable of maintaining a charged batter level) and 135 ampere, 12 volt deep cycle batteries, or diesel powered generator with fuel capacity sufficient for 10 hours of continuous operation.

F. PCMS signs shall be removed outside the clear zone of the traveled way when not in use unless protected by portable barrier or equipment and specifically approved.

2.3 CONSTRUCTION EQUIPMENT

A. The Contractor shall not park construction equipment during non-working hours within the right-of-way without permission from the Chief of Police.

B. All equipment shall have adequate barricades, signs and flashers as approved by the Chief of Police.

2.4 UNIFORMED POLICE OFFICER

A. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.

B. The Contractor to arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

C. The Contractor shall be responsible for documentation of actual hours worked by police details including dated, officers' names, and location of detail.

PART 3 - EXECUTION

3.1 DETOURS

A. The Contractor shall not detour traffic without prior approval of the Engineer, Waltham City Engineer, and the Chief of Police. The Contractor shall furnish and place all signs required for notification and detours. Access to local residents on all streets must be maintained.

B. The Contractor shall coordinate traffic detours with the Engineer, Waltham City Engineer, Chief of Police, Fire Department, and Waltham School Department Superintendent.

C. The Contractor shall notify Waltham Police Department a minimum of 48 hours prior to any detours or road closures.

D. The Contractor shall notify adjacent residents and businesses a minimum of 24 hours prior to detouring traffic.

E. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.

1. This project shall require custom detour signs that list specific street names.

F. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

3.2 INCONVENIENCES TO RESIDENTS OF VICINITY

A. Whenever a traveled way is closed, perform the Work in such a manner that local travel, residents and businesses near the Work will be inconvenienced as little as possible.

B. Allow access to residents and abutting landowners along the project to driveways and other normal outlets from their property.

3.3 TRAFFIC CONTROL OFFICERS

A. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.

3.4 GENERAL

A. The Contractor shall be held responsible for all damage to the work due to the failure of barricades, barrier fences, warning signs, or lights to properly protect the work from traffic, pedestrians, or other causes.

END OF SECTION

SECTION 01710

PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
2. At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.

C. Mechanical sweeper – the sites shall be swept on a daily basis at the conclusion of each work day. Sweeping shall be performed by a mechanical power sweeper.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Cleaning During Construction:

1. Execute cleaning operations to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials andrubbish.
2. Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
5. Clean interiors of buildings, when applicable, prior to finish painting, and continue to clean on an as-needed basis until buildings are ready for occupancy.
6. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw material from heights.

B. Control of Hazards:

1. Store volatile wastes in covered metal containers, and remove from premises daily.
2. Prevent accumulation of wastes which may create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

C. Disposal:
   1. Do not burn or bury rubbish and waste materials on project site.
   2. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.

D. Final Cleaning:
   1. Employ experienced workmen, or professional cleaners, for final cleaning.
   2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
   3. Repair, patch and touch up marred surfaces to specified finishes.
   4. Rake clean non-paved surfaces of the project site.
   5. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Keep accurate record documents for all additions, demolition, changes of material or equipment (from that shown on the Drawings), variations in work, and any other additions or revisions to the Contract (via Change Order, Work Change Directive, Field Order or Clarification).

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain at job site, one copy of:
   1. Contract Drawings
   1. Specifications
   2. Addenda
   3. Reviewed Shop Drawings
   4. Change Orders
   5. Any other modifications to the Contract
   6. Field Test Reports
B. Store documents in files and racks specifically identified for this use, that are apart from documents used for construction.
C. File documents in a logical manner indexed for easy reference.
D. Maintain documents in clean, dry, legible condition.
E. Do not use record documents for construction purposes.
F. Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.
G. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests.

1.3 RECORDING

A. Label each document "PROJECT RECORD" in large high printed letters.
B. Keep record documents current and do not permanently conceal any work until required information has been recorded.
C. General Field Recording Issues:
   1. All ties should be taken from existing, permanent features such as utility poles, corners of buildings and hydrants. Porches, sheds or other house additions should be avoided as they could be torn down. A minimum of two ties should be taken.
   2. Stations should be recorded to the nearest foot.
   3. Inverts should be recorded to the nearest hundredth of a foot.
   4. Elevations should be recorded to the nearest hundredth of a foot.
   5. Building dimensions should be recorded to the nearest 1/4".
D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):

1. Existing Utilities
   a. Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be required.
   b. Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties should be shown on plan. Utility should be drawn to scale in section (horizontally and vertically) and an elevation should be called out to the nearest hundredth of a foot.
   c. When existing utility lines are broken and repaired, ties should be taken to these locations.
   d. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
2. Manholes, Catch Basins, and other structures.
   a. Renumber structure stationing to reflect changes.
   b. Show ties to center of structure covers or hatches.
   c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
   d. Show inverts for other structures at the face of the structure.
   e. Draw any new structures that are added on plan and profile.
   f. Show any field or office redesigns.
   g. Redraw plan if the structure's location is moved more than 5 feet in any direction. Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.
   h. Redraw profile if inverts changed by more than 6 inches.
3. Gravity Sewer Line
   a. Change sewer line slopes indicated on Drawings if inverts are changed.
   b. Draw any new gravity lines that are added on plan and profile.
   c. Show any field or office redesigns.
   d. Redraw the sewer line profile if manhole inverts are redrawn.
   e. Redraw the sewer line on plan corresponding to relocated manholes.
4. Water Mains
   a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks should be recorded.
   b. Revise elevations indicated on the Drawings to reflect actual construction.
5. House Water and Sewer Services
   a. Draw all house services (even to empty lots) on plan, and show ties.
   b. Show ties or distances to sewer wyes from manhole.
   c. Show ties to water corporation stop, curb stop or connection to private side.
   d. Show chimneys heights in the profile.
   e. The City’s standard form shall be used to record water and sewer services information.
      1. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.
      2. Form shall include: pipe materials, depth of services, depth of main,

depth of sewer chimney, and any utilities crossed in trench both under and over and depths to said utility crossings.

6. Ledge

   a. Ledge profiles should be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.

7. Roads
   a. Show centerline road profile and level spot elevations.
   b. Show pavement widths.
   c. On road cross sections, show the pavement cross slope.
   d. Show any deviations from the design plans.

E. Specifications and Addenda - Legibly mark up each section to record:
   1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   2. Changes made by Change Order, Field Order, or other method.

1.4 SUBMITTALS

A. At the completion of the project, and prior to the release of retainage, deliver record documents to the Engineer.
   1. Record drawings shall be provided as a bound, red-line paper set.

B. Accompany submittal with transmittal letter, in duplicate, containing:
   1. Date, project title and number.
   2. Contractor's name and address.
   3. Title and number of each record document with certification that each document is completed and accurate.
   4. Signature of Contractor, or his authorized representative.

C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in withholding final completion and in non-approval of final payments of the Contract. If Contract Time has elapsed, this shall be grounds for imposing liquidated damages.

1.5 QUALITY ASSURANCE

A. All horizontal and vertical dimensions, swing-ties, and elevations shall be accurate to within one-tenth of a foot, unless greater accuracy is specified elsewhere in the Specifications (e.g., concrete elevations, weir elevations, etc.).

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 MAINTAINING AND PROVIDING RECORDS

A. Records shall be kept current as the work progresses.

B. Records shall be made available for review by the Owner, Engineer, and Resident Project Representative upon request.

C. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests.

D. Failure to provide records shall be grounds for withholding of final payment and, if beyond contract time, shall be grounds for imposing liquidated damages.

END OF SECTION

DIVISION 2

SECTION 02015

TEST PITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide test pits where noted/shown on the Drawings or at locations requested by the Engineer.

1. In general the work under this Section shall consist of the excavation of test pits or other miscellaneous excavations not specified for payment elsewhere, by the Contractor where it may be necessary to locate or examine soils, groundwater, drains, pipes, rock, public utilities, subsurface structures, or any other possible obstacle or condition.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 COORDINATION WITH UTILITY OWNERS

A. The Contractor shall coordinate the excavation of all test pits with the respective Utility Owners having facilities in the vicinity of the location of test pits.

1. All Utility Owners shall be informed of the necessity of work under this Section and the Contractor shall give sufficient notice to the respective Utility Owners to afford reasonable time for coordination.
2. If so desired by respective Utility Owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

3.2 EXCAVATION

A. Test pit shall be completed 15 days before the proposed separation work is to commence.

B. Unless otherwise specified, the Contractor shall dig test pits as required by the Contract Documents, and the Contractor shall notify the Engineer of the results immediately and prior to the start of any underground installations within said test pit areas.

1. The Owner/Utility Owners shall be notified well in advance of excavation so that they also may make the necessary measurements to locate all objects within test pits.
2. Excavation of test pits shall be accomplished by such means as are required to ensure that any underground utilities or structures that may be encountered are not damaged.
3. It shall be the Contractor's responsibility for any damages incurred during the excavation operations. Any such damages shall be repaired by Contractor (if

permitted) to the satisfaction of the Owner/Utility Owners at the Contractor's expense. Where the repair and/or replacement must be done by the Owner/Utility Owners, any and all costs thereof shall be borne by the Contractor.

4. The Contractor shall notify the Engineer and/or Utility Owners of any conflicts uncovered which may require design revisions, relocations, and/or adjustment.
5. No work shall be started within these areas of conflict until so authorized by the Engineer.
6. Test pit excavation and backfill shall comply with the applicable provisions of Section 02200.
7. Hand excavation shall be performed at no additional cost, where necessary, to prevent damage to the existing utilities.

3.3 RECORDS

A. The Contractor shall measure and record the size, configuration, horizontal and vertical location of all utilities, pipes or other obstacles uncovered in the various test pits dug under this Section.

B. The Contractor shall submit each test pit record to the Engineer within two days of completion of each test pit.

3.4 RESTORATION

A. The surface of test pit areas shall be restored to a condition equal to or better than original.

END OF SECTION

SECTION 02076

ASBESTOS-CEMENT (TRANSITE) PIPE REMOVAL

PART 1 - GENERAL

1.1 CONTRACT REFERENCES

A. Drawings and General Provisions of Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to this Section.

B. Examine all other sections of the specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION OF WORK

A. This section covers the furnishing of all labor, materials, facilities, equipment, services, employee training and testing, permits and agreements necessary to perform the work required for the removal, transportation and disposal of asbestos-cement piping. The Contractor shall perform all work in accordance with these specifications, U.S. Environmental Protection Agency (U.S. EPA) and OSHA regulations, NIOSH recommendations, Massachusetts Department of Environmental Protection (MassDEP) and Department of Labor Standards (DLS) regulations, local statutes, local ordinances, local codes and any other applicable federal, state and local government regulations and guidelines. Whenever there is a conflict or overlap of the above referenced requirements, the strongest provisions are applicable as determined by the Owner's Representative. Deviations from this specification must be approved in writing by the Owner's Representative prior to the Contractor continuing work.

B. The Contractor shall furnish all labor, material, supervision, construction tools, staging, rigging and other equipment necessary to perform the work described below.

C. Provide appropriate worker training, respiratory protection and medical examination.

D. Provide access, support and protection to all authorized visitors and inspectors.

E. Filing of all required notifications and permits and payment of all required associated costs and fees.

F. Abatement activities including removal and disposal of Asbestos Containing Material (ACM), recordkeeping, security, etc.

G. The Contractor shall be responsible for the complete removal and disposal of all identified asbestos-containing/contaminated materials located at the site as specified herein and on the plans. This shall include, but shall not be limited to the disposal of asbestos-cement (AC) pipe and impacted soils as required to complete the installation of replacement piping as shown on the drawings.

H. The Contractor's Asbestos Competent Person (CP) shall be responsible for coordinating daily asbestos activities with the Engineer's Resident Project Representative (RPR), Asbestos Monitor (AM), Licensed Site Professional (LSP), Licensed Asbestos Contractor (AC), Transporter (T) and Disposal Facility (DF). The Asbestos Documentation Checklist shown at the end of this section shall be completed and submitted to the Owner by the CP on a daily basis throughout the entire project.

I. Provide specific training on asbestos cement pipe removal to all workers, which at a minimum should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent. Provide

MA licensed asbestos workers for any cutting or pipe breaking operations, or any work that has the potential to cause asbestos to become friable during handling. Document all training prior to work by submitting certificates of attendance or copies of licenses.

J. Provide a written Asbestos Work Plan (AWP) that addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared and stamped by a MA Asbestos Project Designer.

K. Provide a written Soil Management Plan (SMP) that addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

L. Provide all asbestos work in accordance with applicable regulations, specifications and guidance documents including Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated June 2011.

M. The contractor shall verify that all non-regulated materials leaving the site do not contain asbestos. This shall include at a minimum, visual screening of all soil for presumed asbestos containing material.

N. Furnish all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing and disposing of Asbestos-Containing-Material resulting from unforeseen conditions.

O. Provide secure, fenced and locked asbestos storage area in accordance with Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated June 2011, 310 CMR 7.00 and 310 CMR 19.00.

1.3 SCHEDULING

A. The Contractor shall prepare an abatement schedule for submittal to the Owner at the Project Kickoff Meeting.

B. The Contractor shall update the abatement schedule on a weekly basis.

1.4 PERIOD OF PERFORMANCE

A. The Contractor shall complete all work of this Section including completion of all punch list items within the period indicated in the Bid Form and contract documents.

1.5 AUTHORITY TO STOP WORK

A. If the Owner or the Owner's Representative presents a written stop asbestos removal order, the Contractor shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the Owner or the Owner's Representative. A stop asbestos removal order may be issued at any time the Owner or the Owner's Representative determines abatement conditions / activities are not within specification requirements or are not in compliance with applicable regulations. Work stoppage shall continue until conditions have been corrected to the satisfaction of the Owner or the Owner's Representative.

B. Stop asbestos removal orders may be issued for, but may not be limited to the following:
   1. If the Contractor disregards the authority of the Owner’s Representative;
   2. If the Contractor disregards laws or regulations of any public body having jurisdiction; or
   3. If the Contractor’s work presents a risk to a building, building occupants, the general public, other contractors, owner representatives or the environment.

C. The absence of a stop work order issued by the Owner or the Owner's Representative shall not in any way be construed as an approval or acceptance of the Contractor's work.

1.6 DEFINITIONS

All terms not defined herein shall have the meaning given in the applicable publications and regulations.

A. Abatement: Procedures to control the release of asbestos fibers from ACM; includes removal, encapsulation, and enclosure of ACM.

B. ACM: Asbestos-containing materials.

C. Adequately Wet: Sufficiently mixed or penetrated with liquid to prevent the release of particulate. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

D. Amended Water: Water containing a wetting agent or surfactant that has been added to increase the ability of the water to penetrate ACM.

E. Asbestos: Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered.

F. Asbestos-Cement (AC) Piping: AC pipe has been widely used for water and sewer mains and occasionally used as electrical conduits, drainage pipe, and vent pipes.

G. Asbestos-Containing Building Material (ACBM): Any building material containing more than one percent by weight of any asbestos of any type or mixture.

H. Asbestos Containing Material (ACM): Any material containing equal to or greater than 1% asbestos based on analysis via polarized light microscopy (PLM) is considered ACM.

I. Asbestos Contaminated Material: any material which has become contaminated (superficially or in the materials matrix or composition) with one or more asbestos fibers.

J. Asbestos Documentation Checklist (ADC): A checklist that must be submitted daily that documents asbestos (i.e. soil, pipe, etc.) removal activities and regulatory compliance during the project. The Contractor's Asbestos Competent Person (CP) shall be responsible for completing the ADC, then obtaining review and verification by the Engineer's Resident Project Representative (RPR). The CP is responsible for coordinating other activities as needed by the Asbestos Monitor (AM), Licensed Asbestos Contractor (AC), Transporter (T), Disposal Facility (DF), and Licensed Site Professional (LSP). The following defines specific responsibilities for the completion of each task in the ADC:

1. Competent Person – General Contactor's representative that identifies existing asbestos hazards in the workplace and selects the appropriate control strategy to minimize asbestos exposure, and has the authority to take prompt corrective measures. Oversees all removal of asbestos, including removal of intact asbestos pipe without breakage or cutting, and coordinates RPR, AM, AC, T, DF and LSP activities. Ensures all contract and specification asbestos regulatory requirements are met and documents by completing the ADC. Ensures proper personal protective equipment is worn by all workers. Collects daily asbestos air samples to document acceptable asbestos exposure levels for OSHA worker exposure. Visually inspects all soil leaving the site to verify there is no presumed asbestos containing materials present in clean soils, and notifies the Owner immediately if there are any variances from the specification or regulations.
2. Licensed Asbestos Contractor – General Contractor's subcontractor that performs asbestos removal in contained or glove bag work areas if pipe is damaged or friable,

not intact, deteriorated, crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix (e.g., saw cutting and/or tapping). Works with CP to ensure all asbestos stored on the site is wrapped, labeled and stored in a fenced/locked/secured area. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Provides summary documentation to the CP for inclusion in the ADC, to ensure work is performed in accordance with the Specifications and regulatory requirements. Notifies the Owner immediately if there are any variances from the specification or regulations during site visits.

3. Asbestos Monitor – Owner's representative that performs air monitoring and/or visual inspections of contained and/or glove bag work areas to ensure area meets DLS clearance criteria. Provides summary documentation of test results to CP for inclusion in the ADC for contained work areas. Ensures proper personal protective equipment is worn by workers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations during site visits. Observes contractors work activities at the start of the project to ensure compliance with the specifications, then periodic unannounced site visits as determined by the city of Waltham to document ongoing compliance.
4. Engineer's Resident Project Representative – Owner's Representative that observes all Contract and Specification asbestos regulatory requirements are met by reviewing the ADC. Visually observes soil leaving the site to observe that there is no presumed asbestos containing material present in clean soils. Notifies the Owner immediately if there are any variances from the Specification or regulations.
5. Licensed Site Professional – General Contractor's subcontractor that oversees activities necessary to transport and dispose of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are permitted and meet minimal City requirements. Signs the ADC. Reviews all Waste Shipment Records for accuracy and coordinates Owner's signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations.
6. Transporter - General Contractor's subcontractor that transports and disposes of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are licensed and meet minimal City requirements. Reviews all Waste Shipment Records (WSR) for accuracy and verifies Owner's signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations.
7. Disposal Facility - General Contractor's licensed disposal site for asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides completed WSR to the CP for inclusion in the ADC to ensure proper asbestos disposal. Notifies the Owner immediately if there are any variances from the specification or regulations.

K. Asbestos Work Plan (AWP): The written AWP addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared by a MA Asbestos Project Designer.

L. Authorized Visitors: Any visitor authorized by the Owner or any representative of a regulatory agency or other agency having jurisdiction over the project.

M. Clean: Visually free of dust, dirt, debris and any foreign material.

N. Clean Room: An uncontaminated room that is a part of the worker decontamination unit and in which worker's street clothes and uncontaminated protective equipment can be stored.

O. Competent Person: In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy to minimize asbestos exposure, who has the authority to take prompt corrective measures, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work, who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

P. Critical Barrier: One or more layers of plastic sealed over all openings into a work area or other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Q. Decontamination Area/Unit: An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

R. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component.

S. Employee Exposure: The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

T. Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

U. Glove bag: Not more than a 60 x 60-inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled; which is placed with an air-tight seal around an asbestos covering and which permits asbestos material contained by the bag to be removed without releasing asbestos fibers into the atmosphere.

V. HEPA Filter: High-Efficiency Particulate Air (HEPA) An air filter capable of trapping and retaining at least 99.97 percent of all monodispersed particles sized 0.3 micron in diameter or larger.

W. HEPA Vacuum: Vacuum equipment with HEPA filter system for filtering the exhaust air from the unit.

X. Intact: The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

Y. Negative Initial Exposure Assessment: A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL's.

Z. NESHAP: National Emission Standards for Hazardous Air Pollutants (Title 40, Part 61).

AA. Non-Friable Asbestos-Containing Building Materials: Materials which contain asbestos bound by a matrix which cannot, when dry, be crumbled, pulverized, or reduced to powder by hand pressure.

BB. Presumed Asbestos Containing Material: Material presumed to contain asbestos unless proven otherwise by laboratory analysis.

CC. Project Designer: A person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C. Sec. 763.90(g) and is certified in accordance with 453 CMR 6.00.

DD. Project Monitor: An individual who is certified by applicable state agencies to observe abatement activities performed by contractors, to represent the Owner to ensure work is completed according to specifications and in compliance with statutes and regulations, and to perform air monitoring to determine final clearance.

EE. Regulated Area: An established area within which airborne concentration of asbestos fibers exceeds or can reasonably be expected to exceed the permissible exposure limit.

FF. Removal: All procedures necessary to remove and dispose of ACM from the designated areas in accordance with the contract documents and all applicable regulatory requirements.

GG. Soil Management Plan (SMP): The written SMP addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

HH. Specific Training: Course titled Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent that is approved by the MA Department of Environmental Protection for training contact hours.

II. Unforeseen Condition: Asbestos encountered during pipe removal activities that is not identified in the specification or plans.

JJ. Waste Generator: Any owner or operator whose act or process produces asbestos-containing waste material.

KK. Waste Shipment Record: The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

1.7 CODES, REGULATIONS, AND STANDARDS

A. General Applicability

1. All work under this contract shall be performed in strict accordance with all applicable Federal, State, and Local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
2. The most recent edition of any relevant regulation, standard, document, code or policy statement shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
3. Copies of all standards, regulations, codes and other applicable documents, including this specification shall be available at the work site.

B. Contractor Responsibility

1. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to all aspects of the abatement project. The Contractor is responsible for providing and maintaining training, accreditation, medical exams, medical records, and personal protective

equipment as required by applicable Federal, State and Local regulations. The Contractor shall hold the Owner and Owner's Representative harmless for any failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of the Contractor, Contractor's employees, or subcontractors of the Contractor.

C. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only. The publications listed below are not intended to be a comprehensive list of all regulations applicable to this work.

1. Environmental Protection Agency (EPA):
   National Emission Standards for Hazardous Air Pollutants (NESHAP) Title 40, Part 61).
   A Guide to Respiratory Protection for the Asbestos Abatement Industry.
2. Occupational Safety and Health Administration (OSHA):
   Asbestos Construction Standard 29 CFR Part 1926.1101
   Asbestos General Industry Standard 29 CFR 1910.1001
   Respiratory Protection, 29 CFR 1910.134
   Hazardous Waste Operation 29 CFR 1910.120
3. U.S. Department of Transportation
   49 CFR 100 - 185, Transportation
4. National Institute for Occupational Safety and Health (NIOSH):
   "Respiratory Protection A Guide for the Employee."
5. American National Standards Institute (ANSI):
   Z86.1-1973 - Commodity Specification for Air
   Z9.2 - HEPA Filter Specifications
   Z88.2-1980-Respiratory Protective Equipment
6. Massachusetts Division of Labor Standards (DLS):
   The Removal, Containment or Encapsulation of Asbestos (453 CMR 6), including all clarifications, policy statements, etc.
7. Massachusetts Department of Environmental Protection:
   310 CMR 7.00, 7.09, 7.15 and all related amendments and policy statements
   Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated June 2011

1.8 PERSONNEL QUALIFICATIONS

A. All personnel of the Contractor or any approved subcontractors involved with asbestos abatement work (including removal of asbestos-cement pipe and soils contaminated with asbestos containing materials) shall meet the following minimum qualifications:

1. Medical examination within the past year in accordance with OSHA 1926.1101 with a physician’s written opinion that the worker has no condition that would preclude him/her from working with asbestos or wearing a respirator.

B. The Contractor shall employ a Competent Person to oversee all aspects of ACM removal. In the event that a previously identified competent person is not on site when ACM is encountered, the Contractor shall immediately stop work and adequately wet any exposed ACM. The Contractor shall not resume work requiring ACM removal until a previously identified competent person is on site to oversee removal and has been authorized by the Owner.

C. There shall be a sufficient number of trained and qualified workers, foremen and superintendents to accomplish the work within the required schedule. No untrained nor

fully qualified and pre-approved person shall be employed to speed up completion of the abatement work.

D. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9). Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by an EPA approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site. At a minimum, this should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent.

E. Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. The physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion that the person has been evaluated for working in a heat stress environment while wearing personal protective equipment (including a negative pressure respirator) and is able to perform the work.

1.9 SITE SECURITY

A. Regulated area access is to be restricted to authorized trained/accredited and protected personnel. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel.

1.10 EMERGENCY PRECAUTIONS

A. A site-specific Emergency Action Plan shall be submitted by the Contractor prior to the Project Kickoff Meeting and shall be reviewed by the Owner’s Representative. The Plan shall meet the requirements of 29 CFR 1926.35.

1.11 RESPIRATORY PROTECTION PROGRAM

A. The Contractor shall develop and implement a Respiratory Protection Program (RPP) which complies with the January 8, 1998 OSHA requirements, 29 CFR 1926.1101 and 29 CFR 1910.132 and 134. All respirators used must be approved for asbestos abatement activities by the proper regulatory authority.

B. Minimum respiratory protection required shall conform to current OSHA and Massachusetts DOS regulations including 29 CFR 1926.1101 and 453 CMR 6.00.

1.12 SUBMITTALS

A. Submittals shall be in accordance with Specification Section 01340 - Submittals.

B. The following submittals shall be submitted to the Owner's Representative at the Project Kickoff Meeting. Submittals shall be submitted to and accepted in writing by the Owner's Representative prior to the Contractor receiving approval to begin work.

1. Certificates of training and documentation of medical examination including a physician’s determination that the employee is able to wear a respirator and documentation of current successful respirator fit test (29 CFR 1926.1101 Appendix C) of all personnel assigned to the project, including Competent Person.
2. Certification of compliance with OSHA requirements including but not limited to medical surveillance, record keeping and personnel exposure monitoring.
3. Respiratory Protection Program. Include site specific exposure assessment for respirator selection.

4. A written project schedule. The schedule shall be date specific and include all phases of the project.
5. Comprehensive safety manual that addresses a site specific Emergency Action Plan, Fall Protection Plan, Equipment Hazards, Trenching Safety Plan and Hazard Communication Plan.
6. Proposed waste disposal site and waste transporter. Include name, address, telephone number and operating permits, etc.
7. Material safety data sheets (MSDS) for all materials and products to be used by the Contractor on this project.
8. Listing of Competent Persons and qualifications. For all workers, submit certificates of attendance or copies of licenses, which at a minimum should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent.
9. Submit an Asbestos Work Plan (AWP) that addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared by a MA Asbestos Project Designer.
10. Submit a Soil Management Plan (SMP) that addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

C. During Abatement
1. Results of personnel exposure monitoring.
2. Project schedule.
3. Contractor shall submit competed ADCs to the Owner on a daily basis.

D. Post Abatement Submittals
1. Disposal receipts and Waste Shipment Record (within timeframes regulated by EPA and DLS) signed by the Owner prior to leaving the site then by the landfill operator demonstrating that the ACM removed from the project has been packaged, transported and disposed of properly.
2. Provide the owner with copies of on-site job logs, notifications, permits, accident reports, personnel exposure air monitoring results, waivers of lien.
3. Copies of any notices of non-compliance issued by governmental authorities.
4. Field notes documenting visual inspections of soils for asbestos.

PART 2 - MATERIALS AND EQUIPMENT

2. 1 MATERIALS

A. Deliver all materials in original packages, containers or bundles bearing the name of the manufacturer.

B. Damaged, deteriorating or contaminated products or equipment shall not be used on this project, and shall be removed from the work site.

C. Polyethylene sheeting shall be at least 6-mil thickness, shall be fire retardant and shall meet all applicable Standards for temporary construction barriers.

D. Duct tape or other waterproof tape, furring strips, staples, nails, screws, or other materials shall be available to secure polyethylene sheeting

E. Disposable bags, poly sheeting used to wrap asbestos-cement pipe and/or disposal drums shall be of 6-mil polyethylene, on which labels are applied, as required by EPA, OSHA and DOT regulations.

F. Asbestos warning signs that are posted at all approaches and/or entrances to work areas shall conform to OSHA 29 CFR 1926.1101. Warning signs shall be posted in English as well as all other applicable languages if persons who cannot read English are present.

G. All fire extinguishers required for the project shall be ABC class type, properly pressurized and in good working condition.

H. Adequately stocked first aid kits shall be on-site.

I. Surfactant (wetting agent) shall be a 50/50 mixture of polyoxyethylene ether and polyoxyethylene ester, or equivalent, mixed in a proportion of 1 fluid ounce to 5 gallons of water or as specified by manufacturer. An "equivalent surfactant" shall be understood to mean a material with a surface tension of 29 dynes/cm as tested in its properly mixed concentration, using ASTM method D1331-56- ("Surface and Interfacial Tension of Solutions of Surface Active Agents")

2.2 TOOLS AND EQUIPMENT

A. Transportation Equipment: Transportation equipment, as required, shall be suitable for loading, temporary storage, transport, and unloading of contaminated waste without exposure to persons or property. The equipment shall be secured at all times and access limited to authorized personnel only. Open-top dumpsters used for transport of asbestos waste shall be secured within a fenced compound with a locking gate.

B. Vacuum Equipment: All vacuum equipment utilized in the work area shall be equipped with HEPA filtration systems, 99.97% efficient to 0.3 microns particulate size. Deliver all vacuums to the site with clean waste containers and new HEPA filters installed. Vacuum wands, brushes, hoses, and other accessories shall be delivered to the site new or, if previously used, shall be delivered to the site in airtight disposal bags.

C. The Contractor shall provide approved respirators and protective clothing to all Contractor personnel. The Contractor shall also provide approved protective clothing to representatives of the Owner, and to representatives of the State or other governmental entity who may inspect the job site.

D. Protective clothing requirements must include, but may not be limited to:
   1. One-time use, disposable, full-body coveralls made of Tyvek® fabric or approved equal.
   2. Hard Hats
   3. Eye protection
   4. Gloves
   5. Respiratory protective equipment in accordance with OSHA 29 CFR 1926.1101 and 29 CFR 1910.134. Respirators shall be NIOSH approved for protection against asbestos exposure.
   6. Other as appropriate for site conditions

E. The Contractor shall have sufficient equipment to mix and spray wetting agents.

F. The Contractor shall have a sufficient quantity of ladders, platforms, hand tools, and materials to conduct the abatement project in an efficient and workmanlike manner. All equipment shall be used according to OSHA Safety and Health Standards for the Construction Industry (29 CFR Part 1926).

G. All electrical cord and connections within all work areas shall be protected with ground-fault circuit interrupters (GFCI). All temporary electrical power shall be in accordance with OSHA Electrical Code for Wet Environment.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

A. Notify Owner's Representative prior to the start of the work and request inspection to document compliance with these specifications.

B. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101. Provide Fall Protection Training and OSHA approved fall protection for all work performed at a height of 6-feet or more above floor/ground level.

C. Provide boots, booties, hard hats, goggles, gloves, protective clothing, respirators and any other appropriate personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project.

D. The Competent Person shall ensure that each time workers enter the regulated area, they observe and follow all required procedures and wear appropriate personal protective equipment.

E. The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for regulated areas at 29 CFR 1926.1101 (e) are met. No person within a regulated area shall be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator (if applicable).

F. Provide all personnel throughout the abatement process with the specified protective clothing and gear. Ensure that all personnel entering and leaving the workspace follow procedures described below:

1. Entering from the outside: Don two protective suits over street clothes and clean protective equipment.
2. Exiting from the work area: Dispose of all protective clothing into labeled plastic bags for disposal as asbestos waste. Remove respirator and wash and wipe thoroughly to decontaminate the respirator.

G. A three-chamber decontamination unit shall be constructed adjacent to the work area if the AC pipe is broken or cut within a negative pressure work area. Otherwise, the workers shall be provided and use a hand and face washing decontamination area prior to exiting the demarcated area.

H. Post written procedures in the workplace and train all personnel on the procedures for the evacuation of the injured and the handling of potential fires. Provide aid to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination during evacuations and fire procedures. Exceptions to normal, routine exiting procedures shall be made for emergencies such as, but not limited to, serious personal injury and fires.

I. The Contractor shall instruct all employees and workers in the proper care of their personally issued respiratory protection equipment (if applicable), including daily maintenance, sanitizing procedures, etc.

J. All respiratory protection equipment (if applicable) shall be inspected by Contractor's personnel at the beginning of each work period, including breaks and lunch periods.

3.2 GENERAL AC PIPE PROCEDURES

A. Non-friable asbestos materials contain more than one percent asbestos by weight and cannot be crumbled, pulverized, or reduced to powder by hand pressure when dry. Non-friable asbestos material such as asbestos concrete pipe typically has asbestos fibers that are bound or locked into the product matrix, so that the fibers are not readily released unless subject to significant abrasion. A variety of pipe disturbance activities minimize release of asbestos from non-friable materials including:
   1. Pipe snapping
   2. Placing wet burlap over piping during breakage
   3. Applying foam over break area
   4. Wet methods
   5. Local ventilation equipped shrouds with High Efficiency Particulate Air (HEPA) filtration

B. Use of these methods shall be identified in the asbestos plan, then verified with worker air sampling at the start of the project to ensure non-friable asbestos is adequately controlled.

C. The Contractor shall be responsible for taking whatever steps are necessary to prevent a release to the environment and additional contamination of the areas beneath the AC pipe.

D. Construct negative pressure enclosures and install air filtration units, as applicable.

E. Dust and airborne fiber release shall be minimized by the use of amended water. The Contractor shall prevent visible dust emissions during, abatement, cleaning and all other activities.

F. Expose the asbestos cement pipe without disturbing the AC pipe.

G. Excavate no closer than 6 inches of the pipe. Carefully uncover the remainder of the pipe by hand or with a shovel.

H. An assessment should then be made to determine if the pipe is damaged, cracked or broken.

3.3 INTACT AND NOT DETERIORATED AC PIPE REMOVAL PROCEDURE

A. Utilize the following procedures if the pipe is not damaged (intact and not deteriorated).

B. Place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination.

C. Adequately wet the asbestos cement pipe with amended water using surfactant or liquid soap before and during removal to avoid creating airborne dust.

D. Remove the asbestos cement pipe to the nearest coupling (bell or compression fitting).

E. Slide the pipe apart at the joints (no saw cutting) or use other methods that do not cause the pipe to become friable or release asbestos fibers.

F. In the event of breakage of asbestos pipe during removal which results in pieces contacting soil, remove all debris and soil located adjacent to and beneath the debris as well as six inches of soil from beneath and surrounding the debris. All resultant debris and soils shall be properly handled, packaged and disposed of as friable, regulated asbestos waste.

G. The Owner's Representative and the Owner shall be notified immediately in the event of breakage.

H. Wrap the wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label in accordance with OSHA requirements. This can be done in the trench or adjacent to the trench.

3.4 DAMAGED REMOVAL PROCEDURE

A. Utilize the following procedures if the pipe is damaged (not intact, deteriorated, or when saw cutting and/or tapping is necessary).

B. Place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination.

C. Adequately wet asbestos cement pipe with amended water where cutting or breaking will occur.

D. If AC pipe is found to be friable or will be rendered friable, abatement shall be conducted in containment.

E. Saw cutting of asbestos cement pipe shall only be conducted within a "mini- containment" in accordance with Massachusetts regulations 310 CMR 7.15 and 453 CMR 6.00, unless such activity is conducted using HEPA exhausted, shrouded cutting equipment.

F. Within the containment work area, there shall be a minimum of 4 air changes per hour and a minimum pressure differential of -0.02-inches water column within the work area(s) relative to the adjacent areas (outdoors).

G. In the event of breakage of asbestos pipe during removal which results in pieces contacting soil, then the Contractor shall remove all debris and soil located adjacent to and beneath the debris as well as six inches of soil from beneath and surrounding the debris. All resultant debris and soils shall be properly handled, packaged and disposed of as friable, regulated asbestos waste.

H. The Owner shall be notified immediately in the event of breakage.

I. Wrap wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label. This can be done either in the trench or adjacent to the trench.

3.5 CLEANING AND FINAL DECONTAMINATION

A. After the removal of the AC pipe has been completed and before removal of barriers (as applicable), the entire area shall be thoroughly wet cleaned and/or vacuumed with HEPA filtered vacuum. All plastic barriers, tapes and disposable contaminated equipment shall also be disposed of as asbestos waste. All reusable contaminated equipment such as masks, hard hats, etc., shall be thoroughly decontaminated through wet cleaning or sealed within 6-mil polyethylene bags before removal from the work area.

3.6 MONITORING, TESTING AND INSPECTION

A. The Contractor is responsible for meeting OSHA requirements for his personnel, including but not limited to, monitoring requirements, safety compliance training and record keeping.

B. The Contractor is responsible for personnel (employee) exposure monitoring for airborne asbestos fibers and other contaminates in compliance with OSHA regulations. At a minimum, contractor collects daily asbestos air samples at the start of the project to document acceptable asbestos exposure levels for OSHA worker exposure and to determine the effectiveness of controls. Notify Owner's Project Monitor prior to the start of the work and request inspection to document compliance with these specifications.

C. Contractor shall report results within 24 hours of collection in writing to the Owner's industrial hygienist. Employee exposure monitoring results from the previous day shall be posted each day. The Owner's Project Monitor may, at his or her discretion, also conduct exposure monitoring on Contractor personnel and area air monitoring at

locations inside and outside of the work area. Provide cooperation and support to the Owner's Project Monitor throughout the abatement process.

D. After a thorough cleaning of the negative pressure regulated work area (as applicable), the Owner's Project Monitor shall determine the workspace is ready for inspection and final testing. The Owner's Project Monitor will visually inspect the workspace for the detection of any visible dust or debris. The cleaning procedures shall be repeated until a level of no visible debris is achieved.

E. Following successful visual inspection of the work area and after a sufficient period of time has elapsed to allow complete drying of the work area; the final clearance air sampling will be performed by the Owner's Project Monitor.

F. The final testing within negative pressure regulated work areas (as applicable) shall take place under active agitation of the air in the work space with fans running, leaf blowers operating and any other means found suitable by the Owner's Project Monitor during the final testing. The number of air samples collected within the work area shall be in accordance with the Massachusetts DLS regulation 453 CMR 6.00. If analysis of clearance air samples shows fiber levels in excess of 0.010 f/cc using phase contrast microscopy (PCM), then repeat cleaning and re-sampling will be required until regulated clearance criteria are met.

G. If unforeseen asbestos is encountered as discussed in Section 3.07, Owner's Project Monitor will perform perimeter air monitoring to ensure activities do not exceed the DLS level of 0.010 f/cc.

3.7 UNFORESEEN ASBESTOS CONTINGENCY PLAN

A. If unforeseen asbestos is encountered during pipe removal activities not identified in the specification or plans, the Contractor shall immediately stop all asbestos removal and adequately wet any exposed ACM.

B. The Owner shall be notified immediately in the event unforeseen asbestos is encountered to:

1. Determine quantities
2. Implement Project Monitor air sampling
3. Identify regulatory requirements

C. The Contractor shall not resume any asbestos removal activity until authorized to do so by the Owner.

D. Cost for unforeseen asbestos is reimbursed under the allowance item.

3.8 WASTE DISPOSAL

A. It is the responsibility of the Contractor to determine current waste handling, transportation, and disposal regulations and or requirements for each waste stream generated at this site by this work and for each waste disposal facility. The landfill destination must be approved by the Owner. The Contractor must comply fully with these specifications and all U. S. Department of Transportation and EPA requirements as well as the requirements of all states through which the waste is transported and all requirements of the state where disposal occurs.

B. Since individual disposal facilities have different permit conditions and specific characterization data requirements, the Contractor is responsible for final characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final waste characterization is the responsibility of the Contractor, and costs for characterization shall be incorporated into the Contractor's bid price for construction.

C. Manage wrapped asbestos cement pipe, polyethylene sheeting and any other material contaminated with visible asbestos debris as asbestos waste in accordance with 310 CMR 7.15 and 310 CMR 19.061.

D. All asbestos wastes must be handled, packaged, stored, transported, and disposed of as in compliance with all Federal, State, and local regulations and codes.

E. If waste containers are not already so preprinted, warning labels having waterproof print and permanent adhesive shall be affixed to the lid and/or sides of the containers, whether or not these containers are further packaged. Warning labels shall be conspicuous and legible, and conform to the latest OSHA, EPA, DOT asbestos regulatory labeling requirements.

F. Waste containers for asbestos-containing materials shall be kept covered at all times.

G. Include owner's name and address on all waste containers.

H. All waste shall be thoroughly wetted when packaged. When a waste bag is full, it shall be securely sealed with tape, and then placed in the designated temporary storage area inside of the work area.

I. All AC pipe shall be double wrapped in 6-mil polyethylene sheeting and labeled as ACM prior to transport.

J. Properly wrapped and labeled asbestos pipe, as well as all other containerized debris, must be placed in a roll-off container(s), or covered trucks, trailers or vans that are lined with 2 layers of 6 mil polyethylene sheeting. The container should be an enclosed leak-tight container and locked having proper labels and DOT placards as required. If open top roll-off containers are used, they must be properly sealed, labeled and secured inside a locked fenced area to prevent access by unauthorized personnel and covered at the end of each work day to prevent water accumulation.

K. Contractor shall insure that transport vehicles do not leak water or other material while being loaded, being transported or while on site partially loaded. If water is observed leaking from any transport or storage container, contractor shall immediately stop work, unload the container (including dumpsters and semi-trailers) find and correct the source of the leak, and place waste material back into the container. This process will be repeated each time any water is observed leaking from a storage or transport vehicle that contains asbestos waste. Contractor shall also take all steps necessary, as determined by the Owner's Project Monitor, to decontaminate the ground or other surfaces that became wet due to water leaking from a container that holds asbestos waste.

L. To comply with the requirement that waste disposal to a permitted landfill be documented, remove waste containers from work areas only under the direction of Owner's Representative, and complete appropriate documentation for each load of waste removed from the site. ACM waste shall not be transported until the owner has inspected said waste and signed off on Asbestos Waste Shipment Record (WSR).

M. Accurately measure and record on the Asbestos disposal checklist the volume of each container or load of waste removed from the site.

N. Provide legal transportation of the waste to the disposal landfill, and complete or obtain all required licenses, manifests, dump slips, or other forms. Copies of all forms or licenses, and the signed original of the WSR for each waste load, shall be given to Owner's Representative.

O. Waste may be transported to and temporarily stored at a pre-approved off-site storage area owned by Asbestos Contractor, but it must ultimately be disposed of at the specified landfill before final payments are approved.

P. The Contractor will document actual disposal of the waste at the designated landfill by completing a WSR and forwarding the original along with the Bill of Lading to the Owner within the time limits specified by EPA NESHAP regulations. Investigate, correct and notify owner immediately in writing if executed WSR is not received from disposal facility. Properly executed WSR is required for final payment of work under Section 01150.

Q. Complete WSR must be retained for two years by the owner, municipality and contractor. Indefinite retainage of WSR is recommended to address any long term disposal site issues.

3.9 GENERAL APPLICABILITY OF CODES, REGULATIONS, LAWS AND STANDARDS

A. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, laws and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

3.10 CONTRACTOR RESPONSIBILITY

A. The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling and disposal of asbestos contaminated materials, and protection of workers and visitors to the site, and persons occupying areas adjacent to the site.

3.11 ASBESTOS DOCUMENTATION CHECKLIST

A. The following checklist must be submitted daily that documents asbestos (i.e. soil, pipe, etc.) removal activities and regulatory compliance during the project. The Contractor's Asbestos Competent Person (CP) shall be responsible for completing the ADC, then obtaining review and verification by the Engineer's Resident Project Representative (RPR), The CP is responsible for coordinating other activities as needed by the Asbestos Monitor (AM), Licensed Asbestos Contractor (AC), Transporter (T), Disposal Facility (DF), and Licensed Site Professional (LSP). The following defines specific responsibilities for the completion of each task in the ADC:

1. Competent Person – General Contactor's representative that identifies existing asbestos hazards in the workplace and selects the appropriate control strategy to minimize asbestos exposure, and has the authority to take prompt corrective measures. Oversees all removal of asbestos, including removal of intact asbestos pipe without breakage or cutting, and coordinates RPR, AM, AC, T, DF and LSP activities. Ensures all contract and specification asbestos regulatory requirements are met and documents by completing the ADC. Ensures proper personal protective equipment is worn by all workers. Collects daily asbestos air samples to document acceptable asbestos exposure levels for OSHA worker exposure. Visually inspects all soil leaving the site to verify there is no presumed asbestos containing materials present in clean soils, and notifies the Owner immediately if there are any variances from the specification or regulations.
2. Licensed Asbestos Contractor – General Contractor's subcontractor that performs asbestos removal in contained or glove bag work areas if pipe is damaged or friable, that is not intact, deteriorated, crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix e.g. saw cutting

and/or tapping. Works with CP to ensure all asbestos stored on the site is wrapped, labeled and stored in a fenced/locked/secured area. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Provides summary documentation to the CP for inclusion in the ADC, to ensure work is performed in accordance with the Specifications and regulatory requirements. Notifies the Owner immediately if there are any variances from the specification or regulations during site visits.

3. Asbestos Monitor – Owner's Representative that performs air monitoring and/or visual inspections of contained and/or glove bag work areas to ensure area meets DOS clearance criteria. Provides summary documentation of test results to CP for inclusion in the ADC for contained work areas. Ensures proper personal protective equipment is worn by workers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations during site visits. Observes contractors work activities at the start of the project to ensure compliance with the specifications, then periodic unannounced site visits as determined by the city of Waltham to document ongoing compliance.
4. Engineer's Resident Project Representative – Owner's representative that observes all Contract and Specification asbestos regulatory requirements are met by reviewing and observing the ADC. Visually observes soil leaving the site to observe that there is no presumed asbestos containing material present in clean soils. Notifies the Owner immediately if there are any variances from the Specification or regulations.
5. Licensed Site Professional – General Contractor's subcontractor that oversees activities necessary to transport and dispose of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are permitted and meet minimal City requirements. Signs the ADC. Reviews all Waste Shipment Records for accuracy and coordinates Owner's signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations.
6. Transporter - General Contractor's subcontractor that transports and disposes of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are licensed and meet minimal City requirements. Reviews all Waste Shipment Records (WSR) for accuracy and verifies Owner's signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the Owner immediately if there are any variances from the specification or regulations.
7. Disposal Facility - General Contractor's licensed disposal site for asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides completed WSR to the CP for inclusion in the ADC to ensure proper asbestos disposal. Notifies the Owner immediately if there are any variances from the specification or regulations.

Asbestos Documentation Checklist
(This form is only required if asbestos is encountered. Attach additional documentation as necessary [e.g., test results, waste shipment records, etc.])

Project Name_____ Date:_____

Mandatory Signatures:

Completed by Contractor Asbestos Competent Person (CP) - Print Name and Signature

_____

Verified by Engineer's Resident Project Representative (RPR) - Print Name and Signature

_____

Complete as Applicable:

Quantity of Asbestos Pipe Removed in Linear Feet _____

Quantity of Asbestos Pipe Removed under Containment in Linear Feet _____

Station Locations of Asbestos Pipe Removed _____

Quantity of Asbestos Pipe Shipped Off-Site in Linear Feet _____

Quantity of Asbestos Pipe Shipped Off-Site in Cubic Yards _____

Quantity of Asbestos Contaminated Soil Removed in Cubic Yards _____

Asbestos Contaminated Soil Removal Time in Hours_____

Disposal Site and Address_____

Transporter Name and Address_____

Summary of Asbestos Testing Results_____

Asbestos Contractor_____

Asbestos Monitoring Firm_____

Soil Management Plan Consultant _____

Check off and verify all that apply for daily asbestos compliance activities:

YES	NO	NA	Compliance Activity
			1. Does the DEP asbestos regulatory notification cover the start/stop date, type and quantity of removed asbestos?
			2. Do all workers removing asbestos pipe have 8-hour DEP approved asbestos pipe removal training and was an Asbestos Competent Person present?
			3. Do workers that wear respirators or are licensed asbestos workers have medical exams?
			4. Were all asbestos pipes removed intact in non-friable state?
			5. Was plastic placed under all asbestos during pipe separation?
			6. Were wet methods used during all asbestos disturbances?
			7. Was a High Efficiency Particulate Air (HEPA) filtered ventilation shroud used during uncontained pipe sawing?
			8. Were containment methods (i.e. glove bag or negative enclosure) used during non-intact breakage or cutting of asbestos?
			9. Was Owner contacted immediately if breakage or cutting of asbestos pipe resulted in friable asbestos material?
			10. Did a MA Licensed Asbestos Monitor perform clearance testing or visual inspection if breakage or cutting of asbestos pipe was necessary?
			11. Was worker air sampling performed for OSHA compliance?
			12. Did a MA Licensed Asbestos Contractor perform asbestos work under containment if breakage or cutting of asbestos pipe was necessary?
			13. Were soils visually inspected for presumed asbestos containing material, other than soil and pipe scheduled for removal, prior to removal from the site?
			14. Was all asbestos disposal work performed in accordance with the Soil Management Plan and disposed of at an Owner approved facility?
			15. Was the stored asbestos wrapped in 2-layer plastic, labeled and stored in a locked/fenced/secure location?
			16. Was all asbestos shipped off site accompanied by a properly executed Waste Shipment Record with the Owners signature?
			17. Was all asbestos shipped off site labeled with the owner's name and address?
			18. Was proper personal protective equipment worn during asbestos work including respirators, clothing, gloves and boots?
			19. Did workers decontaminate in a washing facility after asbestos disturbance?
			20. Provide in the space below, any additional comments or variances to the preceding items referencing appropriate item number:

END OF SECTION

SECTION 02080

SOIL AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 QUALIFICATIONS

A. The Contractor shall demonstrate the necessary skills, experience, training, and qualifications to conduct the work as specified herein.

B. The Contractor shall possess all required licenses, insurance, permits and trained employees to properly execute the work as specified herein.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, and Appendix C apply to work of this section.

1.3 OBJECTIVE AND OVERVIEW

A. This Section includes furnishing all labor, equipment, and materials, and performing all operations in connection with the handling, stockpiling, and disposal and/or in-project reuse of soil and associated fill and waste material resulting from the construction operations as specified. In-project reuse shall be defined as material that is reused within the project, such as replacement of soil back into the excavation trench after installation of new utilities.

B. The soil management practices specified herein apply to all soil excavated during the course of this contract, including potentially contaminated soil and fill material. The objective of soil management practices detailed herein is to manage all soil excavated at the site during the course of this contract in compliance with applicable Federal, state and local laws and regulations and in a cost-effective manner.

C. This Section includes proper handling and management of waste materials, including, but not limited to, construction debris building demolition, municipal waste, boulders, soil, fill, ash, rubble, and empty or crushed drums and/or drum parts.

D. Activities conducted under this Section shall be implemented in compliance with the Contractor's Site-Specific Health and Safety Plan (HASP).

E. This Section describes the general parameters and requirements for testing (including field screening and laboratory chemical analysis), excavation, handling, storage, tracking, transport, and disposal and/or in-project reuse of natural and fill soils.

F. In the course of the work, it may be necessary to excavate and handle potentially contaminated soil/solid waste. The soil/solid waste management practices specified herein apply to all soil/solid waste excavated during the course of this contract. The Contractor shall reuse geotechnically suitable excavated material prior to using imported backfill to reduce the volume of material to be disposed off-site. Imported backfill shall be used only as accepted by the Engineer. Historic fill soils and roadway base/subbase shall be re-used to the maximum extent before reusing naturally occurring soils.

G. To the extent possible, the Contractor shall reuse geotechnically suitable contaminated (Class B) or impacted (Class A-2) excavated material prior to using background (Class A-1) material to reduce the volume of impacted or contaminated soil to be disposed of off- site. The Contractor shall segregate fill from natural soils during excavation and shall segregate fill and natural soil stockpiles to avoid mixing impacted and background soils prior to in-project reuse.

H. All work shall be conducted in compliance with the following Contractor-prepared plans:
   1. Site-Specific Health and Safety Plan;
   2. Soil and Waste Management Plan;
   3. Air Monitoring Plan;
   4. Dewatering Plan;
   5. Groundwater and Storm Water Handling Plan;
   6. Equipment and Personnel Decontamination Plan;
   7. Quality Control Plan;
   8. Spill and Discharge Control Plan; and

1.4 DEFINITIONS

A. Asphalt, Brick and Concrete (ABC): Asphalt, Brick and Concrete material that is found in fill material during excavation. All ABC generated during construction shall be disposed of offsite at an appropriate, licensed facility that will accept ABC waste.

B. Surface Roadway Materials: For the purpose of this Specification, the term shall mean existing exposed materials that make up the existing roadway pavement, sidewalks, and curbs. These materials can be composed of asphalt, concrete or granite. Surface roadway materials are excluded from the "Asphalt, Brick, and Concrete (ABC) definition in this Specification. Surface roadway materials shall be disposed of offsite at an appropriate, licensed facility that will accept this material, which may include an asphalt reclamation facility. Removal, transportation, and disposal of surface roadway materials are not part of this Specification.

C. Area of Excavation: For the purposes of reusing soil/fill on-site, the *area of excavation* is considered to be the approximate area in which the soil/fill was removed provided that area is consistent in soil strata, color, texture, geotechnical properties and has substantially similar visual and olfactory characteristics. Soil/fill returned to the *area of excavation* shall be returned to approximately the same horizontal and vertical location from which it originated provided that it is not placed in an area that differs substantially in physical or chemical characteristics as can be observed and measured during excavation.

D. Authorized Excavation: Earth Excavation or "Excavation" consists of removal of materials encountered to the elevations and widths indicated in the Contract Drawings, Specifications, or as directed by the Engineer.

E. Background: (see Section 1.4-L-1)

F. Competent Person: for purposes of this Specification, the term shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them [29 CFR 1926.32(f)].

G. Fill (Historic Fill): Fill, also known as urban, historic, or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with historic fill includes, but are not limited to; coal, glass, brick, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials.

H. Hazardous Waste:
   1. Hazardous waste as defined 310 CMR 40.0006; or
   2. Hazardous waste as defined in 40 CFR 261.3.
   3. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or

b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

I. Peat: A substance of vegetable origin, consisting of roots and fibers, moss, etc., in various stages of decomposition, and found, as a kind of turf or bog. Peat shall be considered natural soil when it is encountered in small amounts (layers 1-foot (304.8 mm) or less in thickness) and when it is impractical to separate the peat from the natural soil or urban fill strata. Otherwise, peat shall be considered a distinctive stratum.

J. Liquid Waste: materials generated onsite due to work performed and are waste or excess including but not limited to collected groundwater, collected stormwater, non- aqueous phase liquids, Contractor-supplied fuels and fluids, and drummed liquids.

K. Solid Waste (Waste): materials generated on site due to work performed and are waste or excess, including but not limited to asphalt, brick and concrete (ABC) waste, demolition waste, decontamination waste, dredging spoils (dewatered), metal waste, plaster/drywall, plastic waste, rock, rubber waste, sediment, tar waste, trash, vegetation debris, wood waste.

L. Soil Classification Categories: Unless specifically stated otherwise, terms used in this specification are as defined in the Massachusetts Contingency Plan (MCP), 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

1. (Class A-1) Background: Any soil or fill material which meets the regulatory definition of "background" as defined in 310 CMR 40.0006 may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified herein and as specified in Section 02200. For record keeping purposes soil/fill that meet the definition of background, shall be transported under a Material Shipping Record (MSR).

   Class A-1 soil may also be re-used off-site without restriction provided it is re-used in an area where soil concentrations are equal to or greater than the Class A-1 soil being re-used (MCP “Similar Soils” provision). The Contractor is responsible for determining the background levels at the point of excavation. It is also the Contractor’s responsibility to identify one or more disposal facilities/locations with background levels appropriate to receive the material to be disposed or reused. It is the Contractor’s responsibility to determine these background levels in advance so as to comply with 310 CMR 40.0032(3)(b) and so as not to delay or adversely affect construction operations.

2. (Class A-2) Impacted: Any soil or fill material which contains oil or hazardous materials (OHM) at concentrations greater than background levels but less than release notification thresholds established by 310 CMR 40.0300 and 40.1600. Impacted soil may be reused in the area of excavation or as fill provided it is reused in an area of equal or greater contamination and meets the physical requirements as specified herein and as specified in Section 02200. Class A-2 soils requiring off-site transportation and disposal/reuse shall be transported using a Material Shipping Record (MSR).

3. (Class B) Contaminated: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600, except where the presence of the material is consistent with the regulatory definition of "background" as defined in 310 CMR 40.0006.

Any soils which contain either petroleum or chemical odor or visual indications of oil or hazardous materials shall be handled as potentially contaminated soils. Suitable soil which does not have any evidence of contamination may be reused within the area of excavation without first performing laboratory analyses. Soil/fill that may be contaminated shall be set aside by the Contractor for assessment by the Owner's environmental professional. Soil/fill that is staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been tested and has equal or less contamination than the point where it is to be reused and it is not reused beneath a permanent structure such as a building foundation. Any excavated soil/fill material not reused within the area of excavation must be characterized prior to non-project reuse. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill.

Class B soil that cannot be reused on site shall be reused off-site, recycled, or disposed as a solid waste at an appropriately permitted facility unless it also meets the regulatory definition of hazardous waste as defined in 40 CFR Part 261 or contains detectable asbestos. Subcategories of Class B soil are defined as follows:

a. Class B-1: Soil and Fill that meet all applicable criteria (i.e., COMM 97- 001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in- state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Class B-1.

b. Class B-2: Soil and Fill that meet all applicable criteria (i.e., COMM 97- 001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in- state lined landfills.

c. Class B-3: Soil and Fill that meet all applicable criteria for instate recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed in-state recycling facility.

d. Class B-4: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined, and unlined landfill reuse criteria as well as in-state recycling acceptance criteria, but meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities, and are not classified as a Resource Conservation and Recovery Act (RCRA) Hazardous Waste.

e. Class B-5: Soil and Fill that contain concentrations of contaminants that require removal to regional disposal facilities and are not classified as RCRA Hazardous Waste.

f. Class B-6: Soil and fill which does not meet one of the designations above due to excessive foreign materials and/or debris that are not classified as a hazardous waste.

4. (Class C) Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of

hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste as defined in 40 CFR 261.3 is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, subpart C and/or that is listed in 40 CFR 261, subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste. Subcategories of Class C soils shall be as follows:

a. Class C-1: Soils classified as hazardous waste that can be readily treated on-site to eliminate the toxicity characteristic (e.g., for lead).

b. Class C-2: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be readily treated on-site. This material must be transported to an out-of-state approved RCRA Subtitle C hazardous waste disposal or treatment facility under a Uniform Hazardous Waste Manifest.

M. Special Waste: Any waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the waste. PCB-contaminated soils/fill is an example of special waste categories.

N. Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.

O. Unauthorized Over Excavation: Consists of removal of materials beyond indicated elevations and width limits indicated in the Contract Documents without direction of the Engineer. Over-excavation material handling, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Over-excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.

P. Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits as shown in the Contract documents without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.

Q. Unknown Materials: Any material, that is not readily identifiable as nonhazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. Such wastes include but are not limited to:

1. Unlabeled drums or containers containing material which is not readily identifiable as a non-hazardous substance.
2. Any material, which varies significantly from material previously observed on site and which cannot be readily identified as a nonhazardous.
3. Waste material of unusual color or odor or material with indications of hazardous levels (e.g. exceeding OSHA permissible exposure limits) of contaminants as evidenced on an organic vapor monitor or other similar instrument.

The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner or their representative shall assess the material with the Contractor and inform the Contractor as to the nature of the material (known or unknown).

1.5 WORK INCLUDED

A. Managing excavated soil; wastes; asphalt, brick and concrete (ABC); surface roadway materials; and fill materials.

B. Characterization of soil, fill, and unknown material for disposal/ off-site reuse purposes; field screening and soil management/segregation; temporary storage/staging; and characterization (as may be necessary for unknown materials and/or for compliance with receiving facility requirements); and disposal and/or off-site reuse of excavated soil and fill material. All laboratory chemical analyses conducted shall utilize currently accepted U.S. EPA and applicable state agency analytical protocols and procedures.

C. Management of liquid waste. If groundwater or storm water potentially impacted by oil and hazardous material (OHM), based on visual or olfactory evidence, is encountered in the course of the work, construction dewatering and discharge permits and groundwater treatment may be necessary depending upon the discharge method(s) and/or location(s) utilized by the Contractor. The Owner and Engineer shall be notified by the Contactor if groundwater or storm water potentially impacted by OHM is identified.

D. All work at the site must be performed in accordance with all applicable federal, state, and local regulations, permits and licenses, including, but not limited to:

1. The applicable parts of the Code of Federal Regulation (CFR) Title 40: Protection of Environment, pertaining to the Comprehensive Environmental Response and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), RCRA, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) as regulated by the U.S. Environmental Protection Agency (U.S. EPA);
2. State regulations specified in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), and Massachusetts General Law 21E - Massachusetts Oil and Hazardous Materials Release Prevention and Response Act, and applicable Massachusetts Department of Environmental Protection (MassDEP) guidelines and policies;
3. MassDEP Technical Update. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil (2002);
4. Department of Transportation (DOT) regulations 49 CFR, and state transportation licenses and permits;
5. OSHA regulations (including, but not limited to, 29 CFR 1910.1000, 29 CFR 1926, and CFR 1910.120), 40-hour Occupational Safety and Health Administration (OSHA) training (plus 8-hour refresher training) and all other applicable state and federal regulations regarding health and safety requirements;
6. NIOSH/OSHA/USCG/EPA: “Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities” October 1985, DHHS (NIOSH). Publ. No. 85-1 15;
7. Department of Transportation training;
8. U.S. Army Corps of Engineers 404 permit;
9. General Contractor's license;
10. National Pollutant Discharge Elimination System (NPDES) Notice of Intent (NOI) to discharge and associated general permits;

11. City of Waltham pretreatment and construction dewatering requirements and permits;
12. Excavation and/or grading permits;
13. Special use permits;
14. Special waste haulers certificate;
15. Massachusetts Wetlands Protection Act;
16. The Contractor's Soil and Waste Management Plan (SWMP) and Health and Safety Plan to protect the workers and the public.

E. Implementation of the submitted HASP and other applicable includes establishing work zones (e.g., support zone, contamination reduction zone, exclusion zone), preparing a decontamination pad(s) and staging area(s), performing the appropriate environmental monitoring, training and medical monitoring of personnel, coordinating waste disposal and waste characterization as needed, etc.

F. The Contractor shall characterize all excavated and stockpiled soil and fill material prior to off-site reuse or disposal. Characterization requirements may vary depending on the source/location of the excavated soil/fill, the site selected to receive soil suitable for off-site reuse, or the disposal facility permits and policies. The Contractor is responsible for final waste characterization and shall determine if any additional waste characterization is required at no additional cost to the Owner.

G. The Contractor shall develop, implement, maintain, supervise, and be responsible for all soil management practices during the course of this contract. An OSHA Competent Person, with demonstrated experience in clean and contaminated soil and hazardous waste handling, shall be present during all excavation, backfilling, field screening, segregating, handling, and characterization of all soils excavated in the course of completing this contract to ensure that soil is managed in accordance with applicable laws, regulations, and this Section.

Soil management activities shall include and be conducted as specified herein:

1. Providing and constructing a secure soil staging area sized to adequately segregate soils in accordance with the conditions specified without impeding construction-related activities. The Contractor is to use existing information and obtain additional information as may be needed to minimize the need for a staging area. If a staging area is required to characterize unknown or excess material for any reason, the Contractor is responsible for locating, selecting, preparing and securing the area.

2. If the soil storage area consists of an unimproved or otherwise pervious surface, the Contractor shall install a lining of 6-mil (or greater) polyethylene, to protect the soil from the potential of intermixing with existing subsurface soils.

3. Stockpiles shall be no greater than 250 cubic yards in volume. If space constraints, etc. make it infeasible to maintain separate stockpiles of soils to 250 cubic yards, the Waste Management Plan shall include a map with the locations of the composite samples for each stockpile shall be provided to the Resident Engineer prior to the submittal of the samples to the off-site analytical laboratory. This will allow any portion of the stockpile, which came back as contaminated soil to be properly segregated and managed separately

4. Stockpiles shall be established and maintained as per EPA requirements under the Construction General Permit Section 2.1.2.4. Requirements include the following.

   a. Locate the piles outside of any natural buffers and physically separated from other stormwater controls;

b. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier;

c. For all soils, provide cover or appropriate temporary stabilization to minimize sediment discharge and to contain and securely protect from wind; nevertheless, the Contractor shall provide cover for any stockpiles containing contaminated soils (>RCS-1 or containing asbestos containing material – see Item 1.5.G.5);

d. Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water; and

e. Unless infeasible, contain and securely protect from wind.

5. Excavated soil/fill that is contaminated or hazardous, or may be suspected to be contaminated or containing hazardous materials shall be stockpiled and covered prior to characterization and off-site reuse or disposal. Since individual disposal facilities will have different permit conditions and specific pre-characterization data requirements the Contractor is responsible for final soil characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final soil characterization is the responsibility of the Contractor and costs for securing a staging area and conducting waste characterization shall be incorporated into the Contractor's bid price for construction. Contractor's operations shall meet all stockpiling requirements established in the MCP (310 CMR 40.0036)
6. During construction activities, excavated soil/fill waste shall be field-screened by the Contractor and either loaded directly for off-site disposal (provided the excavated material is consistent with previously conducted investigations) or stockpiled in a soil/fill waste staging area located by the Contractor and approved by the Owner and Engineer. Stockpiles of Class A, B, and C soils shall be minimized to reduce the amount of waste material stored onsite. Stockpiled materials that are to be disposed of shall remain onsite for only as long as it would reasonably take to characterize (if not done in advance), load and transport offsite to an approved disposal facility. Stockpiles of Class B soil must be removed within 120 days of being generated per the MCP (310 CMR 40.0031). Stockpiles of Class C soil must be removed within 90 days of being generated per RCRA and the MCP. Soils that are to be re-used as fill material shall be stockpiled and maintained as specified herein.
7. Soil suspected of having the characteristics of a hazardous waste or of containing a listed hazardous waste shall not be removed from the excavation except at the direction of the Engineer.
8. Soil/fill waste shall not be staged within 100 feet (30.5 meters) of a reservoir, wetland or Area of Critical Environmental Concern or in a 100-year floodplain. Soil/fill waste shall not be staged in the work area over night. Contaminated material requiring additional waste characterization due to waste disposal facility requirements or in order to assess unknown materials, shall be staged securely pending analytical sampling and characterization by the Contractor.
9. The Contractor shall reuse excavated soil at the point of origin to the maximum degree possible. Soil/fill which cannot be reused immediately at the point of origin shall either have been pre-characterized for off-site reuse or disposal by

the Contractor and directly loaded for off-site transport (provided the excavated soil/fill is consistent in visual, olfactory and field screening characteristics with subsurface investigation conducted prior to construction pursuant to the MCP) or it shall be staged at a location determined and secured by the Contractor pending analytical characterization.

10. Excavating unknown, previously uncharacterized material which may be classified as RCRA hazardous waste and disposing of it at an approved facility.
11. Removing characterized on-site materials for off-site re-use or disposal.
12. Placing and grading of certified clean fill (including fill from on-site which is determined to be suitable for re-use). The Contractor is to maximize the in-project reuse of on-site materials by using soil suitable for such reuse prior to importing material on site.
13. Demobilizing the site, including, but not limited to, removing and disposing of excess or waste soils, rock, solid waste, demolition waste, construction-related equipment and materials used for personnel and equipment decontamination and related waste such as personal protective equipment (PPE), decontamination water/solids, temporary covers, and wash-water storage tanks; disconnection of temporary utilities; and final clean-up to pre- construction conditions.
14. In the event that a previously uncharacterized, unknown material is encountered the Contractor shall manage the material separately and will temporarily stage the material pending characterization as specified herein.

H. All Investigation Derived Wastes are the property and responsibility of the Contractor and are to be disposed of by the Contractor under a Uniform Hazardous Waste Manifest and/or by a Bill of Lading, as appropriate. All samples and laboratory by-products will be returned to the Contractor for disposal. The parties understand and agree that any consultant or sub-consultant (at any tier) is not, and has no responsibility as, a generator, treater, storer, transporter, or disposer of hazardous or toxic substances found or identified at the project site, and that the Contractor agrees to assume responsibility for and indemnify and hold any consultant or sub-consultant (at any tier) harmless from the foregoing.

I. The Contractor is responsible for being aware of potential hazards at the site and reviewing all existing information which provides evidence of contamination within the limit of the work.

1.6 EXISTING CONDITIONS

A. Refer to the documents referenced as part of this Section. The Contractor is obligated to review existing environmental assessment reports and manage the soil and groundwater in accordance with applicable state and federal regulations.

1.7 SUBMITTALS

A. The Contractor shall prepare a Soil and Waste Management Plan (S/WMP) that generally describes the work to be performed under 02080 Part 3 (Execution). The Soil Management plan shall include, but not be limited to detailing the submittal and implementation of the following:

1. Soil and Waste Management Plan;
2. Site-Specific Health and Safety Plan;
3. Air Monitoring Plan;
4. Dewatering Plan;

5. Groundwater and Stormwater Handling Plan (Treating and discharging water from the site);
6. Equipment and Personnel Decontamination Plan
7. Quality Control Plan;
8. Spill and Discharge Control Plan, and
9. The Soil and Waste Management Plan (S/WMP) shall be submitted at least three weeks prior to the beginning of any intrusive work at the site. All other required plans shall be submitted to the Owner or Engineer and/or their representative for review and approval at least two weeks prior to beginning any intrusive work at the site. Plans shall be consolidated provided the requirements of each plan are fully incorporated therein.

B. Soil and Waste Management Plan (S/WMP): The S/WMP shall outline measures for soil and fill sampling, field screening, laboratory chemical analysis, and disposal/ off-site reuse. The S/WMP shall be prepared by a Massachusetts Licensed Site Professional (LSP). The S/WMP shall be implemented prior to the commencement of any excavation activities. At a minimum, this plan shall address the following:

1. Methods, procedures, and equipment used for excavating, handling, characterizing, segregating, reusing/backfilling, loading, and transportation of contaminated soil/solid waste materials encountered during excavation operations;
2. A list of all transporters and waste facilities, complete with license numbers, permit numbers, contact person, and address and telephone number that the Contractor utilizes for waste disposal. In addition, a copy of a memorandum of understanding between the Contractor and each disposal facility shall be attached to the Soil and Waste Management Plan. The memorandum of understanding shall detail that the disposal facility agrees to accept a specified quantity of waste as characterized in the contract specifications and detail what if any restrictions may apply. The Contractor shall provide copies of the permits held by each disposal facility which the Contractor plans to use to dispose of non-hazardous solid waste, and hazardous waste;
3. A summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non- compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history;
4. Procedures for securing the staging area, controlling dust and soil/solid waste migration, air monitoring procedures, and methods of preventing damage to uncontaminated areas via contaminant migration and for decontaminating vehicles and personnel exiting the staging area;
5. The means and methods for decontaminating all equipment and personnel, including provisions for installing an equipment decontamination pad if required or specified;
6. Methods and procedures for identifying stockpiled material (e.g., labeling, marking containers) and procedures for identification and tracking;
7. Methods, procedures, and equipment used for obtaining the necessary information needed to satisfy the off-site reuse/disposal facility requirements specified herein and/or by the facility;
8. Methods, procedures, and equipment proposed for assessing and handling Unknown Materials. The S/WMP shall indicate which laboratory(ies) the

Contractor shall utilize for chemical analysis soil, groundwater and unknown materials.

a. An Unknown Materials information sheet shall be developed as part of the Contractor's S/WMP, upon which the Contractor shall record information such as container type, size, and condition; and, any identifying characteristics of the unknown material. The format of the information sheet shall be as accepted by the Owner and/or its representatives;

b. The Contractor's plan for notifying the Owner and Engineer in the event that an unknown material as defined in this specification is encountered. The plan shall include the phone numbers and names of the Owner's representative(s) that the Contractor would contact in such an event.

9. Provisions for separation of incompatible materials and segregation of different class of soil;

10. Procedures for consolidating (i.e., bulking) compatible materials for disposal;

11. Procedures for dewatering as well as handling, characterization, storing, treating and disposing of groundwater due to dewatering. Refer to this Specification Section and to Section 02401;

12. Procedures for diverting and handling site stormwater. This would include handling, treatment and discharge of stormwater;

13. Provisions, procedures and equipment used for control of dust, vapor and odor; including measures to control objectionable dust, vapors, and odors originating from the site (Section 3.7). This shall describe procedures to minimize the creation of dust, and the control of objectionable vapors and odors originating from the site;

14. Provisions, procedures and equipment used to monitor air at the site (Section 3.6). This shall include site specific monitoring for potential hazards in the air; including the proposed instrument(s) to be used, the expected hazards (e.g., dust, VOCs), the monitoring frequency, the monitoring locations, and the reporting procedures.

C. Soil Management/Tracking Documentation:

1. Prior to off-site disposal or reuse, the Contractor shall provide to the Engineer a letter from the disposal facility indicating that the facility has reviewed the available data relative to the soil/solid waste to be delivered and agrees that the soil/solid waste meets their acceptance criteria. The letter shall be signed by a duly authorized representative of the receiving facility.

2. Within the time constraints established in state and/or Federal laws and regulations, the Contractor shall submit to appropriate authority(ies) and the Owner, as applicable, Uniform Hazardous Waste Manifests, Material Shipping Records, and/or Bills of Lading for all soils and associated fill, rock, ABC and waste disposed or reused of off-site utilizing such documents. Copies of all manifests, Bills of Lading, and all other documents used to track and/or permit off-site transportation of soils shall be submitted to the Owner and Engineer within ten (10) days of shipment. All manifests and Bills of Lading shall be signed by the transporter and receiving/disposal facility. The Contractor is responsible for preparation of all manifests, Bills of Lading, Material Shipping Records, and all other related documents completely and accurately prior to submitting them to the Owner and/or its representative for generator and LSP signatures. The Contractor shall be responsible for paying for any and all fines associated with

inaccurate, incorrect, or improperly completed manifests, Bills of Lading and all other related documents, including fines resulting from late or untimely submittals.

D. Groundwater and Stormwater Handling Plan: The Groundwater and Storm water handling plan shall provide provisions to treat and discharge water from the site that meets all applicable local, state and federal permits.

E. Quality Control Plan: The Contractor shall prepare a Quality Control plan for the development, implementation, and maintenance of a quality control system to ensure that the specified quality is achieved for all materials and work performed.

F. Spill and Discharge Control Plan (SDCP): The SDCP shall provide contingency measures and reporting responsibilities for potential uncontrolled spills and discharges of contaminated and/or hazardous materials, including, but not limited to: fuels, oils, contaminated groundwater, granular solid waste, leachate, decontamination water, sewage, and other on-site waste materials. In addition to the above listed items, the SDCP shall specifically contain: procedures for containing dry and liquid spills; absorbent material available on site; storage of spilled materials; governmental reporting (i.e., notification) procedures; decontamination procedures; discharges of sanitary or combined sewers into storm drains either by flow handling/bypassing or accidental or unintentional discharge; and procedures for protecting wetlands and surrounding public and private property.

The Spill and Discharge Control Plan shall indicate the location and quantity of the materials to be staged on site and the basis for the quantities (i.e. indicate the vessel which will be on site containing the greatest volume of oil or hazardous materials). No fuel or oil tanks or drums may be temporarily staged on site unless they are stored within a secondary containment system. Fuel deliveries shall be performed in a designated area which has either secondary spill containment or an impervious surface with absorbent berms located around the point of fuel delivery. The Spill and Discharge Plan shall indicate the location of the fueling area and the nature of secondary containment which the Contractor intends on utilizing.

1. Notification Procedures: The Contractor shall prepare in advance of work activities a notification list, complete with phone numbers, addresses, and contact names for all parties to be notified in the event of a spill. This list shall be posted on-site at all times and shall include:
   a. Owner's designated representatives;
   b. Owner;
   c. Fire Department;
   d. Engineer; and
   e. Massachusetts Department of Environmental Protection (as required per 310 CMR 40.0000). The Owner shall be notified immediately of an uncontrolled spill or discharge. If human health or the environment are potentially threatened, the Contractor shall take immediate action to abate the conditions and notify emergency personnel.
2. Spill Incident Report(s): In the event of an uncontrolled spill or discharge, a written report detailing each uncontrolled spill or discharge shall include, at a minimum, the cause and resolution of incident, outside agencies involved, and date of occurrence. The report shall be submitted to the Owner within 48 hours of the incident. The Contractor shall document all spills on the as-built Drawings and submit the Drawings to the Owner at project completion. The Contractor shall be responsible for remediating any spills or releases of oil or hazardous

materials as a result of the Contractor's activities. The site shall be remediated to pre-release conditions at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 DUST CONTROL

A. Dust suppression may be achieved by applying controlled amounts of water or dust suppression chemicals to the project site, and through covering of soil stockpiles, etc. Dust suppression shall be carried out in accordance with the approved SWMP.

2.2 SPILL CONTROL

A. At a minimum, the Contractor shall maintain on-site absorbent pads, booms and absorbent materials in sufficient quantity to address a release of fuel oil, hydraulic oil or other OHM that the Contractor intends to use or store on site, including fuel oil and hydraulic oil that is used within earth moving equipment. The quantity of spill containment materials maintained on site shall be sufficient to respond to a catastrophic release from the vessel containing the greatest quantity of oil or hazardous material on-site.

PART 3 - EXECUTION

3.1 GENERAL

A. All work in this section will be performed in accordance with the Contractor's Work Plan, S/WMP and Site-Specific HASP that have been approved by the Owner and Engineer.

B. The primary concern of the Contractor in the excavating, handling, sampling, bulking, and on-site storage of soil/solid waste and/or drummed material (if encountered) will be to protect the health and safety of the site workers, the public, and the environment.

C. The Contractor shall keep a copy of the Health and Safety Plan (HASP) on site during all operations and shall conduct daily health and safety meetings. Failure to keep a copy of the HASP on-site, or any other breach of the Contractor's Plan, may be cause for stopping work at the cost of the Contractor. Delays caused by the Contractor's failure to comply with the health and safety regulations or any health and safety plan shall not entitle the Contractor to recover any additional costs or time lost. The Contractor shall not be allowed to resume activities until corrective measures are accepted by the Engineer and/or their representative and implemented.

D. Medical surveillance records, OSHA 40-hour training forms, accident forms, and all other documentation requirements of the Contractor's safety and health program for personnel working on the site (who are subject to exposure to potentially contaminated soil) shall be up-to-date and kept on file at the site. The Contractor shall provide documentation of employee status upon request of the Engineer and/or their representative.

3.2 SOIL/SOLIDS FILL WASTE MANAGEMENT

A. Soil and fill material that is managed under a Utility-Related Abatement Measure (URAM) Plan pursuant to the MCP, and which is staged off-site may be re-used within fourteen (14) calendar days of excavation. Any material which is suitable for re-use as ordinary borrow, based on analytical results and could have been placed on site, but was not, due to Contractor delay (i.e. analytical results were not available within 10 days following excavation) will be disposed in accordance with the applicable regulations by the Contractor at no cost to the Owner.

B. Soil and fill material that is managed under a Utility-Related Abatement Measure (URAM) Plan pursuant to the MCP, which is staged off-site and which is determined at the staging area to be characteristically hazardous may be treated (stabilized) within the "Area of Contamination" only and must be reused with 14 days or disposed of within ninety (90) calendar days of excavation. No treatment may occur at the staging area. Pursuant to the MCP and RCRA, hazardous Remediation Waste (e.g., Class C soils) shall be removed from the site within 90 days. All other Remediation Waste (e.g., Class B soils) shall be removed within 120 days unless exceptions identified at 310 CMR 40.0031(7) apply.

C. Class B and C excavated soils shall be completely covered with a minimum 10-mil thick layer of plastic tarp. Soils exhibiting evidence of potential contamination including but not limited to odors and/or staining shall be covered prior to characterization and off- site reuse or disposal. Stockpiled soils determined to be Class B or C, as described herein, shall be securely covered at the close of each day and continuously when not being added to or otherwise being handled by the Contractor. Stockpiles shall also be covered at times as directed by the Engineer. All stockpiling activities shall meet the MCP requirements for management of Remediation Waste (310 CMR40.0036).

3.3 SOIL/FILL WASTE CHARACTERIZATION

Soil and fill material shall be classified based on the criteria established in the accepted SWMP.

A. Initial Characterization of Soil/Fill Waste Material: A summary of existing conditions and investigation findings performed by the Engineer during design, including a summary of analytical results, shall be available to the Contractor.

B. The Contractor shall review all the existing conditions information supplied by others. The Contractor shall use the information and shall either perform independent sampling and characterization of soil/fill waste strata to be encountered during construction in advance of excavation such that excavated soil can be segregated and directly transported to an appropriate facility or the contractor shall make the necessary arrangements to secure a staging area(s) suitable for storing soil stockpiles pending analyses, at no additional cost to the Owner.

C. Soil shall be preliminarily segregated based on the Soil Classification Categories detailed in Sub-section 1.4, except as indicated below.

1. Potential Asbestos Containing Material (PACM). If soil/fill waste suspected of containing asbestos is encountered during excavation, the Contractor shall immediately contact the Engineer to discuss the nature and extent of the PACM and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the PACM, MassDEP shall be contacted for approval. Discovery and management of PACM shall be documented in the S/WMP. Evidence of PACM includes but is not limited to the presence of suspect asbestos-containing building debris such as cementitious (transit) piping, vinyl floor tiling, roofing paper or paper-like insulation materials or any other suspect asbestos containing material observed in the soil/fill waste. Following MassDEP approval, such soil/fill waste shall be segregated and stockpiled pending confirmatory analysis to determine appropriate disposal requirements.

2. Unknown Material. If unknown material is encountered during excavation, the Contractor shall immediately contact the Owner and Owner's representative to discuss the nature and extent of the unknown material and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the unknown material from the excavation area, the Contractor and Owner and/or its representatives, shall visually assess the material and its potential

hazards. Drums shall be assessed to determine whether they are leaking, bulging (evidence of reactive waste), crushed, or empty. Crushed, empty, and/or skeletal parts of drums shall be handled as solid waste, as specified. The Contractor shall record any identification or markings on the drummed material(s). Discovery and management of unknown materials shall be documented as required in the SMP.

D. Final Waste Characterization: Final waste characterization shall be the responsibility of the Contractor. The Contractor shall be responsible for determining the characterization requirements of each disposal facility in advance to facilitate timely disposal and to adequately estimate the disposal costs. The Contractor shall perform additional segregation based on disposal requirements. Disposal or off-site reuse of the material shall depend on sampling and characterization analytical results. At the request of the Engineer or Owner, the Contractor shall provide a split sample. The Contractor shall perform or observe all sampling and shall provide notice in advance to the Engineer so that the Engineer may observe the sampling procedure.

1. Stockpiles within the staging area shall be sampled and characterized within a timely manner so as not to impede construction activities or preclude the reuse of soil/fill on site. If soil/fill cannot be reused on site due to the Contractor's delay in sampling material, the Contractor shall dispose of the soil/fill at no additional cost to the Owner including the additional cost of imported fill material used in its place to meet project requirements.

3.4 STAGING AREAS

A. The Contractor's staging area shall be large enough to store equipment, materials and all stockpiled soils. The contractor shall protect the staging area from contamination due to excavating, handling, storing and disposing of hazardous materials.

B. Stockpiles of soils that are known or suspected to be hazardous within the soil staging areas shall be placed on a 20-mil HDPE liner/filter fabric and bermed to minimize the potential for contamination release. Each soil category shall be staged in separate areas with barriers to keep different soil types from mixing. Waste characterized as RCRA hazardous waste will not be stored on site for a period greater than sixty (90) days. All other waste must be disposed of off-site within 120 days of excavation. At the end of each working day, contaminated soils will be covered with 10-mil polyethylene to minimize the potential for release of contaminants. All stockpiling activities shall meet the MCP requirements for management of Remediation Waste (310 CMR40.0036).

C. Covers on stockpiles of soils that are known or suspected to be hazardous shall be secured with tires, ropes, anchors or equivalent material. The cover system shall be capable of resisting actual wind gusts at the site, with a minimum wind capacity of 40 miles per hour. The stockpile covers shall be installed and secured at the end of each working day and at all times when earthwork is not taking place on site. Stockpile covers shall be immediately re-covered should wind forces expose any of the excavated materials. Failure to adequately protect the stockpiles may result in non-payment.

D. Stockpiles are to be segregated based on visual, olfactory, and field screening results. Similar material may be stockpiled together. Each stockpile must be clearly separated from adjacent stockpiles. A temporary construction fence with visual screen shall be maintained around the perimeter of the stockpile area at all times.

E. Stockpiles will be clearly designated by a sign post or marker which can be cross-referenced with samples collected from the pile for characterization purposes. The signs/markers are not to be moved, except by authorized personnel and not until the soil is ready to be either reused on site or loaded for off-site disposal.

F. Unknown, potentially hazardous soils/debris and drummed materials encountered during the project shall be located in a separate bermed location. The Contractor's Soil and Waste Management Plan shall provide construction details of the dimensions and protective measures proposed for the staging area(s). The construction details and protective measures are subject to the approval of the Owner and/or its representatives. The Contractor shall select the area to facilitate handling of the material and to minimize interference with other ongoing construction activities. The Owner or Engineer must agree with the location prior to construction. In the event that excavation is conducted near storm water drainage basins or inlet manholes, the Contractor must protect the drainage structures with filter fabric or provide similar protection to prevent sediment loading and migration of contaminated soils and sediments.

3.5 EQUIPMENT AND PERSONNEL DECONTAMINATION

A. Equipment and personnel decontamination facilities shall be provided by the Contractor when hazardous materials are expected to the encountered and handled onsite. Equipment and personnel decontamination area(s), conforming with the Contractor's HASP and these Specifications, will be constructed in such a manner to protect existing site surfaces, materials, and structures from contamination. The equipment decontamination area(s) will be sized adequately to provide for the decontamination of the largest piece of equipment to be decontaminated. Filter fabric will be placed over an impermeable liner to protect the liner from rips, punctures, or tears from traffic and heavy equipment.

B. The Contractor shall establish a site-specific decontamination protocol and decontamination areas for personnel and equipment utilized at the subject site. Personnel and equipment decontamination shall be conducted in compliance with the HASP.

C. The decontamination protocol shall include (i) the means, methods, and materials for the proposed decontamination procedures; (ii) the procedures employed to contain and store the wash or rinse liquids/sludges; (iii) procedures used to sample, analyze, and characterize the contaminated wash or rinse liquids/sludges; (iv) procedures to contain or clean contaminated equipment and PPE; and (v) the procedures for handling and disposing of solid wastes generated from site decontamination activities. All sample analysis or sample compositing shall be completed by a certified laboratory. The Contractor shall be responsible for the cost of this analytical work. The Contractor shall submit a copy of the analytical results and laboratory certifications to the Owner for review prior to proceeding with disposal. The Contractor shall be responsible to properly manifest and dispose of all residual wastes generated from on-site activities in conformance with federal, state, and local environmental and transportation regulations. The Contractor shall be responsible for the manifests and procedures to be used to package and dispose of contaminated solid wastes, wash, or rinse liquids at an EPA or state-approved treatment or disposal facility. The Contractor shall be responsible for any releases from site or decontamination activities due to its work, and will remediate any release for which the Contractor is responsible to pre-existing conditions at the Contractor’s expense.

D. Provisions for collecting decontamination water will be incorporated into the maintenance of the decontamination pad and will include placing an impermeable liner over a sloped surface such that water is directed, if necessary, into an area for subsequent pumping to 55-gallon drums or other appropriate tankage. Following completion of the work, the wash water shall be characterized by the Contractor and disposed off-site, in accordance with federal, state, and local regulations.

3.6 ENVIRONMENTAL FIELD MONITORING / DUST CONTROL

A. Refer to related Section 01562 – Dust Control.

B. Air monitoring shall occur when excavating or handling soils that are known or suspected to be hazardous or contain hazardous materials pursuant to the MCP. The Contractor shall keep accurate documentation of all air monitoring, which will be made available to the Engineer or Owner upon request.

1. Air monitoring shall include headspace analyses in a jar or plastic bag performed using a portable photoionization detector or other appropriate instrument for the anticipated conditions. The Contractor shall be responsible for properly calibrating the instrument each day and recording the calibration in a daily log which shall include the following information:
   a. Name of device or instrument calibrated.
   b. Date of calibration.
   c. Results of calibration.
   d. Name of person performing the calibration.
   e. Identification of the calibration gas.
2. The Contractor is responsible for providing fully charged instrument(s) at the start of each work day.
3. When applicable, field screening samples shall be taken from numerous locations within the excavation. Samples shall be taken from any area that appears to be visibly contaminated or where an odor is noted.

C. If there are indications of contamination, the frequency of air monitoring will be determined by an Industrial Hygienist or competent environmental health professional. The Contractor's Site Health and Safety Officer and Superintendent will be responsible for assuring that monitoring is conducted in an appropriate manner, and that work practices, engineering controls and/or Personal Protective Equipment are proper for the conditions.

D. The air monitoring program is to be designed to protect public health and the environment from the potential generation of dust and contaminant release during work. At a minimum, the air monitoring shall include daily monitoring and documentation of one upwind, and two downwind conditions during periods of activity on the site and when there is a potential for dust being generated on the site. The air monitoring information including air monitoring in the vicinity of all site activities shall also be utilized for establishing levels of personal protection measures in the Contractor's Site Specific Health and Safety Plan. The Contractor shall submit his/her air quality monitoring program for review and approval prior to commencement of site activities.

E. Air monitoring shall be performed by the Contractor during all soil handling operations. In contaminated areas, detectors for organic contaminants and dust should be utilized to monitor on-site and off-site breathing zones and possible sources of potentially hazardous material (e.g. excavations, regrading, etc.). All personnel shall be made aware of the potential hazards and be informed of air monitoring information by the Contractor. Particular attention to air quality shall be made in the work area during earthwork activities to ensure that contaminants do not escape to the atmosphere and affect off-site population, on-site control, working conditions and personnel protection measures.

F. Dust shall be controlled during excavation of soil/fill waste material to limit potential spread of contaminants and potential exposure of contaminants to workers and the public.

G. Nuisance dust levels shall be reduced by pre-wetting the surface soils and by establishing and maintaining clean access roads. At a minimum, the Contractor shall provide clean water, free from salt, oil, and other deleterious materials.

H. Areas of exposed earth to be excavated shall be lightly sprayed with water before excavation if there is potential for nuisance dust generation. Additional water spray may be utilized only when any indication of excessive dust is observed. To the extent feasible, the Contractor shall minimize the use of water within the limits of excavation.

I. Unimproved access roads shall be sprayed with water on a regular basis to minimize the generation of dust.

J. All containers temporarily storing waste material shall be covered at all times except as necessary to place waste material into the container. The Contractor shall monitor the covers daily to ensure the covers are in place and effectively eliminating the generation of dust and make appropriate notes in the site log.

3.7 VAPOR AND ODOR CONTROL

A. Unimproved access roads shall be sprayed with water on a regular basis to minimize the generation of dust. The Contractor shall provide the materials and labor to control objectionable vapors and odor in accordance with the Contractor's SMP. The Contractor shall limit the exposure area and shall cover the exposure area with synthetic reusable covers, lime, foam suppressants, or other methods to reduce off-site odors to acceptable levels. The Contractor shall not use soil suitable for on-site reuse as cover to control vapor and odors.

3.8 BULKING

A. Following characterization and compatibility testing of waste material, the Contractor shall place compatible materials into common containers to reduce transport and disposal costs, when practicable and with the approval of the Engineer. In addition, materials that are improperly contained shall be transferred into the appropriate containers. Drums and containers used during this project shall meet the appropriate DOT, OSHA, and U.S. EPA regulations for the materials contained. The Contractor shall describe the bulking procedures in the Soil and Waste Management Plan.

3.9 CONTAMINATED LIQUIDS

A. The Contractor shall collect and properly dispose of contaminated liquids and other liquids generated or encountered on site during construction. Contaminated liquid sources include decontamination water, and drummed liquids encountered during excavation. The Contractor shall be responsible for treating and disposing of contaminated liquids as required by applicable regulations.

3.10 CONTAMINATED GROUNDWATER AND CONTAMINATED STORM WATER CONTROL

A. The Contractor shall divert all groundwater and storm water from work areas that may contain oil or hazardous materials (OHM). Groundwater and stormwater, which may contact OHM, polychlorinated biphenyls (PCBs), lead, asbestos or other types of impacted soil, shall be collected within the immediate area of the contact.

B. The Contractor shall perform chemical sampling and testing of the discharge water (groundwater and/or storm water) in accordance with the requirements contained in the issued permits and report the results to the controlling agency. The Engineer may also independently sample and test the discharge water periodically. Chemical testing performed by the Engineer does not release the Contractor from this responsibility. The Contractor shall not discharge the water in the storm drains without reviewing the

chemical testing results to determine compliance with discharge limitations given in the permits. Discharge of treated contaminated groundwater into local sanitary sewer systems is strictly prohibited.

C. The Contractor shall obtain all required EPA, State and city of Waltham permits necessary for disposal and/or discharge of treated groundwater and treated storm water including proper transportation, disposal, and/or discharge.

D. The Contractor shall obtain all permits necessary for discharge of pumped groundwater to the ground for recharge or to the City's storm drain system, be responsible for compliance with the conditions stated in the permits and paying all fines when in violation of the permits at no cost to the Owner.

3.11 BACKFILLING AND COMPACTION

A. Excavated areas shall be backfilled with appropriate backfill material (including excavated material suitable for reuse and, when necessary, imported off-site material). Imported backfill used in excavated areas shall have been analyzed and certified as free of contaminants and as specified in SECTION 02200 - EARTHWORK.

3.12 CLEANUP

A. During the course of the work, the Contractor shall keep the Site and his operations clean and neat at all times. He shall dispose of all residue resulting from the site clearing operations; and at the conclusion for the day's Work, he shall remove and haul away any surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site clearing operations and shall leave the entire site in a neat and orderly condition.

END OF SECTION

SECTION 02095

TRANSPORTATION AND DISPOSAL OF SOIL AND WASTE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, equipment, and incidentals required to transport waste material off site, and dispose, reuse or recycle excess soil (defined herein as including sediments) or waste materials at a licensed facility approved by the Owner.

B. All personnel involved in the transportation of waste from the site shall have the required Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) training.

1.2 RELATED WORK

A. Section 01320 – Safety and Health Plan
B. Section 01500 – Temporary Facilities and Controls
C. Section 02080 – Soil and Waste Management
D. Section 02200 – Earthwork
E. Section 02401 – Dewatering

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01340 – Submittals:

1. A list of all transporters, destination/receiving sites and waste facilities, complete with license numbers and permit numbers (as appropriate), contact person, and address and telephone number that the Contractor utilizes for soil management and waste disposal. The transporters shall have adequate financial insurance and liability insurance mechanisms to handle any accidents, and associated third-party compensation.
2. A summary of the history of compliance for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history.
3. If hazardous wastes are to be transported, Contractor shall have or obtain a valid EPA identification number to transport hazardous materials and any other permits or licenses as required by federal, state, and local laws, regulations, ordinances, and procedures.
4. Where appropriate the Contractor shall submit waste manifests for all waste disposed off site to the appropriate authority, agency, facility, or person within the time constraints specified by state and federal regulations. Copies of all waste manifests and Bill of Lading (BOL) documentation including weight slips and BOL summary sheets shall be provided to the Owner within 10 days. It is the responsibility of the Contractor to complete all waste manifests and Bills of Lading completely and accurately prior to submitting them to the Owner. For MassDEP Bills of Lading the Contractor shall provide to the Owner's Licensed Site Professional (LSP)

all information required for preparation of electronic Bills of Lading. The Contract shall be responsible for preparation of Material Shipping Records (MSR). The Contractor shall be responsible for submitting to the Owner's LSP all information necessary for preparation of LSP opinion letters to disposal facilities and coordinating disposal documentation with all parties. The Owner's LSP and the Owner shall the sign any MassDEP Bill of Lading forms where required only after the Contractor has provided the information required for preparation of electronic MassDEP forms. The Contractor shall reimburse the Owner for any and all fines associated with inaccurate, incorrect, or improperly completed waste manifests or BOLs, including fines resulting from late or untimely submittals.

5. The Contractor shall submit waste manifests and bills of lading for all hazardous waste disposed off-site to the appropriate authority, agency, facility, or person within the time constraints specified by state and federal regulations. Contractor shall provide the original copy of manifests signed by the hazardous waste transporter and the receiving facility to the Owner immediately.
6. Prior to transporting any soils or fill material to a disposal facility the Contractor shall submit a letter from the disposal facility indicating that the facility has reviewed the available data and the generator's profile of the material and the facility agrees that it meets the facility's acceptance criteria.

1.4 DEFINITIONS

A. Asphalt, Brick and Concrete (ABC): Asphalt, Brick and Concrete material that is found in fill material during excavation. All ABC generated during construction shall be disposed of offsite at an appropriate, licensed facility that will accept ABC waste.

B. Surface Roadway Materials: For the purpose of this Specification, the term shall mean existing exposed materials that make up the existing roadway pavement, sidewalks, and curbs. These materials can be composed of asphalt, concrete or granite. Surface roadway materials are excluded from the "Asphalt, Brick, and Concrete (ABC) definition in this Specification. Surface roadway materials shall be disposed of offsite at an appropriate, licensed facility that will accept this material, which may include an asphalt reclamation facility. Removal, transportation, and disposal of surface roadway materials are not part of this Specification.

C. Bill of Lading (BOL): A document signed by a waste transporter or the transporter's representative and issued to a waste generator that evidences the receipt of waste to a specified disposal facility or location.

D. Fill (Historic Fill): Fill, also known as urban, historic, or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with historic fill includes, but are not limited to; coal, glass, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials which would preclude the disposal of the fill as landfill daily cover.

E. Generator: Party Per 40 CFR 260.10 Generator means any person, by site, whose act or process produces hazardous waste identified or listed in Part 261 or whose act first causes a hazardous waste to become subject to regulation.

F. Hazardous Waste:

1. Hazardous waste as defined 310 CMR 40.0006; or

2. Hazardous waste as defined in 40 CFR 261.3.
3. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
    a. Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or
    b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

G. Liquid Waste: materials generated on the site due to work performed and are waste or excess including but not limited to: collected groundwater, collected stormwater, non- aqueous phase liquids, contractor-supplied fuels and fluids, and drummed liquids.

H. Peat: A substance of vegetable origin, consisting of roots and fibers, moss, etc., in various stages of decomposition, and found, as a kind of turf or bog. Peat shall be considered natural soil when it is encountered in small amounts (layers 1-foot (304.8 mm) or less in thickness) and when it is impractical to separate the peat from the natural soil or urban fill strata. Otherwise, peat shall be considered a distinctive stratum.

I. Solid Waste (Waste): materials generated on the site due to work performed and are waste or excess, including but not limited to: asphalt, brick and concrete (ABC) waste, demolition waste, decontamination waste, dredging spoils (dewatered), metal waste, plaster/drywall, plastic waste, rock, rubber waste, sediment, tar waste, trash, vegetation debris, and wood waste.

J. Soil Classification Categories: Unless specifically stated otherwise, terms used in this specification are as defined in the MCP, 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

1. (Class A-1) Background: Any soil or fill material which meets the regulatory definition of "background" as defined in 310 CMR 40.0006 may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified herein and as specified in Section 02200. For record keeping purposes soil/fill that meet the definition of background, shall be transported under a Material Shipping Record (MSR).

   Background soil may also be re-used off-site without restriction provided it is reused in an area where background concentrations area equal to or greater than the site-specific background determined at the off-site reuse location. The Contractor is responsible for determining the background levels at the point of excavation. It is also the Contractor's responsibility to identify one or more disposal facilities/locations with background levels appropriate to receive the material to be disposed or reused. It is the Contractor's responsibility to determine these background levels in advance so as to comply with 310 CMR 40.0032(3)(b) and so as not to delay or adversely affect construction operations.
2. (Class A-2) Impacted: Any soil or fill material which contains oil or hazardous materials (OHM) at concentrations greater than background levels but less than release notification thresholds established by 310 CMR 40.0300 and 40.1600. Impacted soil may be reused in the area of excavation or as fill provided it is reused in an area of equal or greater contamination and meets the physical requirements as specified herein and as specified in Section 02200. Class A-2 soils requiring off-site transportation and disposal/reuse shall be transported using a Material Shipping Record (MSR).

3. (Class B) Contaminated: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600, except where the presence of the material is consistent with the regulatory definition of "background" as defined in 310 CMR 40.0006.

   Any soils which contain either petroleum or chemical odor or visual indications of oil or hazardous materials shall be handled as potentially contaminated soils. Soil which does not have any evidence of contamination can be reused within the area of excavation without first performing laboratory analyses. Soil/fill that may be contaminated should be set aside by the Contractor for assessment by the Owner's environmental professional. Soil/fill that is staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been tested and has equal or less contamination than the point where it is to be reused and it is not reused beneath a permanent structure such as a building foundation. Any excavated soil/fill material not reused within the area of excavation must be characterized prior to reuse. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill.

   Class B soil that cannot be reused on site shall be reused off-site, recycled, or disposed as a solid waste at an appropriately permitted facility unless it also meets the regulatory definition of hazardous waste as defined in 40 CFR Part 261 or contains detectable asbestos. Subcategories of Class B soil are defined as follows:

   a. Class B-1: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Class B-1.
   b. Class B-2: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state lined landfills.
   c. Class B-3: Soil and Fill that meet all applicable criteria for instate recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed in-state recycling facility.
   d. Class B-4: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined, and unlined landfill reuse criteria as well as in-state recycling acceptance criteria, but meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities, and are not classified as a Resource Conservation and Recovery Act (RCRA) Hazardous Waste.
   e. Class B-5: Soil and Fill that contain concentrations of contaminants that require removal to regional disposal facilities and are not classified as RCRA Hazardous Waste.
   f. Class B-6: Soil and fill which does not meet one of the designations above due to excessive foreign materials and/or debris that are not classified as a hazardous waste.

4. (Class C) Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the

environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste as defined in 40 CFR 261.3 is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, Subpart C and/or that is listed in 40 CFR 261, Subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste. Subcategories of Class C soils shall be as follows:

a. Class C-1: Soils classified as hazardous waste that can be readily treated on-site to eliminate the toxicity characteristic (e.g., for lead).
b. Class C-2: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be readily treated on-site. This material must be transported to an out-of-state approved RCRA Subtitle C hazardous waste disposal or treatment facility under a Uniform Hazardous Waste Manifest.

K. Material Shipping Records (MSR): See Bill of Lading (BOL).

L. Special Waste: Any waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the waste. PCB-contaminated soils/fill is an example of special waste categories.

M. Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.

N. Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.

O. Unknown Materials: Any material, that is not readily identifiable as nonhazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. Such wastes include but are not limited to:

1. Unlabeled drums or containers containing material which is not readily identifiable as a non-hazardous substance.
2. Any material, which varies significantly from material previously observed on site and which cannot be readily identified as a nonhazardous.
3. Waste material of unusual color or odor or material with indications of hazardous levels (e.g. exceeding OSHA permissible exposure limits) of contaminants as evidenced on an organic vapor monitor or other similar instrument.

The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner or their representative shall assess the material with the Contractor and inform the Contractor as to the nature of the material (known or unknown).

P. Waste Manifests: the hazardous waste shipping documentation required to ship all hazardous waste and subject to provisions in 49 CFR 172 Subpart C.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide completed Bills of Lading, Material Shipping Records, manifests, certificates of disposal, weight slips and all other documentation relative to disposal, reuse, treatment or recycling of soil and waste material.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall reuse, recycle or dispose of all excess soil and wastes resulting from excavation activities in accordance with federal, state and local regulations and these specifications. Transport shall be by a permitted and licensed waste transporter. The Contractor shall be responsible for supplying the proper manifests to be approved and signed by a representative of the Owner.

B. Prior to disposal, the Contractor shall maintain segregated waste stockpiles in conformance with all applicable federal, state, and local waste disposal regulations and as specified in Section 02080 - SOIL AND WASTE MANAGEMENT.

C. The Contractor shall be responsible for preparing and keeping in proper order all waste manifests, BOLs, MSRs , and shall designate one person who shall be made available to sign all transportation documentation. The Contractor shall be responsible for obtaining the generator's signature and all other signatures required for the proper completion of the manifests. The Contractor shall allow a minimum of five working days from the date of the submittal for any documents requiring the signature of the Owner and/or the LSP. The manifests shall document the handling of the waste from the time it is generated until the time it is properly disposed.

D. The Contractor shall be responsible for obtaining all federal, state, and local permits and variances to allow transport of materials and wastes on public roadways.

E. The Contractor shall be responsible to inform the Owner if hazardous waste disposal will not be performed within 90 days of hazardous waste characterization. This notification shall take place a minimum of 30 days prior to the 90-day deadline. No hazardous waste stockpiled at the site shall remain on site more than 90 days after it is characterized. In accordance with 310 CMR 40.0031, all other Remediation Waste shall not remain on site more than 120 days from initial date of generation.

F. The Contractor shall obtain certificates of disposal for all disposed wastes.

G. Transportation of wastes shall be in compliance with any relevant federal, state and local requirements, and such as to assure that waste material is not released during transit.

3.2 SOLID WASTES

A. Transporters of solid wastes that include, but are not limited to, contaminated soil/fill (including oil-contaminated soil/fill), construction and demolition debris, non-hazardous laboratory wastes, bottles, tires, metal parts, tree stumps, brush, and grass cuttings will utilize trucks or dumpsters specifically designed to ensure that material, dust, or liquid is

not released in transit. No truck shall be allowed to exit the site until all free liquids are drained from soil/fill being transported off-site. Moisture content of the soil/waste shall be reduced by the Contractor, to or below the maximum acceptance limits required by the disposal facility. Material shall be covered at all times. The vehicle in which the waste is transported shall be driven directly to the intended destination without any stops or detours in between, except those necessary in response to road conditions, vehicle service needs, or emergencies. Discharge or release of material during transport shall be immediately reported to the Owner. Transporters shall clean up any discharge that occurs in transit, at the Contractor's expense.

B. The disposal site shall be permitted by the state in which the facility is located to receive and dispose of solid waste, and shall be approved for use by the Owner. The Contractor shall provide copies of the disposal facility's operating permit. No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed in writing to accept the type and quantity of waste.

C. Manifesting of solid waste shall be required and shall include at a minimum: vehicle identification; date of loading and disposal; tonnage, as measured at the disposal site; and signature of the Owner and/or its representative, transporter, and disposal facility's representative. Transportation of the wastes shall be accompanied by the appropriate manifests such as a MassDEP Bill of Lading, as required in the Code of Massachusetts Regulations (CMR) 310 CMR 40.0030, a Material Shipping Record or by a Uniform Hazardous Waste Manifest. The original shall be returned to the Owner, and/or their representative, within ten (10) working days of disposal.

D. All solid waste shall be disposed in accordance with all applicable federal, state and local laws and regulations, as well as all other state laws through which the waste material is being transported.

3.3 HAZARDOUS WASTES

A. Transporters of hazardous wastes shall be in conformance with Code of Federal Regulations (CFR) 40 CFR, Part 171, all other federal laws and regulations and 310 CMR 30.400, and all other state laws through whose boundaries the waste material is being transported. The transporter shall provide copies of its EPA identification number, Massachusetts transporter's license, and proof of driver training in transporting hazardous waste.

B. The disposal site shall be in conformance with 40 CFR, Part 264 and relevant laws of the state in which the facility is located. The Contractor shall provide copies of the disposal facility's EPA and state treatment and disposal permit.

C. Manifesting of hazardous wastes shall be in conformance with 40 CFR, Part 264, Subpart E, 310 CMR 30.310 and 310 CMR 30.405.

D. Actual quantities which are subject to unit rates shall be tabulated by the Contractor and verified by the Engineer on a daily basis. The Contractor shall not be reimbursed for unit rate work performed without the prior approval of quantities by the Engineer.

3.4 DUST CONTROL

A. Dust control measures shall be implemented during loading and transport of waste material from the site.

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Clearing includes, but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, posts, signs, fences, culverts and other vegetation and minor structures; the protection of designated wooded growth; the storage and protection of minor structures and materials which are to be replaced; and the disposal of non-salvageable structures and materials, and necessary preliminary grading.

B. Limits of Work:
   1. Perform clearing and grubbing work within the areas required for construction, or as shown on the Drawings, to a depth of l2 inches below the existing grade.
   2. Perform additional clearing and grubbing work within areas and to depths which, in the opinion of the Engineer, interfere with excavation and/or construction, or are otherwise objectionable.

C. Work Not Included:
   1. Clearing and grubbing work performed for the convenience of the Contractor will not be considered for payment.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Dispose of combustible material by burning only when permitted by and in accordance with all applicable local and state laws, ordinances and code requirements.

B. Remove and dispose of non-salvageable structures and material in accordance with all applicable local and state laws, ordinances and code requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide all materials required to complete the work.

B. All timber and wood shall become the property of the Contractor unless other agreements are made between the Owner and the Contractor.

C. Repair any damage to structures to the complete satisfaction of the Owner and Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Carefully preserve and protect from injury all trees and/or shrubs not to be removed.

B. Right-of-way:

1. Where excavation is required on public or private rights-of-way containing trees, shrubs, other growth, or any structure or construction, obtain the Engineer's direction concerning the extent to which such obstacles can be cleared or stripped prior to performing the Work.
2. In all rights-of-way, remove only those particular growths or structures which are, in the opinion of the Engineer, essential for construction operations.
3. All other removals or damage shall be replaced or restored at the Contractor's expense.

3.2 PERFORMANCE

A. Clearing:

1. Remove and dispose of all trees, brush, slash, stubs, bushes, shrubs, plants, debris and obstructions within the area to be cleared, except any areas that may be designated as "Selective Clearing", and except as otherwise shown on the Drawings or as directed by the Engineer.
2. Remove all stumps unless otherwise directed by the Engineer.
3. Dispose of material to be removed daily as it accumulates.
4. Take special care to completely dispose of all elm trees and branches immediately after cutting either by burial in approved locations or, when permitted, by burning in areas well removed from standing elm growth.

B. Protection of Wooded Growth:

1. Fell trees toward the center of the area being cleared to protect trees and shrubs to be left standing.
2. Cut up, remove and dispose of trees unavoidably falling outside the area to be cleared.
3. Employ skilled workmen or tree surgeons to trim and repair all trees that are damaged but are to be left standing.

C. Selective Clearing:

1. When shown on the Drawings and when directed by the Engineer, perform selective clearing work to preserve natural tree cover.
2. Perform selective clearing work only under the direction and supervision of the Engineer.
3. Remove all dead and uprooted trees, brush, roots and other material which, in the opinion of the Engineer, are objectionable.
4. Cut flush with the ground and remove only those trees indicated by the Engineer.
5. Employ skilled workmen or tree surgeons to carefully trim all branches requiring cutting on trees to be left standing. Wood exposed as the result of removal of branches is to be left exposed to air and sunlight.
6. Bituminous paint shall not be used on wood exposed as a result of branch removal, excavation around roots, or damage to tree bark.

D. Grubbing:

1. Perform grubbing work beneath new roads, driveways, walks, seeded areas and other areas and as directed by the Engineer.

2. Grub out all sod, vegetation and other objectionable material to a minimum depth of l2 inches below the existing grade.
3. Completely remove all stumps, including major root systems.

E. Disposal:
1. Remove from the site and dispose of material not being burned.
2. Provide an approved disposal area unless otherwise specified.

F. Burning:
1. Dispose of combustible materials by burning, only if approved by local and state officials.
2. Employ competent workmen to perform burning work in such a manner and at such locations that adjacent properties, trees and growth to remain, overhead cables, wires and utilities will not be jeopardized.
3. Do not leave fires unguarded.
4. Do not burn poison oak, poison ivy or other plants of similar nature.
5. Do not use tires or other combustible waste material to augment burning.
6. Burn combustible materials daily as the work progresses.
7. The Contractor shall be responsible for all damage caused by burning and shall be responsible for obtaining all necessary permits for burning.

3.3 REPLACEMENT OF MATERIALS

A. Paving, Curbing and Miscellaneous Material:
1. Remove all paving, subpaving, curbing, gutters, brick, paving block, granite curbing, flagging and minor structures that are over the area to be filled or excavated.
2. Remove and replace bituminous asphaltic and Portland cement concrete in accordance with the appropriate sections of these Specifications.
3. Properly store and preserve all material to be replaced in a location approved by the Engineer.

B. Shrubs and Bushes:
1. Remove, store, and replace ornamental shrubs and bushes to be preserved in accordance with accepted horticultural practices.

C. Topsoil:
1. When applicable, carefully remove, store, and protect topsoil in accordance with the appropriate section of this division.

D. Responsibility:
1. Replace, at no additional cost to the Owner, materials lost or damaged because of careless removal or neglectful or wasteful storage, disposal or use of these materials.

END OF SECTION

SECTION 02115

STRIPPING AND STOCKPILING TOPSOIL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Segregate topsoil approved by the Engineer prior to excavation, trenching and grading operations and stockpile it for use in the work.

B. Related Work Specified Elsewhere (When Applicable):
   1. Demolition, clearing, grading, and excavation are specified in the appropriate sections in this division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil shall consist of friable loam of at least two percent decayed organic matter (humus), free of subsoil, and reasonably free of clay lumps, brush, roots, weeds, and other objectionable vegetation, stones and similar objects larger than one (1) inch in any dimension, litter and other materials unsuitable or harmful to plant growth. It shall contain no toxic materials.

B. The quality of the topsoil material to be used shall be subject to approval by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Remove topsoil from the areas that are likely to be disturbed as a result of construction operations to a depth based on the soil profile, as approved by the Engineer.

B. Remove topsoil from all designated areas prior to the performance of normal excavation.

3.2 STORAGE

A. Transport topsoil and deposit in storage piles convenient to the areas which are subsequently to receive the application of topsoil.

B. Stockpile topsoil separate from other excavated materials in areas approved by the Engineer.

C. Take all necessary precautions to prevent other excavated material and objectionable material from becoming intermixed with the topsoil before, during and after stripping and stockpiling operations.

D. Neatly trim and grade stockpiles to provide drainage from surfaces and to prevent depressions where water may become impounded.

E. Construct temporary erosion control devices for all stockpiled material, subject to the Engineer's approval.

F. All loam stripped and stockpiled shall be immediately seeded with 70% Domestic/30% Perennial Rye Grass.

END OF SECTION

SECTION 02156

TEMPORARY EXCAVATION SUPPORT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Design, furnish, install, maintain, and remove temporary excavation support system as required to comply with all applicable State and Federal regulations including the Occupational Safety and Health Act. Excavation support system shall consist of steel sheeting, pile and lagging bracing or other systems designed by the Contractor.

B. Related Work Specified Elsewhere (When Applicable):
   1. Section 02200 Earthwork
   2. Section 02401 Temporary Dewatering System

1.2 DESIGN REQUIREMENTS

A. The Contractor shall be responsible for the design and construction of the excavation support structures. The excavation support structures (sheeting systems or other special excavation techniques) shall be properly designed by a Professional Engineer registered in the State in which the project is located, who practices in a discipline applicable to excavation work and has more than 5 years of experience in the design of excavation support systems. The excavation support system shall be designed to accommodate an additional 2 feet of excavation below the bottom of excavation shown on the Contract Drawings.

B. The excavation support system shall be designed and installed to limit the upward hydraulic gradient into the bottom of the excavation and to sustain all existing and expected loads and utilities, to prevent migration of fine grained materials into the excavation, to prevent all movement to earth which could in any way cause injury to workmen, delay the work or endanger adjacent structures. If detrimental effects result from construction activities, the Contractor shall modify the design, revise construction procedures and/or take measures to mitigate and abate further movement at no cost to the Owner.

C. The Contractor shall prepare an excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as the adjacent grade and adjacent structures, throughout construction. The excavation support system monitoring plan shall include vibration and deformation monitoring. Contractor shall retain the services of a qualified vibration monitoring consultant to perform vibration monitoring during installation and removal of the excavation support system. Refer to Paragraphs 1.3 and 3.4 for additional requirements.

D. The internal lateral bracing shall be located so that the braces shall not pass through walls and/or slabs of existing or proposed structures.

E. The support system shall provide adequate room to properly perform the installation and to allow for inspection of the installation.

F. Prior to the installation of any portion of the temporary lateral support system, the Contractor shall furnish to the Owner precondition surveys documenting the existing conditions of the adjacent structures.

G. The use of existing structures to support the sheeting bracing or structural framing shall be prohibited.

1.3 SUBMITTALS

A. Provide submittals in accordance with Specification Section 01340.

B. Submit qualifications of temporary excavation support system design engineer.

C. Submit attached certificate of design and complete scaled and dimensioned layout drawings of the proposed excavation system, stamped and sealed by a Professional Engineer registered in the State in which the project is located. Drawings shall show plan, sections and elevations of the support system as well as the proposed structures. Submittal shall identify:

1. Physical location on the site and identify any existing utilities, site piping, site electrical conduit that must be relocated prior to excavation support system installation.
2. Type and location of any surcharge loads adjacent to the excavation support system required by the Contractor to execute the work (e.g., excavators, trucks, cranes, soil piles, etc.).
3. Design calculations, supporting documentation and materials cut sheets.
4. Sample monitoring log.
5. System removal requirements.

D. Submit excavation support system monitoring plan, including qualifications of Contractor's vibration monitoring consultant and Contractor's surveyor. The excavation support system monitoring plan shall identify: the specific method, location and frequency of measurements (pre-, during and post-construction); individual(s) responsible for inspection/measurements; submittal and maintenance of on-site records; and threshold vibration values and excavation support system deformation values that, if exceeded, will require immediate stoppage of work and the performance of repairs necessary for reinstatement of a functional system. Provide justification for recommended vibration and deformation tolerances, on a structure-by-structure basis.

E. The Contractor shall have sole responsibility for design, construction, monitoring and removal of the excavation support system as necessary to prevent damage to adjacent structures, utilities, streets adjacent to excavations and for safety of persons working within the excavated areas. The submittals will be reviewed for consistency with the design intent.

F. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02401 (Temporary Dewatering System).

PART 2 - PRODUCTS

2.1 MATERIAL

A. All materials shall conform to all applicable State and Federal regulations including the Occupational Safety and Health Act.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform preparatory work to discover, protect, maintain and restore utilities, foundations or other facilities located in close proximity of the proposed excavation lateral support system.

B. Conduct pre-excavation to remove obstructions along the alignment of the excavation

lateral support system which will interfere with installation of the excavation lateral support system.

C. Install the excavation support system, including the installed wall and bracing system, outside the limits of the permanent structure. Construction tolerances (e.g., wall verticality) and lateral wall deflections as a result of excavation and other activities shallbe considered in determining the plan location.

D. Excavation shall not proceed more than 2 ft. below the bracing level, anywhere within the excavation support limits, until the entire level of bracing is completely installed.

E. The first level of bracing shall be installed within 5 ft of the ground surface prior to any excavation below this level.

3.2 INSTALLATION

A. Install excavation support system in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act. The excavation support system design engineer shall visit the site during excavation support system installation.

3.3 INTERNAL LATERAL WALL BRACING (RAKERS, WALES AND STRUTS)

A. Rakers are only allowed for the temporary lateral brace that is installed within 5 ft. of the ground surface.

B. Use wales, struts, corner braces to provide support of the excavation lateral support walls as required. Include web stiffeners, plates, brackets, or angles as required to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Allow for eccentricities due to fabrication and assembly. Consider effects of temperature changes.

C. Install and maintain all support members in continuous tight contact with each other and with the wall being supported.

D. Preload all bracing members (including rakers, corner braces, and struts) in accordance with methods, procedures and sequence as described on the reviewed shop drawings. Coordinate excavation work with installation of bracing and preloading. Use steel shims and steel wedges, welded or bolted in place, to maintain the preloading force in the bracing after release of the jacking equipment pressure. Wood shims or wedges shall not be used. Braces shall be preloaded to 50 percent of the maximum design load. Provide means to control the fluctuation of loading due to temperature variations.

E. Accomplish preloading by jacking struts, rakers, etc. in place against the excavation lateral support system walls, or by other methods acceptable to the Owner or Owner's Representative.

3.4 MONITORING

A. Contractor shall implement the excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as adjacent grade and adjacent structures, throughout construction. Monitoring shall include the following at a minimum:

1. Pre-Installation Structure Elevation Survey. Conduct survey prior to excavation support system installation.
2. Vibration monitoring (full time) during excavation support system install.
3. Installation Structure and Support System Surveys. Conduct surveys after excavation support system installation but prior to first brace installation; at mid-point of excavation; and at bottom of excavation. Conduct surveys at weekly intervals during

structure construction. Conduct survey prior to excavation support system removal. Each survey shall assess the support system deformation and key structures.

4. Vibration monitoring (full time) during excavation support system removal.
5. Post-Installation Structure Survey. Conduct survey after removal of excavation support system.

B. The excavation support system design engineer shall visit the site during the monitoring program at periodic intervals.

C. Additionally, if the excavation support system monitoring criteria/requirements are not satisfied due to inadequacy or failure of the excavation support system (settlement of adjacent grade, settlement of structures, cracking of structures, etc.), immediately stop work and perform repairs necessary for reinstatement of a functional system, as well as restoration of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

3.5 REMOVAL OF SHEETING

A. Remove all sheeting and bracing unless the removal may cause injury to adjacent structures and/or property.

B. The General Contractor shall be responsible for repairing all damage to existing structures caused by the removal of sheeting. The excavation support system design engineer shall visit the site during excavation support system removal.

C. All backfill disturbed by the removal of the sheeting shall be re-compacted to its in-situ density.

D. Proceed with backfilling as specified in these Specifications. When the level of compacted backfill reaches the location of bracing and wales, remove these items from the trench or other excavation. When the level of the backfill reaches a point three feet below the existing ground grade, remove the sheeting by approved methods and equipment.

E. After removing the sheeting, complete backfilling in the usual manner.

F. If the Contractor elects to leave the sheeting or any component of the temporary support system in place, the Contractor shall cut the sheeting or such component at least 4 feet below the ground surface, or as directed by the Engineer.

CERTIFICATE OF DESIGN

RE: Contract between

OWNER: _____
(Name)

and

CONTRACTOR: _____
(Name)

on

CONTRACT: _____
(Title)

_____
(Number) (Date)

The undersigned hereby certify that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the state of _____ (location of Project);

2. Is qualified by education and training to design the _____ specified in Section _____ of subject contract;

3. Has previously designed comparable excavation support systems;

4. Has prepared the design in full compliance with the requirements of subject contract, including all applicable laws, regulations, rules, and codes – including review and coordination with the Dewatering System design; and

5. Will inspect and supervise installation of the excavation support system, will monitor the in-place system to confirm that the system is installed and functions in accordance with the design and will inspect and supervise the removal of the excavation support system.

CONTRACTOR	ENGINEER
By: _____	By: _____
(Signature)	(Signature)
_____	_____
(Name)	(Name)
_____	_____
(Title)	(Engineering Discipline)
_____	_____
(Date)	(Date)

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Work described by this Section consists of all earthwork encountered and necessary for construction of the project as indicated in the Contract Documents, and includes but is not limited to the following:
   1. Excavation
   2. Backfilling and Filling
   3. Compaction
   4. Embankment Construction
   5. Grading
   6. Providing soil material as necessary
   7. Disposal of unsuitable materials
   8. Disposal of excess suitable material

B. Related Work Specified Elsewhere: (When Applicable)
   1. The use of explosives is specified in the Supplementary Conditions section of this Contract, and in Division 1.
   2. Traffic Regulation is specified in Division 1.
   3. Clearing and Grubbing, Dewatering, Filter Fabric, Temporary Erosion Control, Sheeting, and Paving are specified in the appropriate sections of this Division.
   4. Section 01400 - Quality Control.
   5. Pipe, fittings and valves are specified in Division 2.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. All work shall be performed and completed in accordance with all local, state and federal regulations.
   2. The General Contractor shall secure all other necessary permits unless otherwise indicated from, and furnish proof of acceptance by, the municipal and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the Contract Documents.

B. Line and Grade:
   1. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same to properly perform the work.

C. Testing Methods:
   1. Gradation Analysis: Where a gradation is specified the testing shall be in accordance with ASTM C-117-90 and ASTM C-136-93 (or latest revision).
   2. Compaction Control:
      a. Unless otherwise indicated, wherever a percentage of compaction for backfill is indicated or specified, it shall be the in-place density divided by the maximum density and multiplied by 100. The maximum density shall be the density at optimum moisture as determined by ASTM Standard Methods of Test for

Moisture-Density Relations of Soil Using 10-lb. Hammer and 18-in. Drop, Designation D-1557-91 (Modified Proctor), or latest revision, unless otherwise indicated.

b. The in-place density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand Cone method, Designation D 1556-90, (or latest revision) or Nuclear method Designation D2922.

c. Wherever specifically indicated, maximum density at optimum moisture may be determined by ASTM Standard Methods of Test for Moisture Density Relations of Soils, ASTM D-698-91 (Standard Proctor).

d. An Independent Testing Laboratory will be retained by the Contractor to conduct all laboratory and field soil sampling and testing, and to observe earth work construction activities. Laboratory testing will consist of sieve analyses, natural water content determinations, and compaction tests. Field testing will consist of in-place field density tests and determination of water contents.

1.3 SUBMITTALS

A. Collection of samples and testing of all materials for submittals shall be performed by the Independent Testing Laboratory and paid for by the Contractor until the materials are approved by the Owner or Engineer.

B. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.

C. Submit test results (including gradation analysis) and source location for all borrow material to be used at least 10 working days prior to its use on the site. Contractor shall identify and provide access to borrow sites.

D. Submit moisture density curve for each type of soil (on site or borrow material) to be used for embankment construction or fill beneath structures or pavement.

1.4 TESTS

The Independent Testing Laboratory shall conform to the following procedures and standards:

A. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.

B. All testing shall be performed by a qualified Independent Testing Laboratory acceptable to the Engineer and Contractor at the Owner's expense unless otherwise indicated (see Section 01400 - Quality Control).

C. Field density tests on embankment materials shall be as follows:

D. Tests shall be taken on every 200 cubic yards of embankment material.

E. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.

F. Trenches: Field density test in trenches shall be taken at 75 linear foot intervals on every third lift.

G. In addition to the above tests the Independent Testing Laboratory will perform additional density tests at locations and times requested by the Engineer.

H. Additional density testing will be required by the Engineer if the Engineer is not satisfied with the apparent results of the Contractor's compaction operation.

1. If the test results fail to meet the requirements of these specifications, the Contractor shall undertake whatever action is necessary, at no additional cost to the Owner, to obtain the required compaction. The cost of retesting will be paid by Owner. The cost of retesting will be determined by Engineer and Owner will invoice Contractor for this cost. If unpaid after 60 days, the invoice amount for retesting will be deducted from the Contract Price. No allowance will be considered for delays in the performance of the work.
2. If the test results pass and meet the requirements of these Specifications, the cost of the testing service will be borne by the Owner, but no allowance will be considered for delays in the performance of the work.

1.5 JOB CONDITIONS

A. Site Information:
   1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner and Engineer will not be responsible for interpretations or conclusions drawn there from by the Contractor. Data are made available for the convenience of Contractor.
   2. Additional test borings and other exploratory operations may be made by Contractor at no additional cost to Owner.

B. Existing Utilities and Structures:
   1. The locations of utilities and structures shown on the Drawings are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warranties that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities or structures within the project area.

PART 2 - PRODUCTS

2.1 SOIL MATERIAL

A. Aggregate Base: Shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. Type B Aggregate for base shall not contain particles of rock that will not pass the 4 inch square mesh sieve. The gradation of the part that passes a 3-inch sieve shall meet the following grading requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieves Type B Aggregate
1/2 inch	35-75
1/4 inch	25-60
No. 40	0-25
No. 200	0-5

B. Aggregate Leveling Course and Untreated Surface Course: Shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the material shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
1 inch	95-100
3/4 inch	90-100
No. 4	40-65
No. 10	10-45
No. 200	0-7

C. Common Borrow: Shall consist of approved material required for the construction of the work where designated. Common borrow shall be free from frozen material, perishable rubbish, peat, organic, and other unsuitable material.

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
6-inch	100
No. 200	0-5

Common borrow may be used for embankments unless otherwise indicated and provided that the material is at a moisture content suitable for compaction to the specified density. No rocks shall exceed 3/4 of the depth of the specified lift thickness.

D. Crushed Stone: Shall be a uniform material consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, containing angular pieces, as are those which come from a mechanical crusher. Gradation requirements shall be as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1-1/2 inch	100
1 inch	95-100
1/2 inch	25-60
No. 4	0-10

E. Screened Stone: Shall be a well graded stone consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, meeting the following gradation requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

F. Select Fill (Structural Fill): Shall consist of well graded granular material free of organic material, loam, wood, trash, snow, ice, frozen soil and other objectionable material and having no rocks with a maximum dimension of over 4 inches and meeting the following gradation requirements, except where it is used for pipe bedding in which case the maximum size shall be 2 inches.

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
4 inch	100
3 inch	90-100
¼ inch	25-90
No. 40	0-30
No. 200	0-5

G. Sand: Shall be well graded durable material free of organic matter and conform to the following gradation requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
3/8 inch	100
No. 4	95-100
No. 16	50-85
No. 50	10-30
No.100	2-10
No.200	0-5

Sand conforming to the requirement for fine aggregate in ASTM Standard Specifications for Concrete Aggregate, Designation C-33, will meet the above requirement.

2.2 CONCRETE

A. If concrete is required for excess excavation, provide 3,000 psi concrete .

2.3 FILTER FABRIC

A. If filter fabric is required, refer to Section 02260.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which excavating, backfilling, filling, compaction and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 EXCAVATION

A. General:
   1. Excavation consists of removal and disposal of all material encountered when establishing line and grade elevations required for execution of the work.
   2. The Contractor shall make excavations in such manner and to such widths as will give suitable room for building the structures or laying and jointing the piping; shall furnish and place all sheeting, bracing, and supports; shall do all cofferdamming, pumping, and draining; and shall render the bottom of the excavations firm, dry and acceptable in all respects.
   3. All excavation shall be classified as either earth or ledge.
      a. Earth Excavation shall consist of the removal, hauling and disposal of all earth materials encountered during excavation including but not limited to native soil or fill, pavement (bituminous or concrete), existing sewers and manholes, ashes, loam, clay, swamp muck, debris, soft or disintegrated rock or hard pan which can be removed with a backhoe, or a combination of such materials, and boulders that do not meet the definition of "Ledge" below.
      b. Ledge Excavation: Shall consist of the removal, hauling, and disposal of all ledge or rock encountered during excavation. "Ledge" and "rock" shall be defined as any natural compound, natural mixture that in the opinion of the Engineer can be removed from its existing position and state only by wedging, sledging, boring or breaking up with power operated tools. No boulder, ledge, slab, or other single piece of excavated material less than two cubic yards in total volume shall be considered to be rock unless, in the opinion of the Engineer it must be removed from its existing position by one of the methods mentioned above.
   4. The Contractor shall not have any right of property in any materials taken from any excavation. Do not remove any such materials from the construction site without the approval of the Engineer. This provision shall in no way relieve the Contractor of his obligations to remove and dispose of any material determined by the Engineer to be unsuitable for backfilling. The Contractor shall dispose of unsuitable and excess material in accordance with the applicable sections of the Contract Documents.

B. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer and Resident Project Representative who will observe the conditions.

1. If material unsuitable for the structure or paved area or pipeline (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, screened stone, crushed stone, or concrete as directed by the Engineer.
2. All excavated materials designated by the Engineer as unsuitable shall become the property of the Contractor and disposed of at locations in accordance with all State and local laws and the provisions of the Contract Documents.

C. Unauthorized Excavation: Shall consist of removal of materials beyond indicated subgrade elevations or dimensions without specific authorization of Engineer. Unauthorized excavation, as well as remedial work required by the Engineer shall be at the Contractor's expense. Remedial work required is as follows:
1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with select fill or screened stone compacted to 95%. Provide 12" minimum select fill or screened stone directly under footings. Concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
2. If the bottom of a trench is excavated beyond the limits indicated, backfill the resulting void with thoroughly compacted screened stone, unless otherwise indicated.
3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

D. Structural Excavation:
1. Shall consist of the removal, hauling, disposal, of all material encountered in the excavation to permit proper installation of structures.
2. Excavations for structures shall be carried to the lines and subgrades shown on the Drawings.
3. Excavate areas large enough to provide suitable room for building the structures.
4. The extent of open excavation shall be controlled by prevailing conditions subject to any limits designated by the Engineer.
5. Provide, install, and maintain sheeting and bracing as necessary to support the sides of the excavation and to prevent any movement of earth which could diminish the width of the excavation or otherwise injure the work, adjacent structures, or persons and property in accordance with all state and OSHA safety standards.
6. Erect suitable fences around structure excavation and other dangerous locations created by the work, at no additional cost to the Owner.
7. Exposed subgrade surfaces shall remain undisturbed, protected, and maintained as uniform, plane areas and shape to receive the foundation components of the structure.
    a. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
    b. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade and trim bottoms to required lines and grades to leave solid base to receive the structure.

c. If a structure is to be constructed within the embankment, the fill shall first be brought to a minimum of 3 feet above the base of the footing. A suitable excavation shall then be made as though the fill were undisturbed earth.

E. Trench Excavation: Shall consist of removal, hauling and disposal of all material encountered in the excavation to the widths and depths shown on the Drawings to permit proper installation of underground utilities.

1. Excavate trenches to the uniform width shown on the Drawings sufficiently wide to provide sufficient space for installation, backfilling, and compaction. Every effort should be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Trenches shall be excavated with approximately vertical sides between the elevation of the center of the pipe and an elevation one foot above the top of the pipe.
3. Grade bottoms of trenches as indicated for pipe and bedding to establish the indicated slopes and invert elevations, notching under pipe joints to provide solid bearing for the entire body of the pipe, where applicable.
4. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least two feet above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shallbe excavated as though in undisturbed material.
5. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer and storm lines and proceed upgrade.
6. Perform excavation for force mains and water mains in a logical sequence.
7. The extent of open excavation shall be controlled by prevailing conditions subject to any limits prescribed by the Engineer.
8. As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the state and OSHA safety standards, as outlined in the appropriate section of this Specification.

F. Protection of Persons, Property and Utilities:

1. Barricade open excavations occurring as part of this work and post with warning lights in compliance with local and State regulations.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures that may be required.
3. Rules and regulations governing the respective utilities shall be observed in execution of all work. Active utilities and structures shall be adequately protected from damage, and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped only with written authorization of the utility owner. Report in writing to the Engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable.
4. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility, the property owner, and the Owner.

G. Stability of Excavations:
   1. Slope sides of excavations to comply with all codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
   2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

H. Shoring and Bracing:
   1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
   2. Provide trench shoring and bracing to comply with local codes and authorities having jurisdiction. Refer to Specification Section 02156.
   3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Install shoring and bracing as excavation progresses.

I. Material Storage:
   1. Stockpile excavated materials which are satisfactory for use on the work until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and protect with temporary seeding or other acceptable methods to control erosion.
   2. Locate and retain soil materials away from edge of excavations.
   3. Dispose of excess soil material and waste materials as herein specified.

J. Dewatering:
   1. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations (including surface and subsurface waters).
   2. Excavations shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged. Refer to Specification Section 02401.

K. Cold Weather Protection:
   1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
   2. No frozen material shall be used as backfill or fill and no backfill shall be placed on frozen material.

L. Separation of Surface Material:
   1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the work.
   2. Prior to excavation, existing pavement shall be cut where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
   3. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.
   4. From areas within which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.

M. Dust Control:
   1. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as

necessary, so as to minimize the creation and dispersion of dust. Refer to Specification Section 01562.

2. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed.

3.3 BACKFILL AND FILL

A. General:

1. Backfilling shall consist of replacing material removed to permit installation of structures or utilities, as indicated in the Contract Documents.
2. Filling shall consist of placing material in areas to bring them up to grades indicated on the Drawings.
3. The Contractor shall provide and place all necessary backfill and fill material, in layers to the required grade elevations.
4. Backfill excavations as promptly as work permits, but not until completion of the following:
   a. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
   b. Inspection, approval, and recording locations of underground utilities.
   c. Removal of concrete formwork.
   d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities, or cut off and left in place if required.
   e. Removal of trash and debris.
   f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
   g. Density testing having results meeting requirements specified herein.
5. In general, and unless otherwise indicated, material used for backfill of trenches and excavations around structures shall be suitable excavated material which was removed in the course of making the construction excavation. Unless otherwise specified or allowed by the Engineer the backfill and fill shall be placed in layers not to exceed 8 inches in thickness.
6. All fill and backfill under structures and pavement, and adjacent to structures, shall be compacted crushed stone or select fill as specified or as indicated on the Drawings. The fill and backfill materials shall be placed in layers not exceeding 8 inches in thickness.
7. All structures (including manholes) shall be placed on a 6-inch mat of screened stone unless otherwise indicated.
8. Suitable excavated material shall meet the following requirements:
   a. Free from large clods, silt lumps or balls of clay.
   b. Free from stones and rock fragments with larger than 12 inch max. dimension.
   c. Free from organics, peat, etc.
   d. Free from frozen material.
9. If sufficient suitable excavated material is not available from the excavations, and where indicated on the Drawings, the backfill material shall be select fill or common borrow, unless otherwise indicated, as required and as directed by the Engineer.
10. Do not backfill with, or on, frozen materials.

11. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
12. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet.
13. Do not continue backfilling until the previously placed and new materials have dried sufficiently to permit proper compaction.
14. The nature of the backfill materials will govern the methods best suited for their placement and compaction. Compaction methods and required percent compaction is covered in Compaction section.
15. Before compaction, moisten or aerate each layer as necessary to provide a water content necessary to meet the required percentage of maximum dry density for each area classification specified.
16. Do not allow large masses of backfill material to be dropped into the excavation in such a manner that may damage pipes and structures.
17. Place material in a manner that will prevent stones and lumps from becoming nested.
18. Completely fill all voids between stones with fine material.
19. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
20. Deposit backfill and fill material evenly on all sides of structures to avoid unequal soil pressures.
21. Keep stones or rock fragments with a dimension greater than two inches at least one foot away from the pipe or structure during backfilling.
22. Leave sheeting in place when damage is likely to result from its withdrawal.
23. Completely fill voids left by the removal of sheeting with screened stone which is compacted thoroughly.

B. Pipe Bedding, Initial Backfill and Trench Backfill

1. Place bedding and backfill in layers of uniform thickness specified herein, and as shown on the Drawings.
2. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.
3. Install pipe bedding and initial backfill in layers of uniform thickness not greater than eight (8) inches.
4. Deposit the remainder of the backfill in uniform layers not greater than eight inches.
5. Provide underground utility marking tape for new utility trenches as shown on the Drawings. Refer to Section 02650 – Buried Utility Markings.
6. Where soft silt and clay soils are encountered the trench shall be excavated six inches below the normal bedding and backfilled with 6-inches of compacted sand.
7. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
8. The following schedule lists the bedding materials for various types of pipe. Refer to the pipe trench detail for dimensional requirements.

BEDDING REQUIREMENTS

DI or Concrete Pipe	screened stone or select fill.
PVC or PE Pipe	screened stone.

9. The following schedule lists the initial backfill requirements for various types of pipes. Refer to the pipe trench detail for dimensional requirements.

INITIAL BACKFILL REQUIREMENTS

DI or Concrete Pipe	Screened stone or select fill
PVC or PE Pipe	Screened stone

10. Special bedding and backfill requirements shown on the Drawings supersede requirements of this section.
11. Where pipes or structures pass through or under the impervious core of the lagoon embankments, bedding and backfill material shall consist of the impervious embankment material. Extra care should be given to properly and thoroughly compact the bedding material around the pipe.

C. Improper Backfill:
1. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
3. Excavation, backfilling, and compacting work performed to correct improper backfilling shall be performed at no additional cost to the Owner.

D. Ground Surface Preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surface steeper than 1 vertical to 4 horizontal.
2. When existing ground surface has a density less than that specified under "compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

3.4 COMPACTION

A. General:
1. Control soil compaction during construction to provide not less than the minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements:
1. Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D1557 as indicated.
   a. Structures: Compact each layer of backfill or fill material below or adjacent to structures to at least 95% of maximum dry density (ASTM D1557).
   b. Off Traveled Way Areas: Compact each layer of backfill or fill material to at least 90% of maximum dry density (ASTM D1557).
   c. Walkways: Compact each layer of backfill or fill material to at least 93% of maximum dry density (ASTM D1557).
   d. Roadways, Drives and Paved Areas: Compact each layer of fill, subbase material, and base material to at least 95% of maximum dry density (ASTM D1557).

e. Pipes: Compact bedding material and each layer of backfill to at least 90% maximum dry density (ASTM D1557). Where backfilling with excavated material, compact to native field density.

f. Embankments: Compact each layer of embankment material to at least 95% of maximum dry density (ASTM D1557).

C. Moisture Control:

1. Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, in quantities controlled to prevent free water appearing on surface during or subsequent to compaction operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.

D. Embankment Compaction:

1. After each embankment layer has been spread to the required maximum 8-inch thickness and its moisture content has been adjusted as necessary, it shall be rolled with a sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will insure complete coverage and uniform compaction of an entire lift. Additional passes shall not be made until the previous pass has been completed.
2. When any section of an embankment sinks or weaves excessively under the roller or under hauling units and other equipment, it will be evident that the required degree of compaction is not being obtained and that a reduction in the moisture content is required. If at any place or time such sinking and weaving produces surface cracks which, in the judgment of the Engineer are of such character, amount, or extent to indicate an unfavorable condition, he will recommend operations on that part of the embankment to be suspended until such time as it shall have become sufficiently stabilized. The ideal condition of the embankment is that attained when the entire embankment below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as the roller passes.
3. If the moisture content is insufficient to obtain the required compaction, the rolling shall not proceed except with the written approval of the Engineer, and in that event, additional rolling shall be done to obtain the required compaction. If the moisture content is greater than the limit specified, the material of such water content may be removed and stockpiled for later use or the rolling shall be delayed until such time as the material has dried sufficiently so that the moisture content is within the specified limits. No adjustment in price will be made on account of any operation of the Contractor in removing and stockpiling, or in drying the materials or on account of delays occasioned thereby.
4. If because of insufficient overlap, too much or too little water, or other cause attributable to defective work, the compaction obtained over any area is less than that required, the condition shall be remedied, and if additional rollings are ordered, they will be done at no cost to the Owner. If the material itself is unsatisfactory or if additional rolling or other means fails to produce satisfactory results, the area in question shall be removed down to material of satisfactory density and the removal,

replacement, and re-rolling shall be done by the Contractor, without additional compensation.

5. Material compaction by hand¬-operated equipment or power-driven tampers shall be spread in layers not more than 6 inches thick. The degree of compaction obtained by these tamping operations shall be equal in every respect to that secured by the rolling operation.

E. Compaction Methods: The Contractor may select any method of compaction that is suitable to compact the material to the required density.

1. General: 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. All voids left by the removal of sheeting shall be completely backfilled with suitable materials and thoroughly compacted.

2. Tamping or Rolling: If the material is to be compacted by tamping or rolling, the material shall be deposited and spread in uniform, parallel layers not exceeding the uncompacted thicknesses specified. Before the next layer is placed, each layer shall be tamped as required so as to obtain a thoroughly compacted mass. Care shall be taken that the material close to the excavation side slopes, as well as in all other portions of the fill area, is thoroughly compacted. When the excavation width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe or structure, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping or rolling, the rate at which backfilling material is deposited shall not exceed that permitted by the facilities for its spreading, leveling, and compacting as furnished by the Contractor.

F. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.5 GRADING:

A. General:

1. Grading shall consist of that work necessary to bring all areas to the final grades.
2. Uniformly grade areas within limits of work requiring grading, including adjacent transition areas.
3. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines:

1. Grade areas adjacent to building to drain away from structures and to prevent ponding.
2. Grade surfaces to be free from irregular surface changes, and as follows:
   a. Lawn or Unpaved Areas: Finish grade areas to receive topsoil to within not more than 1" above or below the required subgrade elevations.
   b. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1/2" above or below the required subgrade elevation.
   c. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 3/8" above or below the required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs:
   1. Grade surface to be smooth and even, free of voids, and compacted as specified, to the required elevation.
   2. Provide final grades within a tolerance of 1/2" when tested with a 10' straight edge.

D. Compaction:
   1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

E. Protection of Graded Areas:
   1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
   2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

3.6 BASE COURSE AND LEVELING COURSE

A. General:
   1. Base course consists of placing the specified materials in layers to support a leveling course or paved surface, as indicated in the Drawings.

B. Grade Control:
   1. During construction, maintain lines and grades including crown and cross-slope of base course and leveling course.

C. Placing:
   1. Place base course on prepared subbase conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting base materials.
   2. Place leveling course on prepared base course, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compaction.

D. Shaping and Compacting:
   1. All layers of aggregate base course and leveling course shall be compacted to the required density immediately after placing. As soon as the compaction of any layer has been completed, the next layer shall be placed.
   2. The Contractor shall bear full responsibility for and make all necessary repairs to the base leveling courses and the subgrade until the full depth of the base leveling courses is placed and compacted. Repairs shall be made at no additional cost to the Owner.
   3. If the top of any layer of the aggregate base or leveling course becomes contaminated by degradation of the aggregate or addition of foreign materials, the contaminated material shall be removed and replaced with the specified material at the Contractor's expense.

END OF SECTION

SECTION 02225

FLOWABLE FILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide and install flowable fill material in authorized excavation(s) as shown on the Drawings and/or as specified herein.

B. Related Work Specified Elsewhere:

1. Earthwork, excavation, backfilling, compaction, piping, manholes, testing and pavement are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

A. Perform work in accordance with ACI 229, Controlled Low-Strength Materials, or as specified here-in.

1.3 SUBMITTALS

A. Submit Mix designs for each mixture to be provided at least 15 days prior to production.

1.4 TESTING

A. Flowability: Reference ASTM D 6103

1. A 3-inch diameter by 6-inch-long open-ended cylinder is placed vertically on a level surface and filled to the top with flowable fill. The cylinder is then lifted vertically to allow the material to flow out onto the level surface. The test is considered passing when the material spread is at least 7 inches in diameter and there is no noticeable segregation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Materials shall meet the following requirements:

1. Portland Cement, Type I or II - ASTM C150.
2. Fly Ash (LOI limits do not apply) - ASTM C618.
3. Fine Aggregate/Mineral Filler – ASTM C 33, ASTM or non-ASTM sands or mineral fillers with 100% passing the 1/2" sieve may be considered which produce an acceptable flow and desired performance characteristic. Soils with fine clays will not be considered. All other than ASTM C 33 materials must receive prior approval from the Engineer.
4. Air Entraining Admixtures - As Per Manufacturer's Specifications.
5. Light Weight Cellular Admixture - As Per Manufacturer's Specifications.
6. Water – Potable or ASTM C 94.
7. Preformed Foam – Procedures for evaluation ASTM C 796 and ASTM C869.

B. Flowable Fill:

1. Compressive strength at 28 days between 100-200 psi.
2. Mix:

a. Portland Cement: 50-100 lb/yd^3.
b. Fly Ash: up to 250 lb/yd^3, lime content not to exceed 10% by weight.
c. Fine Aggregate/Mineral Filler: 2,650-2,700 lb/yd^3.
d. Water: 60 gallons/yd^3.

3. Shall be equivalent to MassDOT flowable fill Type 1E or Type 2E (section M4.08).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Flowable fill shall be produced and delivered using standard concrete construction equipment and practices.
B. Placing flowable fill shall be by chute, pumping, or other method approved by the Engineer.
C. The flowable fill shall be discharged directly from the mixer truck into the space to be filled.
D. No flowable fill shall be placed on frozen ground.
E. At the time of placement, the flowable fill shall have a temperature of at least 40 degrees F.
F. When flowable fill is placed in freezing temperatures, the material should be covered with blankets and protected from freezing until hardening.
G. The Contractor shall provide all necessary means to confine the material within a designated space.
H. Formed walls or other bulkheads shall be constructed to withstand hydrostatic pressure exerted by flowable fill where necessary and as determined by the Engineer.
I. The Contractor is responsible to ensure underground utilities, including but not limited to pipes, tanks, structures, cables, etc. are secured to prevent floating.
J. No compaction or vibration of the material is required.
K. Where flowable fill is being used as pipe bedding it shall be placed in lifts to ensure lateral support of the pipe develops along the side of the pipe before continuing with the backfilling.
L. When paving over flowable fill in cold weather, any frozen material on the surface shall be scraped off and removed prior to paving.
M. The flowable fill shall be left undisturbed until the material obtains sufficient strength. Sufficient strength for paving is achieved when the flowable fill can support the weight of foot traffic without apparent deformation. Sufficient strength for supporting vehicular traffic is 2.5 tons per square foot as measured by a pocket penetrometer.
N. Trenches shall be covered and barricaded until hardening occurs.

END OF SECTION

SECTION 02260

FILTER FABRIC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Furnish all materials and install filter fabric of the types, dimensions and in the location(s) shown on the Drawings and specified herein.

B. Related Work Specified Elsewhere:
   2. Temporary Erosion Control, Riprap and Stone Ditch Protection, and Gabions and Revet Mattresses are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

A. A competent laboratory must be maintained by the manufacturer of the fabric at the point of manufacture to ensure quality control.

B. During all periods of shipment and storage, the fabric shall be wrapped in a heavy duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140^{O}F, mud, dirt, dust and debris.

1.3 SUBMITTALS

A. Manufacturer shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this Specification.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Filter fabric for use in stabilization, drainage, underdrains, landscaping and beneath structures shall be formed in widths of not less than six (6) feet and shall meet the requirements of Table 1. Both woven and non-woven geotextiles are acceptable; however no "slit-tape" woven fabrics will be permitted for drainage, underdrain, and erosion control applications.

Table 1

Geotextile Mechanical Property	Test Method	Minimum Permissible Value
Grab Tensile Strength (both directions)	ASTM D4595-86	120 pounds
Grab Elongation	ASTM D4632-86	50 percent
Mullen Burst Strength	ASTM D3786-87	210 psi
Puncture Strength	ASTM D3787	60 pounds
Trapezoid Tear Strength	ASTM D4533-85	50 pounds
Water Flow Rate	ASTM D4491-85	120 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751	U.S. Std. Sieve #80
Coefficient of Permeability	ASTM D4491-85	0.2 cm/sec

The geotextile shall have property values expressed in "typical" values that meet or exceed the values stated above as determined by the most recent test methods specified above.

B. Filter fabric for use in reinforcement shall meet the requirements of Table 2. Woven and non-woven geotextiles are acceptable.

Table 2

Geotextile Mechanical Property	Test Method	Minimum Permissible Value
Grab Tensile Strength (both directions)	ASTM 4595-86	195 pounds
Grab Elongation	ASTM D4632-86	20 percent
Mullen Burst Strength	ASTM D3786-87	340 psi
Puncture Strength	ASTM D3787	85 pounds
Trapezoid Tear Strength	ASTM D4533-85	85 pounds
Equivalent Opening Size (EOS)	ASTM D4751	U.S. Std. Sieve number(s) between #20 and #100

The geotextile shall meet or exceed the "typical" values stated above as determined by the most recent test methods specified above.

C. Filter Fabric for use in siltation fencing shall be the following:
   1. Environfence 100X (Mirafi)
   2. Supac 4NP (Phillip 66)
   3. Exxon 180 Siltfence
   4. Amoco 1380 Silt Stop
   5. Harris Siltfence
   6. Or equivalent

PART 3 - EXECUTION

3.1 Install filter fabric as shown on the drawings or as directed in appropriate specifications in this division or in accordance with manufacturer's instructions or as directed by the Engineer.

A. (All applications) At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage. The filter fabric shall be unrolled and laid smooth and free of tension, stress, folds, wrinkles, or creases except, in curved sections and corners.

B. Filter fabric (geotextile) shall be overlapped a minimum width of 6 inches at each joint. Overlap joints and seams shall be measured as a single layer of cloth. All filter fabric (geotextile) shall be turned down at all exterior limits. Filter fabric (geotextile) overlaps shall be field sewn using UV resistant thread with seam material properties the same as the material with contrasting color, have a stitch density of 4 to 6 stitches/foot of seam and a double row of lock stitches. Heat bonding of the seams along the edges is an acceptable alternative, except over underdrains; heat bonding of seams is not an acceptable alternative to seaming filter fabric.

END OF SECTION

SECTION 02270

TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The work under this section shall include provision of all labor, equipment, materials and maintenance of temporary erosion control devices, as specified herein, as shown on the Drawings and as directed by the Engineer.
2. Erosion control measures shall be provided as necessary to correct conditions that develop prior to the completion of permanent erosion control devices, or as required to control erosion that occurs during normal construction operations.
3. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
4. Erosion control measures shall be in accordance with the Massachusetts Department of Environmental Protection's - Stormwater Management Standards - (referred to hereafter as MassDEP SMS) and "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas," *Franklin, Hampden, Hampshire Conservation Districts, 2003* or latest version.
5. After awarding of or after being awarded the Contract, prior to commencement of construction activities, the Contractor will meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.

B. Design Criteria:

1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices, as may be necessary, until such time as adequate soil stabilization has been achieved.

1.2 SUBMITTALS

A. The Contractor shall furnish the Engineer, in writing, his work plan giving proposed locations for storage of topsoil and excavated material, before beginning construction. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of his responsibility for completion of the work as specified. Excavated material shall be stored away from brooks, streams and wetland areas to prevent erosion from washing back into resource area.

B. Contractor shall furnish a materials list of items proposed to be provided under this section.

C. Contractor shall furnish manufacturer’s specifications and other data needed to prove compliance with the specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fiber Rolls:
   1. Fiber rolls shall be minimum 9-inch diameter cylinders of agricultural straw or rice straw wrapped in photodegradable black synthetic netting.

B. Silt Fencing
   1. Polyethylene, polypropylene, nylon, or polyester fabric supported by stakes spaced no greater than 6-feet apart, minimum silt fencing width of 36-inches.
   2. Silt fencing shall utilize wire fence reinforcement.

C. Mulches:
   1. Straw or Salt Marsh Hay. Loose hay mulching is prohibited.

D. Mats and Nettings:
   1. Twisted Craft paper, yarn, jute, excelsior wood fiber mats, glass fiber and plastic film.
   2. Type and use shall be as specified in the MassDEP SMS.

E. Baled Hay/Straw:
   1. At least 14" by 18" by 30" securely tied to form a firm bale, staked as necessary to hold the bale in place. Bales shall not exceed (100) pounds.

F. Sand Bags:
   1. Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.

G. Permanent Seed:
   1. Conservation mix appropriate to the predominant soil conditions as specified in the MassDEP SMS and subject to approval by the Engineer.

H. Temporary Seeding:
   1. Use species appropriate for soil conditions and season as specified in the MassDEP SMS and subject to approval by the Engineer.

I. Water:
   1. The Contractor shall provide water and equipment to control dust, as directed by the Engineer.

J. Filter Fabrics:
   1. Filter fabric shall be of one of the commercially available brands such as Mirafi, Typar or equivalent. Fabric types for particular applications shall be approved by the Engineer prior to installation.

K. Silt Sacks:
   1. Silt Sacks (or equivalent) shall be placed in downgradient catch basins within the project area and immediately downstream of the project area to prevent sediment from entering the drainage system. Silt sacks shall be periodically cleaned while in use and must be cleaned prior to and after precipitation events. Applicants are advised they may be required to respond immediately for repair and maintenance at the request of the Town within two hours of notification. Silt sacks shall meet the following minimum requirements:
      a. Grab Tensile Strength: 300 lbs
      b. Grab Tensile Elongation: 20%
      c. Puncture (ASTM D-4833): 120 lbs.
      d. Mullen Burst (ASTM D-3786): 800 psi
      e. Trapezoid Tear (ASTM D-4533): 120 lbs.

f. UV Resistance (ASTM D-4355): 80%
g. Apparent Opening Size: 40 US sieve
h. Flow rate: 40 gpm/SF
i. Permittivity: 0.55/sec

2.2 CONSTRUCTION REQUIREMENTS

A. Temporary Erosion Checks:
1. Temporary erosion checks shall be constructed in ditches and other locations as necessary.
2. Fiber rolls or siltation fence may be used in an arrangement to fit local conditions.

B. Temporary Berms:
1. Temporary barriers shall be constructed along the toe of embankments when necessary to prevent erosion and sedimentation.

C. Temporary Seeding:
Areas to remain exposed for a time exceeding 3 weeks shall receive temporary seeding as indicated below:

Season	Seed	Rate
April 1 to June 1 Aug. 15 to Sept. 15	Annual Ryegrass	40 lbs/Acre
May 1 to June 30	Foxtail Millet	30 lbs/Acre
April 1 to July 1 Aug. 15 to Sept. 15	Oats	80 lbs/Acre
Aug. 15 to Oct. 15	Winter Rye	120 lbs/Acre
Nov. 1 to April 1	Mulch w/ dormant seed	80 lbs/Acre @ 50% seed rate increase

D. Mulch All Areas Receiving Seeding:
1. Use either wood cellulose fiber mulch (750 lbs/acre); or straw mulch with chemical tack (as per manufacturer's specifications). Wetting for small areas may be permitted. Biodegradable netting is recommended in areas to be exposed to drainage flow.

E. Erosion control matting for slopes and ditches shall be anchored with pegs and/or staples per manufacturer's recommendations. Contractor shall provide matting along the flowline of all ditches and swales having a longitudinal slope in excess of 0.01 ft/ft, and on all slopes in excess of 3(H) to 1(V).

F. Gravel aprons shall be installed at the entrance of construction sites where disturbance is over 4,000 square feet to prevent sediment from the construction site entering the roadway. Aprons shall be a minimum of 15 feet in length, and extend the width of the entrance.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fiber Rolls (Straw Wattles):

Fiber rolls shall be staked securely into the ground and oriented perpendicular to the slope using wood stakes. A minimum of 3 inches of the stake should stick out above the roll. Stakes shall be spaced 3 to 4 feet apart.

B. Silt Fencing:

1. Silt fence shall be erected in a continuous fashion from a single roll of fabric. The bottom of the fabric fence shall be buried sufficiently below the ground surface to prevent gaps from forming, usually 4 to 6 inches below ground surface. The fabric shall be installed on the upstream side of the stakes. Stakes shall be strong enough and tall enough to securely anchor the fabric to the ground. Stake spacing shall be no more than 10 feet apart for extra-strength fabric and 6 feet apart for standard strength fabric. Maintenance of the fence is required during construction. Fence shall utilize wire mesh reinforcement with a minimum of 14- gauge wire and a maximum of 6-inch spacing.
2. The silt fence shall be maintained at no additional cost to the Owner as follows:
   a. Inspect silt fences and filter barriers immediately after each rainfall and at least daily during prolonged rainfall.
   b. Provide any required repairs immediately.
   c. Should the fabric on a fabric silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, replace the fabric promptly.
   d. Remove sediment deposits after each storm event.
   e. As a minimum, remove sediment when deposits reach approximately one-third the height of the barrier.
   f. Dispose of sediment deposits off-site.
   g. Maintain the fabric silt fence until all upslope soils are permanently stabilized by vegetation.

C. Straw/Hay Bales:

1. Baled hay shall be placed to form temporary water stops, dams, diversions dikes, berms and for other uses connected with water pollution control.
2. Should any bales become too clogged to be effective, they shall be removed from the site and new hay bales provided.
3. Bales shall be replaced as often as necessary to provide effective sediment control.
4. Following completion of construction activities in a particular area, bales shall be legally disposed of, by the Contractor, off-site in an environmentally sound manner.

D. Sediment laden water that is being pumped from the trenches or excavations shall not be pumped directly into water courses or drainage systems.

1. Sedimentation basins, filter fabric fencing, hay bales or other means shall be used for this purpose.

E. Temporary Erosion Checks:

1. Temporary erosion checks shall be constructed in ditches and at other locations designated by the Engineer. The Engineer may modify the Contractor's arrange- ment of silt fences, bales and bags to fit local conditions.
2. Fiber rolls, baled straw, silt fences, or some combination, may be used in other areas, as necessary, to inhibit soil erosion.

3. Siltation fence shall be located and installed as shown on plans or as required to comply with all Federal, State and Local Regulations.
4. Sedimentation ponds shall be sited and constructed to the grades and dimensions as shown on the Drawings and will include drainage pipe and an emergency spillway.

F. Erosion control matting for slopes and ditches shall be installed where indicated on the Drawings and as required to stabilize the soil until permanent vegetative stabilization is established.

G. Maintenance:

Erosion control features shall be installed prior to excavation wherever appropriate. Temporary erosion control features shall remain in place and shall be maintained until a satisfactory growth of grass is established. The Contractor shall be responsible for maintaining erosion control features throughout the life of the construction contract. Maintenance will include periodic inspections by the Owner or Engineer for effectiveness of location, installation and condition with corrective action taken by the Contractor, as appropriate.

H. After the Contractor has stabilized/re-vegetated all disturbed areas to match or exceed pre-existing conditions, the Contractor shall notify the Engineer in order to arrange an inspection from the local conservation commission.

I. Upon review and approval of the local conservation commission, the Engineer shall notify the Contractor to remove and legally dispose of the environmental controls.

J. Removing and Disposing of Materials:

1. When no longer needed, material and devices for temporary erosion control shall be removed and legally disposed of upon approval by Engineer.
2. When removed, such devices may be reused in other locations, provided they are in good condition and suitable to perform the erosion control for which they are intended.
3. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.
4. Sedimentation basins, if no longer required, will be filled in, the pipe removed, the surface loamed and grass cover shall be established.

END OF SECTION

SECTION 02401

TEMPORARY DEWATERING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Design, furnish, operate, maintain, and remove temporary dewatering system to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry; collect and dispose of ground and surface water where necessary to complete the work.

B. Related Work Specified Elsewhere: (When Applicable)

1. Section 02156 Temporary Excavation Support System
2. Section 02200 Earthwork

1.2 DESIGN REQUIREMENTS

A. Dewatering system shall be designed by a Professional Engineer registered in the Commonwealth of Massachusetts who is experienced in the design of Dewatering systems. Engineer shall at least 5 years of experience designing similar temporary dewatering systems.

B. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least one feet below the lowest foundation subgrade or bottom of pipe trench to allow material to be excavated in a dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where temporary excavation support systems are not required. Operate dewatering system continuously until backfill work has been completed.

C. Control of surface and subsurface water is part of dewatering system requirements. Maintain adequate control so that:

1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
2. Erosion is controlled.
3. Flooding of excavations or damage to structures does not occur.
4. Surface water drains away from excavations.
5. Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken
6. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
7. Maintain stability of sides and bottom of excavation. Construction operations are performed in the dry.
8. Any existing dewatering wells that can affect dewatering and excavation shall be sealed below the excavation subgrade.

D. Design shall include an assessment of how the dewatering operations will affect the stability of all adjacent structures

E. Contractor is responsible to perform whatever additional geotechnical investigations are

needed to design the dewatering system to allow for proper construction of new facilities while protecting adjacent structures from damage due to settlement, and in accordance with this specification.

1.3 SUBMITTALS

A. Provide submittals in accordance with Specification Section 01340.
B. Submit qualifications of temporary dewatering system design engineer.
C. Submit design calculations, description and complete scaled and dimensioned layout drawings of the proposed dewatering system, stamped and sealed by a Professional Engineer registered in the Commonwealth of Massachusetts. Such review shall not relieve the Contractor of sole responsibility for the dewatering system as necessary to prevent damage and settlement to adjacent structures, utilities, streets adjacent to excavations and for the safety of persons working within the excavated areas. Submittal shall identify:
    1. Location, depth and size of wellpoints, headers, sumps, ditches; size and location of discharge lines; capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
    2. Estimated average, minimum and maximum pumping rates (total)
    3. Method to minimize or eliminate pumping of fines.
    4. Standby pumping equipment
    5. Standby power equipment
    6. Treatment tankage and discharge locations
    7. Sample monitoring log (flow, TSS, etc.).
    8. System removal requirements.
D. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02156 (Temporary Excavation Support Systems).

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:
    1. Prior to any excavation below the ground water table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.
    2. Keep work areas dewatered until the structures, pipes, and appurtenances to be built there have been completed to such an extent that they will not be damaged by water.
    3. Thoroughly brace or otherwise protect against flotation all pipelines and structures which are not stable.
    4. Maintain standby backup equipment and power supply throughout the duration of the dewatering operation.
    5. Prevent soil particles from entering the discharge points.
    6. Ground water level shall be maintained at least one foot below the bottom of the excavation.

B. Disposal of Water:
   1. Dispose of water pumped or drained from the construction site in a suitable manner to avoid siltation of adjacent drainage structures and piping, wetlands or water bodies, injury to public health, damage to public and private property, and damage to the work completed or in progress.
   2. Provide suitable temporary channels for water that may flow along or across the construction site.
   3. Provide treatment as necessary to prevent discharge of contaminated ground water caused by Contractor's operations, or any contaminated ground water that maypass through the excavation support system selected by the Contractor.
   4. Contractor must obtain all necessary regulatory approvals for the disposal of dewatering flows. These may include, among others, approval by the USEPA under the National Pollutant Discharge Elimination System (NPDES) program for construction activities.

C. Damage:
   1. Avoid damage to and settlement of adjacent buildings, roads, structures, utilities and other facilities.
   2. Any damage to or settlement of structures resulting from the dewatering operations, or the failure of the Contractor to maintain the work in a suitably dry condition shall be repaired by the Contractor at no additional cost to the Owner.

D. Temporary Underdrains:
   1. When necessary, temporary underdrains may be placed in excavations.
   2. Underdrain pipe shall be perforated corrugated metal, polyethylene or P.V.C. pipe.
   3. Entirely surround the underdrain and fill the space between the underdrain and the pipe or structure with free draining material.

E. Excavation Sump Pumping:
   1. When necessary and where appropriate to the geotechnical conditions encountered, excavations may be over excavated 6 to 12 inches and filled with screened stone to allow sump pumping of groundwater.
   2. The system shall be installed with suitable screens and filters so that pumping of fines does not occur.

F. Well and Wellpoint System:
   1. If necessary, dewater the excavations and trenches with an efficient well or wellpoint system to drain the soil and prevent saturated soil from flowing into the excavated wells and area.
   2. Wellpoint and well system shall be of the type designed for dewatering work and shall be installed with suitable screens and filters so that pumping of fines does not occur.
   3. Pumping units shall be capable of maintaining sufficient suction to handle large volumes of air and water at the same time.

3.2 PRE-TREATMENT

A. Contractor shall provide a settling tank (or tanks) to provide pre-treatment of groundwater prior to discharge. Tanks shall be sized to provide 60-minute hydraulic retention time at the anticipated maximum sustained pumping rate. Tanks shall have an underflow baffle to collect any floatables and shall have final overflow weir to allow for flow measurement and sample collection. The effluent weir shall be sized to allow for accurate flow measurement based on the anticipated pumping rates.

B. Routine inspection of the settlingtanks shall be carried out daily, with records maintained.

C. Settling tanks shall be cleaned frequently to prevent excess deposition of solids which could overflow from the tank.

D. Conduct effluent sampling requirements per the requirements of the permitting authority which is receiving the pre-treated dewatering system effluent.

3.3 MONITORING

A. General:

1. Contractor shall monitor the performance of the dewatering system and the groundwater level achieved throughout construction.

B. Corrective Action:

1. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system (loosening of the foundation strata, or instability of slopes, or damage to foundations or structures), the Contractor shall stop work and submit a revised temporary dewatering system design submittal. The revised plan shall indicate why the system revisions are needed and indicated what change will be made to address the issues. Contractor shall perform work necessary for reinstatement of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

CERTIFICATE OF DESIGN

RE: Contract between

OWNER: _____
(Name)

and

CONTRACTOR: _____
(Name)

on

CONTRACT: _____
(Title)

_____
(Number) (Date)

The undersigned hereby certify that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the state of _____(location of Project);

2. Is qualified by education and training to design the _____ _____ specified in Section_____of subject contract;

3. Has previously designed comparable groundwater dewatering systems;

4. Has prepared the design in full compliance with the requirements of subject contract, including all applicable laws, regulations, rules, and codes – including review and coordination with the Temporary Excavation Support System design; and

5. Will inspect and supervise installation of the temporary dewatering system and will monitor the in-place system to confirm that the system is installed and functions in accordance with the design.

CONTRACTOR	ENGINEER
By:_____	By:_____
(Signature)	(Signature)
_____	_____
(Name)	(Name)
_____	_____
(Title)	(Engineering Discipline)
_____	_____
(Date)	(Date)

END OF SECTION

SECTION 02431

CATCH BASINS, GRATES AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Construct catch basins, grates, frames and brick masonry in conformance with the dimensions and locations shown on the Drawings.

B. Related Work Specified Elsewhere: (Where applicable)

1. Pipe, trench excavation and backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Catch Basin Base, Barrel and Top Sections:

1. Conform to ASTM C478-97 except as modified herein, on the Drawings, or as directed by the Engineer.
2. Average strength of 4,000 psi at 28 days
3. Testing:
   a. Determine concrete strength by tests on 6 inch by 12 inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
   b. Have tests conducted at manufacturer's plant or at an approved testing laboratory.
   c. Have not less than 2 tests made for each 100 vertical feet of precast catch basin sections.

B. Frames and Covers:

1. Acceptable Manufacturers:
   a. EJ Group, Inc.
   b. Neenah Foundry Company
   c. Or equivalent.

C. Masonry:

1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
2. Cement: ASTM C-150.
3. Hydrated Lime: ASTM C-207.
4. Sand: ASTM C144.

1.3 SUBMITTALS TO THE ENGINEER

A. Submit shop Drawings and manufacturer's literature in conformance with the Standard General Conditions of the Construction Contract.

B. Bases, Barrel Sections and Tops: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST CATCH BASIN SECTIONS

A. Dimensions, as shown on the Drawings.

B. Use flat tops or eccentric cones as appropriate. Exterior face of cone sections shall not flare out beyond the vertical.
C. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
D. Constructed to support an HS-20 wheel loading.
E. Openings:
   1. Provide openings in the risers to receive pipes entering the catch basin of the types and materials approved by the Engineer.
   2. Make openings at the manufacturing plant or cut openings in the field.
   3. Size: To provide a uniform annular space between the outside wall of pipe and the riser.
   4. Location: To permit setting of the entering pipes at the correct elevations.
F. Joints:
   1. Joint gaskets to be flexible self seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
   2. Acceptable Materials:
      a. Kent-Seal No. 2
      b. Ram-Nek
      c. Or equivalent.
   3. Joints between precast sections shall conform to related standards and manufacturer's instructions.

2.2 FRAMES AND GRATES

A. All essential details of design shall conform to the Drawings. Standard castings differing in non-essential details may be approved by the Engineer.
B. All frames and grates shall be made of cast iron and shall have machined bearing surfaces to prevent rocking under traffic.
C. Grate castings will be smooth with no sharp edges.
D. Constructed to support an HS-20 wheel loading.

2.3 MASONRY

A. Brick:
   1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
   2. Immediately remove rejected brick from the work.
B. Mortar:
   1. Composition (by volume):
      a. 1 part portland cement.
      b. 1/2 part hydrated lime.
      c. 4-1/2 parts sand.
   2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
C. Cement:
   1. Shall be Type II portland cement.
D. Hydrated Lime:
   1. Shall be Type S.

E. Sand:
   1. Shall consist of inert natural sand.

F. Grading:

Sieve	Percent Passing
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Catch Basin Sections:
   1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
   2. Install barrels and tops level and plumb.
   3. Make all joints water tight.
   4. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout or other material approved by the Engineer.
   5. Cut openings (as required) carefully to prevent damage to barrel sections and tops. Damaged barrel sections and tops shall be replaced by the Contractor at no additional expense to the Owner.

B. Pipe Connections to Catch Basins: Connect pipes to catch basins with joint design and materials approved by the Engineer.

C. Masonry:
   1. Laying Brick:
      a. Use only clean bricks in brickwork for catch basins.
      b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar or so wet as to be slippery when laid.
      c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
      d. Construct all joints in a neat workmanlike manner, construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
   2. Curing:
      a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
      b. Protect brick masonry from the weather and frost as required.

D. Frames and Grates:
   1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin opening.
   2. Completely fill all voids beneath the bottom flange to make a watertight fit.

3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
4. Clean the frame seats before setting the covers in place.

E. Bedding and Backfilling:
1. Bedding material of catch basin shall be 6 inches of screened stone (see Section 02200).
2. Backfill 18 inches all around catch basin with gravel borrow.

END OF SECTION

SECTION 02480

LANDSCAPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Perform the following items of work as required to complete the work of this section as shown on the Drawings and as specified hereunder:
   a. Spread stockpiled topsoil and furnish and spread any additional topsoil, required to meet the requirements of this section.
   b. Furnish and sow grass seed/or sod in all areas within the work area to the extent indicated on the Drawings, and in existing grass areas which have been damaged or disturbed by the work of this Contract.
   c. Furnish and install plant materials in all areas within the work area as indicated on the Drawings.
   d. Provide maintenance services as specified hereunder.
2. Examine all other sections of the Specifications and all Drawings for the relationship of the work under this section and the work of other trades. Cooperate with all trades in performing the work under this section.

1.2 SUBMITTALS AND TESTING

A. Seed:

1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is fully labeled in accordance with the Federal Seed Act and is at least equal to the specification requirements.
2. This certification shall appear in, or with, all copies of invoices for the seed.
3. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer, in accordance with the latest rules and regulations under the Federal Seed Act.

B. Topsoil:

1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished. It is the intent of this section that all topsoil which can be recovered from the site shall be used. Furnish additional topsoil as required.
2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.
4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing for agricultural use.
5. Approval, by the Engineer, to use topsoil for use in the work will be dependent upon the results of the soils tests.

C. Lime and Fertilizer:
   1. Furnish the Engineer with duplicate copies of invoices for all lime and fertilizer used on the project showing the total minimum carbonates and minimum percentages of the material furnished that pass the 90 and 20 mesh sieves and the grade furnished.
   2. Each lot of lime and fertilizer shall be subject to sampling and testing at the discretion of the Engineer.
   3. Sampling and testing shall be in accordance with the official methods of the Association of Official Agricultural Chemists.
   4. Upon completion of the project, a final check may be made comparing the total quantities of fertilizer and lime used to the total area seeded. If the minimum rates of application have not been met, the Engineer may require the Contractor to distribute additional quantities of these materials to meet the minimum rates.

D. Sod:
   1. Submit one 12-inch x 12-inch piece of sod, with source location, for approval of the Engineer, before ordering sod for the work.

1.3 DELIVERY, STORAGE AND HANDLING

A. Seed:
   1. Furnish all seed in sealed standard containers, unless exception is granted in writing by the Engineer.
   2. Containers shall be labeled in accordance with the United States Department of Agriculture's rules and regulations under the Federal Seed Act in effect at the time of purchase.

B. Fertilizer:
   1. Furnish all fertilizer in unopened original containers.
   2. Containers shall be labeled with the manufacturer's statement of analysis.

1.4 JOB CONDITIONS

A. Topsoil:
   1. Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental, in the opinion of the Engineer, to the proposed planting or to proper grading.

B. Seeding and Planting:
   1. Work Seasons - Perform seeding and planting work only between the dates of 1 May to 20 June and 15 August to 1 October, except as otherwise directed in writing by the Engineer.
   2. Weather Conditions:
      a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
      b. Stop the seeding work when, in the opinion of the Engineer, weather conditions are not favorable.
      c. Resume the work only when, in the opinion of the Engineer, conditions become favorable, or when approved alternate or corrective measures and procedures are placed into effect.

PART 2 - PRODUCTS

2.1 MATERIALS FOR GRADING AND SEEDING

A. Topsoil:
1. Fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials and obtained from a well-drained site. Mixture of sand, silt, and clay particles in equal proportions.
2. Free of stumps, roots, heavy of stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, weeds, sticks, brush or other deleterious matter.
3. Not less than 4 percent nor more than 20 percent organic matter.
4. Topsoil depth shall be 4-inches, unless otherwise indicated.

B. Fertilizer:
1. Fertilizer shall be used to counteract soil deficiencies as indicated by the soil analysis and as approved by the Engineer. It should be a complete fertilizer, a standard product complying with the state and federal fertilizer laws, part of the elements of which are derived from organic sources, containing the following percentages by weight:

Nitrogen	10N - Minimum 75 percent organic
Phosphorus	6 P -
Potash	4 K -

The fertilizer shall be delivered to the site in the original unopened containers bearing the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall be furnished to the Engineer. The fertilizer shall be spread at the rate of 17 to 20 lbs/1000 sq-ft.

C. Lime:

1. Provide lime which is ground limestone containing not less than 85 percent of total carbonate and of such fineness that 90 percent will pass a No. 20 sieve and 50 percent will pass a No. 100 sieve.
2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. 100 sieve. No additional payment will be made to the Contractor for the increased quantity.

D. Soil Enrichers:
1. They shall be one of the following materials:
   a. Peat Moss - Finely shredded and consisting of not less than 90 percent organic matter.
   b. Sawdust - rotten.
2. They shall be natural and suited to horticultural use. They shall not contain lumps, roots or other foreign matter over two inches in diameter. They shall be free from noxious weeds, seeds and other elements harmful to lawns. They shall be subject to inspection approval by the Engineer at the source and upon delivery and shall contain not more than 35 percent moisture by weight at the time of incorporation into the soil.

E. Mulch for Hydro Seeding:
1. Mulch material shall meet the following requirements:
   a. Hay or straw - Hay or straw mulch shall consist of long fibered hay or straw, reasonably free from noxious weeds or other undesirable material. No

material shall be used which is so wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings or other short fibered material shall be used unless directed.

b. Wood cellulose fiber - Wood cellulose fiber mulch shall consist of natural wood cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Wood fiber mulch shall be supplied in uniform packages not exceeding 100 pounds each. Each package shall be marked to show the air dry weight.

F. Mulch Binder for Hydroseeding:

1. Material for mulch binder shall be emulsified asphalt.

a. Emulsified asphalt mulch binder shall be a type acceptable to the Engineer and may be diluted with water to assure even distribution.

G. Grass Seed Mixture

1. Fresh, clean, new crop seed. Seed may be mixed by an approved method on the site, or may be mixed by the dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers which shall bear the dealer's guaranteed statement of the composition of the mixture and the percentage of purity of each variety. The Dealers Guarantee Statement shall be delivered to the Engineer.

2. Grass seed shall be composed of the following varieties which shall be mixed in the proportions and shall test to 80 percent minimum purity, and 80 percent germination. Percent Proportion by Weight:

a. MDOT Park Mixture:

1)	Creeping red fescue	50 percent
2)	Kentucky Bluegrass	30 percent
3)	Annual Rye Grass	20 percent

NOTE: Add 1 pound White or Dutch Clover per acre.

b. MDOT Roadside Mixture (Slopes):

1)	Creeping Red Fescue	40 percent
2)	Kentucky Bluegrass	25 percent
3)	Kentucky 31 Fescue	30 percent
4)	White Clover	5 percent

NOTE: Add 1 pound White or Dutch Clover per acre.

c. Lawn Areas:

1)	Kentucky 31 Fescue	25 percent
2)	Chewing Fescue	15 percent
4)	Creeping Red Fescue	15 percent
5)	Pennfine Perennial Rye	25 percent
6)	Lynn Perennial Rye	10 percent
7)	Common Annual Rye	10 percent

H. Sod:

1. Preferable two-year growth, at least 85 percent weed-free, solid landscaping sod composed of perennial fescues, Kentucky bluegrass's.

2.2 MATERIALS FOR PLANTING

A. Water:
   1. The Contractor shall arrange and pay for water required for the planting. Water shall be clean and suitable for domestic consumption.

B. Manure:
   1. Manure shall be well rotted, unleached, horse or cow manure or a combination of both. It shall be free from any chemicals used to hasten decomposition artificially, or any other injurious substance.
   2. Manure shall be at least nine months old and not more than two years old, free from sawdust, hay, tanbark or wood shavings, or refuse of any kind. Manure shall consist of not more than 25 percent straw or other acceptable material.

C. Stakes shall be white cedar or approved equal, of size and length as shown on the Drawings.

D. Hose for guying shall be new black or green two-ply fiber garden hose, not less than 1/2 inch inside diameter. Seconds rejected by the factory are acceptable.

E. Burlap for wrapping shall be first quality burlap at least eight ounces in weight and six inches in width.

F. Wire for tree guys shall be galvanized annealed steel wire, No. 14 gauge, as detailed.

G. Tree paint shall be waterproof, adhesive and elastic, free from kerosene, coal tar creosote or any other material injurious to the life of the trees. Tree paint shall contain an antiseptic.

H. Pine bark mulch shall be clean, shredded, free of weeds, seeds, insects and extraneous materials.

I. Plant Materials:
   1. Plant materials shall conform to American Standard for Nursery Stock (April 15, 1951), sponsored by the American Association of Nurserymen, Inc., Standard Plant Names (1942) shall be the authority for plant names. Plant materials shall be of standard quality true to name and type and first class representatives of their species or variety.
   2. All plants shall conform to the varieties specified in the Plant List. No substitutions will be permitted unless approved in writing by the Engineer. Each bundle of plants and all separate plants shall be properly identified by name on legible, waterproof labels, securely attached thereto before delivery to the site.
   3. Plant materials shall be free of damage as a result of handling and transportation.
   4. All plant material shall be certified by the supplier to be free of disease and infestation.
   5. All plants shall be subject to approval at their source prior to shipment. The Contractor shall accompany the Engineer to inspect the materials, and shall request such inspection at least one week in advance.
   6. All plants shall be typical of their species or variety and shall have a normal habit of growth. They shall be first quality, sound, healthy, vigorous, well branched and densely foliated. They shall be free of disease, insect pests, eggs or larvae, and shall have healthy, well-furnished root systems. Plants lacking compactness or proper proportions, and plants injured by too close planting in nursery rows will not be accepted.
   7. All plants shall conform to the measurements specified in the Plant List. Measurements specified shall be the minimum acceptable for each variety. Plants that meet these requirements specified, but do not possess a normal balance

between height and spread, will not be accepted. Plants shall not be pruned prior to delivery.

8. All plants and all tree trunks shall be measured when the branches are in their normal position. Dimensions noted for height and spread refer to the main body of the plant, and not from branch tip to branch tip. Height is defined as the approximate dimension from ground to top of last year's growth. Top spread is defined as the approximate spread to top or principal width. The height of tree trunks need not be specified if the required height can be obtained by pruning the lower branches without leaving unsightly scars or otherwise damaging the trunk. Shade trees shall be free of branches up to five feet, with a single leader, well branched and reasonably straight stems. No trees which have had their leaders cut, or are so damaged that cutting is necessary, will be accepted. Trees which had their tops cut off some years previous will only be acceptable if the scar has not decayed. No trees with cut off tops will be accepted unless corrective surgery has been performed so as to effect a complete healing of the stem.
9. Caliper of trees shall be measured one foot above ground.
10. Plants larger in size than those specified in the Plant List may be provided if approved by the Owner or the Engineer, but the use of larger plants shall not increase the cost of the Contract. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant. If plants required to be bare rooted are furnished in sizes greater than specified, they shall be balled and burlapped.
11. All trees shall have straight trunks with single leader intact. There shall be no abrasion of the bark and no fresh cuts of limbs over 1-1/4 inch which have not completely callused over.
12. All plants shall be grown in nurseries and cultivated, sprayed, pruned, and fertilized annually in accordance with good horticultural practice. All plants shall have been grown under climatic conditions similar to those in the locality of the project, or shall have been acclimated to the conditions of the locality for at least two years.
13. All plants shall be freshly dug; neither heeled in plants nor plants from cold storage will be accepted. All plants shall have been transplanted or root pruned at least once in the past three years. Balled and burlapped plants shall come from soil which will hold a firm ball.
14. Plants marked "B&B" in the Plant List shall be adequately balled and burlapped with firm natural balls of soil, of diameter of sufficient depth to include all the roots. No plant required to be balled and burlapped shall be accepted if the ball is cracked or broken either before or during the process of planting, or when burlap, stakes, ropes or platform required in this connection have been removed.
15. All plants shall be handled so that the roots are adequately protected at all times. During shipment all plants shall be properly protected by a tarpaulin or other suitable covering.

    No plants shall be so bound with rope or wire at any time so as to damage the bark, break branches, or destroy its natural shape. All balled and burlapped plants which cannot be planted immediately on delivery shall be set on the ground and well protected with soil or other acceptable material including watering. Until planted, all material shall be properly maintained.

2.3 STORAGE OF MATERIAL

A. Materials such as fertilizers, ground limestone, etc. shall be stored in weatherproof storage areas and in such a manner that their effectiveness will not be impaired.

PART 3 - EXECUTION

3.1 PREPARATION

A. Equipment:
   1. Provide all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
   2. Demonstrate to the Engineer that the equipment will apply materials at the specified rates.

B. Subsoil Preparation:
   1. Before spreading topsoil, the subgrade shall be raked by approved means. Remove all stones greater than four inches and all debris or rubbish to a depth of six inches. Such materials shall be removed from the site.

C. Screening:
   1. All topsoil shall be screened clear of all stones greater than one inch, sticks, plants, and all other foreign materials before being spread.
   2. During the screening of topsoil, commercial fertilizers and lime as required by the soil analysis shall be mixed with the topsoil so that they are evenly distributed throughout the screened topsoil.
   3. At the completion of this operation, topsoil is referred to as improved topsoil for the purpose of this specification and the Drawings.

3.2 SEED AND SOD BED PREPARATION

A. Spread improved topsoil uniformly over subgrade and all areas where the existing grade has been changed and areas disturbed by construction operations except for those areas indicated on the site plans to be paved. No subsoil, topsoil, or improved topsoil shall be handled in any way when in a wet or frozen condition.

B. Fine rake surface to receive seed or sod.

C. After natural settlement and a light rolling, the completed work shall conform to the lines, grades, pitches, and spot elevations shown on the plans.

D. Seeding may be done immediately thereafter, provided the seed bed has remained in a good friable condition and has not become wet.

3.3 SEASON

A. Do all seeding work within the dates herein specified.

B. If special conditions exist which may warrant a variance in the above dates, submit a written request to the Engineer stating the conditions and proposed variance. Permission for the variance will be given if, in the opinion of the Engineer, the variance is warranted.

C. If seeding is authorized between May 15 and August 15, annual rye shall be sown separately in addition to the specified seed mix. Sow at the rate of six to eight pounds per 1000 square feet.

3.4 SEEDING AND SODDING

A. Immediately before seeding and sodding, the ground shall be restored as necessary to a loose friable condition by discing or other approved method to a depth of not less than two inches. The surface shall be cleared of all debris and of all stones one inch or more in diameter.

B. Seed all areas to be seeded with the specified grass seed, sowing evenly with an approved mechanical seeder at the rate specified in the seed mix schedule. Sow one half the seed in one direction and the other half at right angles to the first seeding. Cultipacker or approved similar equipment may be used to cover the seed and to firm the seed bed in one operation. In areas inaccessible to Cultipacker, the seeded ground shall be lightly raked and rolled in two directions with a water ballast roller. Extreme care shall be taken during seeding and raking to insure that no change shall occur in the finished grades and that the seed is not raked from one spot to another.

C. The hydraulic spray method of sowing seed may be used where approved by the Engineer. This work shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Engineer finds the application uneven or otherwise un- satisfactory, he may require the hydraulic spray method to be abandoned and the balance of the work done as specified herein. Seed must be lightly raked into the surface of the soil unless seeding is to be followed within 24 hours by mulching.

1. Applying Mulch - At the option of the Contractor, any of the following types of mulch material may be applied.

   a. Hay or straw mulch shall be spread evenly and uniformly over the designated areas. Unless other directed, mulch shall be applied to a thickness of 1". Too heavy application of mulch shall be avoided and lumps and thick spots shall be thinned. Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an asphalt mulch binder. Application of a concentrated stream of mulch binder will not be allowed. Asphalt mulch binder may be omitted when authorized by the Engineer and when there is a danger of the asphalt contaminating the surface of nearby structures, houses, vehicles, or other objects. Other methods of anchoring mulch may be used subject to the approval of the Engineer.

   b. Wood fiber mulch shall be applied as a water-borne slurry. The wood fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the rate of not less than 30 pounds per 1,000 square feet unit of area. Wood fiber mulch may be mixed with the proper quantities of seed, fertilizer and lime as required in this section, or may be applied separately after seeding has been carried out. In the latter case, it must be applied within 24 hours after seeding.

2. Maintenance - The Contractor shall maintain the mulch by repairing any damaged mulch and by correcting any shifting of the mulch due to wind, water or other causes, until an acceptable growth of grass has been achieved, regardless of the acceptance status of the seeding. He shall supply additional mulch necessary as a result of damage or seed failure. Repairs to mulched areas and furnishing of

additional mulch shall be incidental to this item. If wood fiber is used, any reseeding will require additional wood fiber mulch.

D. Do not perform broadcast seeding work during windy weather.

E. Compacting:
   1. Compact the entire area immediately after the seeding operations have been completed.
   2. Compact by means of a cultipacker, roller, or other equipment approved by the Engineer weighing 60 to 90 pounds per linear foot of roller.
   3. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
   4. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion, or at right angles to the prevailing wind to prevent dust.

F. Thoroughly wet soil surfaces before sodding. Place sod pieces tightly together, tamping gently into position as the work progresses. After each area of sodding is completed, roll the entire surface in two directions with a water ballast roller, and soak the newly sodded areas.

G. After the grass has started, all of the areas greater than five square feet which fail to show a uniform stand of grass for any reason whatsoever shall be reseeded repeatedly until all areas are covered with a satisfactory growth of grass.

H. At the time of the first cutting, set mower blades two inches high. All lawns shall receive at least two mowings before acceptance. Schedule for mowing shall be coordinated with the Engineer.

I. Maintenance shall also include all temporary protection fences, barriers and signs and all other work incidental to proper maintenance.

J. Maintain grass areas until a full stand of grass is indicated, which will be a minimum of 45 days after all seeding or sodding work is completed, and shall not necessarily relate to Substantial Completion of the General Contract.

K. Protection and maintenance of grass areas shall consist of watering, weeding, cutting, repair of any erosion and reseeding as necessary to establish a uniform stand of the specified grasses, and shall continue until Acceptance by the Engineer of the work of this section. It shall also include the furnishing and applying of such pesticides as are necessary to keep grass areas free of insects and disease. All pesticides shall be approved by Engineer prior to use.

3.5 SEEDING AND SODDING INSPECTION FOR PROVISIONAL ACCEPTANCE

A. The Engineer shall inspect all work for Provisional Acceptance upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.

B. Upon completion and reinspection of all repairs or renewals necessary in the judgment of the Engineer, the Engineer shall certify in writing to the Owner as to the Provisional Acceptance of the work of this section.

C. Upon approval of the Provisional Acceptance by the Owner, the Owner will assume maintenance of the lawn areas.

3.6 GUARANTEE

A. The Contractor shall submit a written guarantee to the Engineer, after Provisional Acceptance of grass, covering reseeding of grass areas which do not survive through one full growing season after the date of Provisional Acceptance, at no cost to the Owner.

3.7 CLEAN-UP

A. Any soil or similar material which has been brought on to paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all time.

B. Upon completion of work under this section all excess stones, debris, and soil resulting from work under this section, which have not previously been cleaned up, shall be removed from the project site.

3.8 PLANTING METHOD

A. The Contractor shall excavate plant pits, furnish and place all plants, and then maintain them in a satisfactory manner until final acceptance.

B. All pits shall be of size and shape as shown on the Drawings.

C. For tree and shrub planting, soil used for backfilling shall be improved topsoil as recommended by soil analysis, with the following additions:

1. For deciduous plants use a mixture of four parts topsoil and one part of manure.
2. For evergreen plants use a mixture of four parts topsoil and one part of peat moss as specified under Soil Enrichers.

D. Plant pits within or near paved areas shall be prepared prior to the laying of the pavement. Where tree pits in paved areas are to be covered with mulch, trees shall be placed at sufficient depth below finished grade to allow for the depth of the mulch.

E. 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 is established. Each plant shall be planted in the center of the pit. When balled, burlapped and platformed plants are set, the platform shall first be removed from the pit and the soil shall be carefully tamped under and around the base of each ball to fill all voids. All burlap, ropes, and wires shall be removed from the sides and tops of balls, but no burlap shall be pulled out from under the balls, except for plastic burlap, which shall be completely removed from the pit.

F. All seals shall remain unbroken and visible on plant material until final inspection by Engineer. The Contractor shall remove all seals immediately after final inspection.

3.9 PLANTING SEASON

A. Do all planting work within the dates herein specified.

3.10 PRUNING, PAINTING, SPRAYING

A. Pruning:

1. Each tree and shrub planted shall be pruned to preserve the natural character of the plant and in a manner appropriate to the particular requirements of the landscape design. In general, approximately one third of the wood shall be removed by thinning or shortening branches, but no leaders shall be cut.
2. All pruning shall be done with sharp tools. All pruning cuts shall be made flush and clean, especially where lower branches have been removed from collected trees.

B. Painting:

1. Pruning cuts over one-half inch in diameter shall be painted with tree paint specified under "Materials" on all exposed cambium as well as other exposed living tissues.

3.11 STAKING

A. All staking shall be done immediately after wrapping. Stakes shall be driven perpendicular into the ground around the periphery of the ball of the tree. Plants shall stand plumb after staking.

3.12 WATERING

A. Plantings shall be watered in a satisfactory manner during and immediately after planting, not less than twice per week, until provisional acceptance.
B. Suitable water for maintaining plants shall be provided by the Owner. The Contractor shall furnish the hose and hose connections from the outlets where water is furnished. Contractor is responsible for all watering until provisional acceptance.

3.13 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted. Plants shall be watered, mulched, weeded, fertilized, cultivated and otherwise maintained and protected until provisional acceptance.
B. Guys shall be tightened and repaired. Defective work shall be corrected as soon as possible after defects become apparent, and weather and season permit.

3.14 TREE SURGERY

A. Existing trees shall be trimmed of all dead and diseased limbs at the direction of the Engineer. All cuts shall be made close to the trunk and those over one inch in diameter shall be covered with an acceptable tree paint manufactured for this specific purpose. In the case of important large trees where a small amount of cavity work would prolong their lives, such work should be done. The services of a qualified tree surgeon are recommended.

3.15 INSPECTION AND PROVISIONAL ACCEPTANCE

A. The Engineer will inspect all planting work for provisional acceptance upon request of the Contractor.
B. The Contractor shall furnish full and complete written instructions for maintenance of the planting to the Owner at the time of provisional acceptance.
C. After all necessary corrective work has been completed and maintenance instructions have been received by the Owner, the Engineer will certify in writing the provisional acceptance of the planting.

3.16 GUARANTEE PERIOD

A. All plants shall be guaranteed by the Contractor for a period of not less than one full year from time of provisional acceptance.
B. At the issuance of provisional acceptance, the Owner shall take over maintenance of the planting. Nevertheless, the guarantee of all plant material will remain with the Contractor. The Contractor shall ascertain that the Owner properly waters and maintains all planting during the one year guarantee period.
C. At the end of the guarantee period, any plant that is missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by the Engineer, shall be

replaced. In case of reasonable doubt or question regarding the condition and satis- factory establishment of a rejected plant, the Engineer may allow such a plant to remain through another complete growing season, at which time the rejected plant, if found to be dead, in an unhealthy or badly impaired condition, shall be replaced at once. The Contractor will not be required to replace an inspected and accepted plant more than once.

D. Replacements shall be plants of the same kind and size as specified in the Plant List. They shall be furnished and planted as specified herein. The cost of replacement shall be borne by the Contractor, except where it can be definitely shown that loss resulted from Owner's failure to maintain planting as instructed.

3.17 FINAL INSPECTION AND FINAL ACCEPTANCE

A. At the end of the guarantee period, inspection will be made by the Engineer, at the request of the Contractor.

B. After all necessary corrective work has been completed, the Engineer will certify in writing the final acceptance of the planting.

3.18 CLEAN UP

A. Upon completion of work under this section, all excess stones, debris and soil resulting from planting work shall be removed from project site. The site shall be restored to a better condition than was present prior to construction.

END OF SECTION

SECTION 02510

CEMENT CONCRETE SIDEWALKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: This work shall consist of the construction of new fiber-reinforced cement concrete sidewalks and driveways in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Engineer.

B. Related Work Specified Elsewhere: (When Applicable) Earthwork, aggregate base and subbase, bituminous concrete paving and granite curbs are specified in the appropriate sections in this Division.

1.2 RELATED DOCUMENTS

A. State of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges, latest edition, herein after referred to as MassDOT Specifications.

1.3 QUALITY ASSURANCE

A. Materials: Use only materials furnished by a bulk cement concrete producer regularly engaged in the production of Portland cement concrete.

B. Submittals: A certificate of compliance shall be furnished to the Engineer that the materials supplied comply with the specification requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The Portland cement concrete shall conform to the requirements of AASHTO M85 Type II with a moderate heat of hydration and with the following exceptions:

1. The autoclave expansion shall be limited to a maximum of 0.20 percent.
2. There will be no requirements for tensile strength.

Only one brand of cement shall be used on any one contract unless otherwise permitted, in writing, be the Engineer.

B. The ¾-inch thick 4,000 psi rated aggregate fiber for reinforcement shall conform to the requirements of ASTM C1116.

C. The welded wire fabric for reinforcement shall conform to the requirements of AASHTO M55-73, unless otherwise specified.

D. The pre-molded expansion joint material shall be non-extruding and resilient bituminous type and shall conform to the requirements of AASHTO M213.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation shall be to the depth and width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm even surface

conforming to the section shown on the plan. All soft and yielding material shall be removed and replaced with acceptable material.

3.2 FORMS

A. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be true, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.3 PLACING CONCRETE

A. The foundation shall be thoroughly moistened immediately prior to placing the concrete. The proportioning, mixing and placing of the concrete shall be in accordance with good construction practices, as stated in the requirements of the MassDOT specifications.

3.4 FINISHING

A. The surface shall be finished to produce a broom like pattern.
B. No plastering of the surface with mortar will be permitted.

3.5 JOINTS

A. Joints shall be located as shown on the plans. Slabs shall be placed alternately and the joints coated with an approved bituminous material before placing the adjacent slab.
B. When a concrete sidewalk is constructed adjacent to a curb, building, retaining wall, light pole base or other fixed structure, a 1/4-inch-thick pre-molded joint filler shall be used between the slab and the structure.

3.6 CURING

A. Concrete shall be cured for at least 72 hours. Curing shall be by moist burlap or mats, white pigmented curing compound or by other approved methods. During the curing period, all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as may be directed.

END OF SECTION

SECTION 02513

BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Furnish all plant, labor, equipment and materials required to install bituminous concrete pavement courses, including sidewalks, driveways, temporary and permanent trench paving and restoration of pavement markings as shown on the Drawings and as specified herein.
   2. Remove bituminous asphaltic and/or Portland cement pavement, and replace bituminous asphaltic pavement, base, binder courses and surface courses, including temporary pavement, within the area(s) shown on the Drawings and as directed by the Engineer.
   3. Keep pavement removal to a minimum width suitable for the required construction.
   4. Apply pavement markings to the permanent paving as specified.

B. Work Not Included: Removal and replacement of paving for the convenience of the Contractor will not be considered for payment.

C. Related Work Specified Elsewhere (When Applicable):
   1. Excavation, backfill, aggregate base and subbase in Division 2.
   2. Pavement markings in Section 02577.

1.2 QUALITY ASSURANCE

A. Materials: Use only materials furnished by a bulk bituminous concrete producer regularly engaged in the production of hot mixed, hot laid bituminous concrete.

B. Equipment: Provide, maintain and operate pavers, dump trucks, tandem, 3-wheel and pneumatic tired rollers well suited to the mixtures being placed. Provide, maintain and operate hand equipment as required. When applicable, provide, maintain and operate trimming equipment and materials.

C. Mix Requirements, Method of Placement and Compaction: The Commonwealth of Massachusetts, Department of Transportation Standard Specifications - Highways and Bridges, 1988 hereinafter called Massachusetts D.O.T. Standards, for mixing, placing and compacting bituminous concrete surfaces are applicable to this work.

1.3 SUBMITTALS

A. A certificate of compliance shall be furnished to the Engineer that the materials supplied comply with the specification requirements.

B. Delivery slips shall be furnished with each load of mix delivered to the project. Information shall include:
   1. Vehicle identification.
   2. Date.
   3. Project.
   4. Identification of material.
   5. Gross, tare and net weights.
   6. Signed by the bituminous concrete producer.
   7. Stamped by a licensed public weighmaster.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Class 1 Bituminous Concrete.

1. General - These mixtures shall be composed of mineral aggregate, mineral filler, if required, and bituminous material.
2. Composition of the mixture - The mineral aggregates, filler, if required, and bituminous material shall be proportioned and mixed as hereinafter specified to conform with the composition by weight tabulated in Table A, herein. Sufficient approved mineral filler shall be used to correct any deficiencies in grading of fine aggregate.
3. Job Mix Formula - The composition limits in Table A are master ranges for the development of Hot-Mix (HMA) job-mix formulas (JMFs). In order to obtain standard texture, density and stability, the Contractor will furnish to the Engineer a specific job-mix formula for the particular uniform combination of materials and sources of supply to be used on each project. The job-mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of performance graded asphalt binder (PG binder) (liquid asphalt) to be added to the aggregate and for batch plants, the number of seconds for dry mixing time and the number of seconds for wet mixing time. AASHTO T 195 (Ross Count) with a coating factor of 98% will be used when necessary to evaluate proper mixing time. The job-mix formula shall specify a single consistent source of aggregate for an entire calendar day.
    a. For this contract, the following HMA mix formulas shall be used:
        1. Temporary Pavement and Binder Course: HMA Base/Intermediate Course
        2. Leveling/shim Course: HMA Dense Mix
        3. Surface Course: HMA Standard Top Course
    b. The use of reclaimed materials will be permitted at the option of the Contractor and provided that the end product is in conformance with the designated job-mix formula. The proportion of reclaimed materials (including reclaimed asphalt pavement (RAP), processed glass aggregate (PGA), and manufactured asphalt shingles (MAS)) in the total mix shall be limited to a maximum of 40% for drum mix plants and 20% for modified batch plants. The maximum amount of RAP for surface courses shall be 15%, except no reclaimed materials will be allowed in the open graded friction course (OGFC). The use of PGA or MAS is not allowed in surface courses.
    c. Two or more job-mix formulas may be approved for a particular plant; however, only material conforming to one job-mix formula will be permitted to be used on any given calendar day. The job-mix formula shall bind the Contractor to furnish paving mixtures not only within the master ranges, but also conforming to the exact formula thus set up for the project, within the engineering limits in Table B:

Table A
Specifications for Hot Mix Asphalt
Percent by Weight Passing Sieve Designation

Sieve Designation and % Binder (Liquid Asphalt) Content	HMA Base/ Intermediate. Course -Binder	HMA Surface Course – Standard Top	HMA Leveling Course - Dense Mix
2 inches			
1 inch	100		
¾ inch	80 - 100		
5/8 inch		100	
½ inch	55 - 75	95 - 100	100
3/8 inch		80 - 100	80 - 100
No. 4	28 - 50	50 - 76	55 - 80
No. 8	20 - 38	37 - 49	48 – 63
No. 16		26 - 40	36 – 49
No. 30	8 - 22	17 - 29	24 – 38
No. 50	5 - 15	10 - 21	14 – 27
No. 100		5 - 16	6 – 18
No. 200	0 - 5	2 - 7	4 – 8
Binder (Liquid Asphalt)	4.5 - 5.5	5.6 - 7.0	7.0 – 8.0

- Percentages shown in table above for aggregate sizes are stated as proportional percentages of total aggregate for the mix.
- Unless authorized by the Engineer, no Job-Mix Formula will be approved which specifies:
- Less than 6% binder (liquid asphalt) for HMA Surface Course – Standard Top.

Table B
Engineering Limits for HMA Aggregate Gradation and PG Binder Content

Sieve Designation / Binder Content	Engineering Limit for OGFC	Engineering Limit for all other mixes
Passing No. 4 sieve and larger sieve sizes	JMF Target ± 5%	JMF Target ± 7%
Passing No. 8 to No. 100 sieves (inclusive)	JMF Target ± 3%	JMF Target ± 4%
Passing No. 200 sieve	JMF Target ± 1%	JMF Target ± 2%
Binder	JMF Target ± .3%	JMF Target ± 0.4%

4. Asphalt cement shall be:
   AC-5
   AC-10
   AC-20
   AC-40
   a. Should a change of sources of materials be made, a new job mix formula shall be established by the Contractor before the new material is used. When unsatisfactory results or other conditions make it necessary, the Engineer may establish a new job mix formula.
   b. The aggregate will be accepted in stockpile at the plant site. The bituminous material will be accepted on certification.
   c. If the Contractor elects to furnish bituminous concrete from more than one plant, the job mix formula must be adhered to by all plants.

B. Mineral Filler:
   1. Limestone dust, Portland cement, or other inert material complying with ASTM D 242 or AASHTO M 17.

C. Emulsified type, Grade RS-1, CRS-1, HFMS-1, CSS-1, CSS-1h

E. Pavement markings shall meet the requirements in Section 02577 Bituminous Pavement Markings.

PART 3 - EXECUTION

3.1 GENERAL

A. Grade Control:
   1. The Contractor shall establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.

B. Trench areas shall receive initial paving as the work progresses where trenches are in paved streets. Not more than 300 linear feet of backfill trench shall be left unpaved.

C. Reset all existing manholes to finished grade as required at no additional cost to the Owner.

3.2 PAVEMENT REMOVAL

A. General:
   1. Exercise extreme care in the removal of pavement so that pavement will not be unnecessarily disturbed or destroyed.
   2. Mechanically cut pavement to be removed to a straight line, unless otherwise directed by the Engineer.

3.3 SURFACE PREPARATION

A. Tack coats shall conform to the Mass. D.O.T. Standard Specifications.

B. Tack Coat
   1. The existing surface shall be cleaned of all foreign matter and loose material and shall be dry before the tack coat is placed.
   2. All pavement surfaces shall be tack coated immediately prior to placing each HMA lift. HMA placed over milled surfaces shall be tack coated at an application rate of 0.07 gallons per square yard. HMA placed over smooth pavements (unmilled) shall be tack coated at an application rate of 0.05 gallons per square yard.

3.4 PLACING THE MIX

A. General:

1. Place asphalt concrete mixture on prepared surface. Minimum allowable temperature for placing is 250°F. Maximum shall be 325°F. Place in areas inaccessible to paving machine and small areas by hand. Place each course to required grade, cross-slope and compacted thickness.

B. Protection:

1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened to the extent that the pavement will not be damaged.

3.5 PAVEMENT MARKINGS

A. Material, approved by the Engineer, is to be furnished and applied after the installation of permanent paving.

B. Apply pavement markings in accordance with existing markings. Match paint color, marking dimensions, layout and other details with existing markings in the vicinity of the project.

END OF SECTION

SECTION 02525

GRANITE CURBS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: This work shall consist of furnishing and installing curb or edging, or removing and relaying existing curbing or edging in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Engineer. The types of curbs are designated as follows:

Type 5 - Vertical granite curb

Type 5 - Sloped granite edging

B. Related Work Specified Elsewhere: Excavation, Aggregate Base and Subbase, and Bituminous Concrete Paving are specified in the appropriate Sections of this Division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. The stone for curbing and edging shall be hard, durable, quarried granite.
2. It shall be gray in color, free from seams, cracks or other structural defects and shall be of smooth splitting character.
3. The curb may contain natural color variations that are characteristic of the granite source.
4. The dimensions, shape and other details shall be as shown on the Drawings.

B. Source:

1. The Contractor shall submit for approval the name of the quarry which is the proposed source of the granite for curb materials.
2. Samples shall be submitted for acceptance by the Engineer when requested.

C. Finish and Surface Dimensions:

1. Vertical Curb, Type 5:
   a. The individual curb stones shall conform to the dimensions indicated on the Drawings and the MassDOT Standard Specification Section M9.04.
   b. Individual stones shall be furnished in minimum lengths of 6 feet, unless otherwise specified.
   c. The exposed face of the stone curb shall be free from indications of drill holes. Half drill holes not larger than 3/4 inches diameter will be permitted in the arris line in the plane of the back.
   d. The top surface shall be sawed or dressed to an approximately true plane with no depression or projection on that surface of over 1/8 inch.
   e. The top front arris line shall be pitched straight and true with no variations from a straight line greater than 1/4 inch.
   f. The top back arris line shall meet the same requirement as the top front arris except that indentations of a maximum of 3/8 inch will be allowed.
   g. There shall be no projection or depression on the back face which would exceed a batter of 1 horizontal on 3 vertical for a distance from the top of 3 inches.

h. The front face shall be at right angles to the top and shall be smooth split and have no projections greater than one inch or depressions greater than 1/2 inches, measured from the vertical plane of the face through the top arris line, for a distance down from the top of 8 inches. The remainder of the face shall have no projections or depressions greater than one inch measured in the same manner.

i. The ends of the curb shall be approximately square with the planes of the top, back and face and so finished that when the sections are placed end to end with the required minimum spacing of 1/4 inch no more than 5/8-inch space shall show in the joint for the full width of the top surface and for the entire exposed front face. The remainder of the end may extend back no more than 8 inches from the plane of the joint.

j. The bottom surface may be sawn or split.

k. Drill holes through the curb will be allowed providing they are at least 9 inches below the top and are mortared full with Portland cement mortar before placing the stone.

1. When curbing is specified on the Drawings with a radius of 60 feet or less, it shall be cut on the specified radius.

2. Sloped Edging, Type 5:

a. The individual curb stones shall conform to the dimensions indicated on the Drawings and the MassDOT Standard Specification Section M9.04.

b. Individual stones shall be furnished in minimum lengths of two (2) feet, unless otherwise specified.

c. The exposed face shall be smooth split to an approximate true plane having no projections or depressions which will allow over one (1) inch to show between a two (2) foot straightedge and the face when the straightedge is placed as closely as possible on any part of the face.

d. Half drill holes not more than three (3) inches in length and 3/4 inch in diameter will be permitted along the bottom.

e. The arris line, top front shall be straight and true with no variation from a straight line greater than 1/8 inch.

f. The arris lines at the bottom of the face shall be straight and true so that not over one (1) inch shall show between the stone and a straightedge for the full length of the stone.

g. The ends shall be square to the length at the face and so finished that when the stones are placed end to end, no space more than 1 1/2 inches will show in the joint for the width of the face.

h. When sloped edging is specified on the Drawings with a radius of thirty (30) feet or less, it shall be cut on the specified radius.

3. Terminal curb, Type 1: Shall meet the requirements of Vertical Curb, Type 1 as contained herein.

D. Joint Mortar:

1. Shall consist of one (1) part portland cement and two (2) parts sand and mixed with sufficient water to form a plastic composition.

2. The portland cement shall conform to AASHTO M85, Type II-A.

3. The sand shall consist of the following gradation:
   100% Passing the No. 8 sieve
   15-40% Passing the No. 50 sieve

0-10% Passing the No. 100 sieve
0-5% Passing the No. 200 sieve

E. 3,000 psi Concrete Materials
   1. Portland cement: ASTM C150; Type II. Tricalcium Aluminate (C_3A) content in cement less than 8%. Cement shall be furnished from one source during the project.
   2. Aggregates:
      a. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specification C-33.
      b. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM Specification C-33.
   3. Water: Potable from municipal water supply or shall meet the requirements of ASTM C1602.

PART 3 - EXECUTION

3.1 REMOVAL OF CURBING

A. The Contractor shall carefully remove, store and clean curb specified on the Drawings or designated for resetting.
B. Curbing damaged or destroyed, as a result of the Contractor's operations or because of his failure to store and protect it in a manner that would prevent loss or damage, shall be replaced with curbing of equal quality at the Contractor's expense.

3.2 EXCAVATION

A. Excavation shall be made to the required depth and base material upon which the curb is to be set shall be compacted to a firm, even surface.
B. All soft and unsuitable material shall be removed and replaced with suitable material which shall be thoroughly compacted.

3.3 INSTALLATION

A. The curb and sloped edging shall be set so that the front top arris line is in close conformity to the line and grade required.
   1. Shall conform to ACI 305 for placement of concrete in cold weather and to ACI 306 for placement of concrete in hot weather.
B. The curb and sloped edging shall be set so that the front top arris line is in close conformity to the line and grade required.
C. All space beneath the curbing shall be filled and thoroughly tamped with material meeting the requirements of the bed course material.

3.4 JOINTS

A. The required spacing between stones shall be a minimum of 1/4 inch and a maximum of 5/8 inch for Type 1 curb.
B. The required spacing between stones shall be a maximum of 1/2 inch for Type 5 curb.
C. Joints between stones shall be carefully filled with mortar along the back portion of the joint to prevent loss of backfill material.

3.5 BACKFILLING

A. After the joints have set, any remaining excavated areas shall be filled and tamped with approved material placed in eight (8) inch layers.

END OF SECTION

SECTION 02527

BITUMINOUS CONCRETE CURBS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. This work shall consist of constructing a hot-mixed, hot-laid bituminous concrete curb on a completed bituminous surface in accordance with these Specifications and within reasonable close conformity to the lines and grades shown on the Drawings or established by the Engineer.

B. Related Work Specified Elsewhere:
   1. Section 02513, Bituminous Concrete Paving.

1.2 QUALITY ASSURANCE

A. Use only materials which are furnished by a bulk bituminous concrete producer which is regularly engaged in production of hot-mix, hot laid bituminous concrete and approved for use by the MassDOT.

1.3 SUBMITTALS

A. Certificates:
   1. Provide certificates in lieu of laboratory test reports.
   2. Certify that materials comply with Specification requirements.
   3. Signed by bituminous concrete producer and Contractor.

1.4 JOB CONDITIONS

A. Weather Limitations:
   1. Bituminous concrete curbs shall not be placed on a wet surface.
   2. Construct between the dates of May 1 and November 22, and then only when the air temperature in the shade is 40°F or above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for bituminous concrete curbing shall be as required in Section M3 of the State of Massachusetts Department of Transportation's "Standard Specifications for Highways and Bridges," latest version.
   1. The bituminous concrete curbing shall meet the requirements of the HMA Dense Mix.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Conditioning of the Existing Surface:
   1. Thoroughly clean of all objectionable material.
   2. Apply a light tack coat of 0.08 to 0.20 gallons per fifteen linear feet of curb area.

B. Equipment:
   1. The curb shall be placed by an approved power operated extruding type machine using the shape mold called for. A tight bond shall be obtained between the base and the curb. The Engineer may permit the placing of curbing by other than mechanical curb placing machines when short sections or sections with short radii are required. The resulting curbing shall conform in all respects to the curbing produced by the machine.

C. Placing:
   1. Place mix at temperature between 275 -325°F.
   2. Where conditions necessitate joints in curb, they shall be constructed to ensure bond between old and new sections of the curb. Prior to placing the new curb material, the old joint shall be tack coated.

D. Curing:
   1. Protect from traffic until the heat of the mix has dissipated and the mix has obtained the proper hardness.

E. Backfilling:
   1. Backfill as soon as possible after mix has obtained the proper degree of hardness.

END OF SECTION

SECTION 02577

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. This work shall consist of providing final reflective pavement lines and markings during paving operations to match existing conditions and/or as shown on the plans. It shall also consist of providing temporary pavement markings during construction.

PART 2 - PRODUCTS

2.1 MATERIALS -PAINT

A. For existing pavement marking applications, paint shall conform to Massachusetts Highway Department (MHD) specifications for Thermoplastic Reflectorized White Paint M7.01.03 and Thermoplastic Reflectorized Yellow Paint M7.01.04.

B. For new roadway construction, paint shall conform to Massachusetts Highway Department (MHD) Engineering Directive E-05-003, dated June 16, 2005 and to MHD specification Section 860.

C. Glass spheres (beads) used to reflectorize paint shall conform to MHD specifications Glass Beads M7.01.07.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor is to replace all pavement markings disturbed by the construction.

B. For existing pavement marking applications, pavement markings shall be placed in conformance with MASSDOT Standard Section 860.

C. For all new roadway construction, pavement markings shall be placed in conformance with MASSDOT Engineering Directive E-05-003, dated June 16, 2005.

D. Markings shall be applied only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free from sand, grease, oil or other foreign substances prior to application. Paint and pavement marking material shall be heated to the Manufacturer's recommended temperature. Ambient air temperature shall be a minimum of 45^{o}F and rising.

E. The paint shall be applied at the rate of between 300 and 350 linear feet per gallon for four (4) inch wide stripes and the glass spheres (beads) shall be applied by the drop-on method at the rate of six (6) pounds to each gallon of paint. Beads applied to reflectorized paint pavement arrows may require an increased application rate. The beads shall be distributed in even application over the entire paint surface.

F. The paint shall be done in a workmanlike manner, with lines well defined and without deviations. When repainting existing lines, the new line shall follow the exact pattern of the old lines and when new measurements are necessary, they shall be exact.

G. The Contractor shall provide all materials, equipment, labor, protective devices, and warning signs necessary to the safe and efficient performance of the work and the safety of the traveling public.

H. Contractor is to protect pavement markings from traffic until markings are sufficiently dry.

I. Traffic markings must be restored by end of day, either after removal or paving. Temporary markings are allowed.

END OF SECTION

SECTION 02578

LOOP DETECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. This work shall consist of providing loop detectors and lead-in wires in areas of resurfacing where the existing loops and lead-ins are removed due to excavation operations.

1.2 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.

B. Submit documentation including data sheets and shop drawings on the materials and methods to be used.

C. Submit other documents including data sheets and shop drawings as specified in the appropriate Sections of this Division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Loop wire shall be encased in a protected plastic tubing of PVC or polyethylene plastic, IMSA 51-5,0.25 inch outside diameter, and the wire may have cross-linked polyethylene insulation, or it may have THHN/THWN insulation.

B. Splicing insulator shall be an approved re-enterable rigid body splice kit with a non-hardening sealing compound compatible with the wire insulation.

PART 3 - EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall obtain an electrical permit from the City of Waltham Wire Inspector prior to construction. The CONTRACTOR shall notify the City of Waltham Wire Inspector 60 days prior to start of work. All traffic signal equipment and related items (such as pavement markings and signs) shall be in place and permission obtained from the City of Waltham Wire Inspector prior to the traffic signal being turned on stop and go operation.

B. In advance of the loop detector installation, the CONTRACTOR shall mark, on site, the loop detectors with any changes required by field conditions such as manholes. The loop detector layout shall be inspected and approved by the OWNER before the loop detectors are installed.

3.2 INSTALLATION

A. Splice and Connection: Splicing and connection shall be made in the pull box nearest the roadway loop sensor, but not exceeding four loops per pull box. All loops included in a detector group shall be spliced in a single pull box. Each lead and lead-in connector shall be stripped back and spliced using a pressure type wire connector applied with a crimping tool.

B. Lead-in splicing shall be staggered to prevent contact with each other. Each crimped splice shall be soldered and insulated. The insulation material shall be heat-shrinked polyolefin. The shielded lead-in cable outer jacket and shield shall be stripped back sufficiently to ensure that the shield cannot come into contact with the spliced conductors. Follow the instructions of the kit manufacturer for this procedure when installing the re-enterable splice kit.

C. The above splice shall be done on the day of the loop wire installation to prevent the entrance of any moisture into the plastic tubing.

D. The lead-in conductors shall be connected to the appropriate terminals in the controller cabinet, by using crimped or soldered terminal ends. The heat source for soldering shall be electrical not exceeding 30W capacity.

3.3 TESTING

A. The following test procedure shall be performed in the presence of the OWNER before and after the loop sensor is sealed in the pavement as detailed below.

B. After installation of wire loop sensors in the roadway and installation of shielded lead-in connecting the loop sensors to the controller cabinet each loop sensor and lead-in combination shall be tested (at the controller cabinet) for proper installation. The resistance from lead to lead of the same loop shall not exceed three ohms per one thousand feet as measured by a high-quality meter suitable for measurements of low resistance in the range of 1 to 6 ohms.

C. A megohm meter test at 500 volts DC shall be made between the two leads of a loop/lead-in combination temporarily spliced together, but otherwise disconnected from all terminals, and the shield drain wire and the earth ground connection. These resistances shall be at least one hundred megohms. A megohm meter test at 500 volts DC shall be made between lead-in shield and the earth ground rod. This resistance shall be at least one hundred megohms.

D. The meter used for these tests shall be checked for calibration each day of use by using a resistor block of plus or minus 5% resistors simulating loads of 1 megohm, 20 megohm and 100 megohms. The observed meter reading shall be plus or minus 10% of the nominal resistor load.

E. If any loop sensor and lead-in combination fails to pass any one of the four tests, it shall be repaired and then re-tested on two occasions at least two weeks apart and then shall pass on each re-test occasion. If the loop sensor lead-in combination does not pass all these re-tests, a new loop sensor and/or lead-in shall be installed, and shall pass these tests, at no additional cost.

F. After the above tests have been satisfactorily completed, all loop sensor/shielded lead-in inductance shall be measured and a written report of the results shall be filed with the OWNER and a copy stored with the “box prints” at the intersection.

END OF SECTION

SECTION 02601

MANHOLES, COVERS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere (when applicable):
   1. Final sewer testing is specified in this Division.
   2. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Manhole Base, Barrel and Top Sections:
   1. Conform to ASTM C478-97 except as modified herein, and on the Drawings.
   2. Average strength of 4,000 psi at 28 days.
   3. Testing:
      a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
      b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
      c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.

B. Frames and Covers:
   1. Acceptable Manufacturers:
      a. East Jordan Iron Works
      b. General Foundries Inc.
      c. Or equivalent.

C. Masonry:
   1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
   2. Cement: ASTM C-150.
   3. Hydrated Lime: ASTM C-207
   4. Sand: ASTM C144

D. Waterproofing:
   1. Acceptable Manufacturers:
      a. Karnak #220 AF Fibered Emulsion Dampproofing, Karnak Corp., Clark, NJ.
      b. PPS 922 Superseal, International Precast Supply.
      c. Or approved equal.

1.3 SUBMITTALS

A. Submit shop drawings and manufacturer's literature in conformance with Section 01340 and the Standard General Conditions of the Construction Contract.

B. Precast Manhole Sections: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

A. Dimensions, shall be as shown on the Drawings:
   1. Base & Riser Sections:
      a. Diameter: As shown on the Drawings.
      b. Length: As required.
      c. Wall Thickness: Not less than 5 inches.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
   2. Tops:
      a. Diameter: Eccentric cone type, 24 inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
      b. Length: 4 feet.
      c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
      e. Exterior face of cone sections shall not flare out beyond the vertical.
   3. Flat Slab Tops:
      a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
      b. Slab thickness: Not less than 6 inches.
      c. Constructed to support an HS-20-wheel loading.

B. Openings:
   1. Provide openings in the risers to receive pipes entering the manhole.
   2. Make openings at the manufacturing plant.
   3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
   4. Location: To permit setting of the entering pipes at the correct elevations.
   5. Openings shall have a flexible watertight union between pipe and the manhole base.
      a. Cast into the manhole base and sized to the type of pipe being used.
      b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
   6. Acceptable Manufacturers:
      a. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
      b. Kor N Seal made by National Pollution Control System, Inc.
      c. Press Wedge II made by Press-Seal Gasket Corporation.
      d. A-Lok Manhole Pipe Seal made by A-Loc Corporation.
      e. Or equivalent.

C. Joints:
   1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. Install a double row of joint sealants for every manhole joint. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
      Acceptable Materials:
      a. Kent-Seal No. 2
      b. Ram-Nek
      c. Or equivalent.
   2. Joints between precast sections shall conform to related standards and manufacturer's instructions.

D. Waterproofing:
   1. The exterior surface of all manholes shall be given two coats of waterproofing material at an application rate as recommended by the manufacturer.
   2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
   3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

2.2 FRAMES AND COVERS

A. Standard Units:
   1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
   2. Have machined bearing surfaces to prevent rocking.
   3. Castings shall be smooth with no sharp edges.
   4. Constructed to support an HS-20-wheel loading.
   5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
      a. Covers -solid with “SEWER” in 3-inch letters diamond pattern.
      b. Frame - 24-inch diameter clear opening, with flange bracing ribs.
   6. Minimum weight of frame and cover shall be 370 lbs.

B. Water Tight Units:
   1. Same features as above for Standard Units, with 22-inch diameter minimum clear opening.
   2. Sealing features:
      a. Inner lid held by a bronze tightening bolt in a locking bar.
      b. Neoprene gasket
      c. Water tight pick hole.
   3. Minimum weight of frame and cover shall be 510 lbs.

2.3 MASONRY

A. Brick:
   1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
   2. Immediately remove rejected brick from the work.

B. Mortar:
   1. Composition (by volume):
      a. 1 part Portland cement.

b. 1/2-part hydrated lime.
c. 4-1/2 parts sand.

2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.

C. Cement shall be Type II Portland cement.

D. Hydrated lime shall be Type S.

E. Sand:

1. Shall consist of inert natural sand.
2. Grading:

Sieve	Percent Passing
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Manhole Sections:

1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
2. Install riser sections and tops level and plumb.
3. Make all joints watertight.
4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.

B. Drop Manholes:

1. The difference in elevation between the invert of the inlet pipe and outlet pipe is to be either less than 6-inches (which does not require a drop manhole) or more than 24-inches (which does require a drop manhole).
2. Where difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe exceeds 24 inches, construct a drop manhole as shown on the Drawings or as directed by the Engineer.

C. Adjust to Grade:

1. Adjust tops of manholes to grade with brick masonry.
2. Concrete rings are not acceptable for adjusting to grade.

D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer.

E. Invert Channels:

1. After manhole and all pipes entering or exiting the manhole have been installed, construct the invert channels and shelf.

2. Channels to be smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
3. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
4. Stop the pipes at the inside face of the manhole where changes of direction occur.
5. Form invert channels and shelf with brick.
6. The maximum change in elevation from the invert of the inlet pipe to the invert of the outlet pipe is 6-inches. Shape invert to make smooth transition in vertical grade.
7. Slope the floor of the manhole (shelf) to the flow channel, as shown on the Drawings.

F. Masonry:
   1. Laying Brick:
      a. Use only clean bricks in brickwork for manholes.
      b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
      c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
      d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
      e. Outside faces of brick masonry shall be plastered with mortar from ¼-inch to 3/8-inch thick.
      f. Completed brickwork shall be watertight.
   2. Curing:
      a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
      b. Protect brick masonry from the weather and frost as required.

G. Frames and Covers:
   1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
   2. Completely fill all voids beneath the bottom flange to make a watertight fit.
   3. Place a ring of mortar at least one-inch-thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
   4. Clean the frame seats before setting the covers in place.

H. Plugging and Patching:
   1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
   2. Touch up damaged water proofing.

I. Cleaning:
   1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.

J. Bedding and Backfilling:
   1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
   2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

3.2 MANHOLE TESTING

A. General:
   1. Perform either a vacuum test on all manholes.
   2. All testing must be performed in the presence of the Engineer.
   3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.

B. Vacuum Test:
   1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling. Vacuum testing to be conducted prior to construction of invert channels.
   2. Plug all lifting holes completely with non-shrink grout.
   3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
   4. Install the testing equipment according to the manufacturer's instructions.
   5. A vacuum of 10 inches of HG shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is:
      a. Greater than 2 minutes for manholes less than 10-feet deep.
      b. Greater than 2.5 minutes for manholes 10 to 15-feet deep.
      c. Greater than 3 minutes for manholes more than 15-feet deep.
   6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.

C. Manhole Repairs:
   1. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
   2. The use of lead-wool or expanding mortar will not be permitted.

D. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manhole shall be repaired and the manhole made watertight.

END OF THE SECTION

SECTION 02610

PIPE & PIPE FITTINGS FOR BURIED APPLICATIONS - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish, install, support, and test pipe and pipe fittings of the type and size and in the location shown on the Drawings and as specified herein.

B. Work and materials shall be performed in accordance with the State Plumbing Code when work is within ten (10) feet of buildings.

C. Related Work Specified Elsewhere:

1. Summary of Work: Section 01010
2. Submittals: Section 01340
3. Sewer Flow Control: Section 02751
4. Sanitary Sewer Cleaning: Section 02752
5. Television Inspection of Pipes: Section 02753
6. Final Pipe Testing: Section 02755
7. Excavation and backfill, and dewatering are specified in the appropriate sections in this Division.

1.2 SUBMITTALS

A. Submit shop drawings in accordance with Section 01340 and the General Conditions of the Construction Contract.

B. Submit manufacturer's "Certification of Conformance" that pipe and fittings and other piping appurtenances meet or exceed the requirements of these Specifications.

1.3 DELIVERY, STORAGE AND HANDLING

A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.

B. Do not drop pipe and fittings.

C. Handle and store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as required by the Engineer.

D. Assure that materials are kept clean and dry.

E. Do not store materials directly on the ground.

F. Follow manufacturer's specific instructions, recommendations and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials are specified in the following Sections of this Division.

B. All materials used in the work must be certified "lead free".

PART 3 - EXECUTION

3.1 INSPECTION

A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.

B. Carefully inspect all materials at the time of delivery and just prior to installation for:
   1. Defects and damage.
   2. Deviations beyond allowable tolerances for joint dimensions.
   3. Removal of debris and foreign matter.

C. Examine areas and structures to receive piping for:
   1. Defects, such as weak structural components, which adversely affect the execution and quality of work.
   2. Deviations beyond allowable tolerances for pipe clearances.

D. All materials and methods not meeting the requirements of this Contract will be rejected.

E. Immediately remove all rejected materials from the project site.

F. Start work only when conditions are corrected to the satisfaction of the Engineer.

3.2 INSTALLATION

A. General:
   1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as specified herein.
   2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
   3. Install adaptors, acceptable to the Engineer, when connecting pipes constructed from different materials. Join PVC to cast iron fittings according to manufacturer’s instructions.

B. Installation in Trenches:
   1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
   2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
   3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
   4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
   5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
   6. Set the pipe true to line and grade.
   7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
   8. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
   9. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
   10. Take all necessary precautions to prevent floatation of the pipe in the trench.

11. Bedding and backfill for all pipe materials shall be as specified in Section 02200, and as shown on the Drawings.

C. Temporary Plugs:
   1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
   2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
   3. Do not use the pipelines as conductors for trench drainage during construction.

D. Sanitary Sewer Service Connections:
   1. Pipe material and installation information are specified respective other Sections of this Division.

3.3 CLEANING AND TESTING

A. All cleaning, CCTV inspection, and testing shall be performed as specified in Sections 02752 – Sewer Pipe Cleaning, Section 02753 – Television Inspection of Pipes, and Section 02755 – Final Sewer Testing.

B. New sanitary sewer: pre CCTV on existing sanitary sewer and post CCTV on the new sanitary sewer

END OF SECTION

SECTION 02615

DUCTILE IRON PIPE & FITTINGS (BURIED APPLICATIONS)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide and install ductile iron pipe and fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere:
   1. Pipe and Pipe Fittings - General is specified in the appropriate Section in this Division.
   2. Excavation, Bedding and Backfill are specified in this Division.
   3. Ductile Iron Pipe & Fittings for Interior Applications is specified in Section 15062.

1.2 QUALITY ASSURANCE

A. Standards (As Applicable):
   1. Cement-mortar lining for water: ANSI A2l.4 (AWWA C104).
   2. Rubber gasket joints: ANSI A2l.ll (AWWA C111).
   3. Ductile iron pipe thickness: ANSI A2l.50 (AWWA C150).
   4. Ductile iron pipe centrifugally cast in metal or sand lined molds: ANSI A2l.5l (AWWA C151).
   5. Pipe flanges and fittings: ANSI Bl6.l and ANSI A21.10 (AWWA C110).
   6. Threaded, flanged pipe: ANSI A21.15 (AWWA C115).
   7. Cast and ductile iron fittings: ANSI A2l.l0 (AWWA C110).
   8. Ductile Iron Compact Fittings: ANSI 21.53 (AWWA C153).

B. Acceptable Manufacturers:
   1. Tyler
   2. Griffin
   3. Union
   4. US Pipe
   5. Or equivalent.

1.3 DELIVERY, STORAGE & HANDLING

A. Exercise extra care when handling ductile iron pipe because it is comparatively brittle.

B. Exercise extra care when handling cement lined pipe because damage to the lining will render it unfit for use.

C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by wood lagging securely fastened in place.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. General:
   1. All exterior (buried) ductile iron pipe shall have push-on or mechanical joints unless otherwise specified or shown on the Drawings. Pipe within valve pits and other structures is considered interior pipe and shall be flanged.

2. Unless otherwise shown on the Drawings or in the pipe schedule, the minimum thickness of ductile iron pipe shall be:
   a. For pipe 4 inches in diameter and smaller: Class 51.
   b. For pipe 6 inches in diameter and larger: [Class 52 (water applications)]; [Class 50 (wastewater applications)].
   c. Pipe with flanges: Class 53.
3. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
4. Pipe shall be double thickness cement lined and seal coated unless noted otherwise on the Drawings, and except for air piping lines which shall be completely unlined.
5. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.
6. Factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless specified otherwise.
7. The outside of pipe within structures and exposed shall not be coated with bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 by Koppers Co.; Multiprime by PPG Industries; Chromox 13R50 Primer made by Mobil Chemical Co.; or equivalent.

B. Joints (as shown on Drawings or as specified):
   1. Push-on and Mechanical Joint:
      a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
      b. Provide gaskets manufactured from a composition material suitable for exposure to the fluid to be contained within the pipe. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40*F to 250*F.
      c. Bolts and nuts for buried mechanical joints shall meet the AWWA C-111 requirements and be made of high strength, low alloy steel.
   2. Joint Bracing:
      a. Provide joint bracing to prevent the piping from pulling apart under pressure as required and as shown on the Drawings.
      b. Types of bracing:
         i. Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with bituminous paint in buried installations and shall be coated with the same coatings as the piping system in interior installations after assembly or, if necessary, prior to assembly.
         ii. Mechanical joint follower gland pipe restrainers.
            (1) Ductile iron gland and restraining ring.
            (2) Gasket shall be standard MJ gasket-ANSI/AWWA-C111/A21.11.
            (3) Working pressure 350 psi, up to 8 inches; 250 psi, 10 inches to 16 inches.
            (4) Test pressure two times working pressure.
            (5) Grip Rings™, Romac Industries, or other equivalent as approved

by Engineer.

iii. Other types of bracing as shown on the Drawings.

2.2 FITTINGS

A. Standard Fittings:

1. Pressure rating of 350 psi for D.I. compact fittings and 250 psi for all others unless indicated otherwise on the Drawings or as specified.
2. Joints the same as the pipe with which they are used or as shown on the Drawings.
3. Cement lining and seal coat as specified for pipe.
4. Factory applied bituminous coatings shall be furnished for all underground fittings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
B. Carefully inspect all materials at the time of delivery and just prior to installation.
C. Carefully inspect all pipe and fittings for:
   1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
   2. Deviations beyond allowable tolerances for pipe clearances.
D. Immediately remove all rejected materials from the project site.

3.2 INSTALLATION

A. General:
   1. Install in strict accordance with the pipe and fitting manufacturer's instructions and recommendations and as specified or as shown on the Drawings.
   2. Concrete thrust blocks or other acceptable thrust resistant system is required at all fittings on pressure pipe. Where thrust blocks are used, these shall be placed against undisturbed soil or screened gravel compacted to 95 percent and shall be placed so that the joints are accessible for repairs.
B. Assembling Joints:
   1. Push-on Joints:
      a. Insert the gasket into the groove of the bell.
      b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
      c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.
   2. Bolted Joints:
      a. Remove rust preventive coatings from machined surfaces prior to assembly.
      b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
      c. After jointing coat all bolts with bituminous material compatible with the pipe coating required herein and/or in Section 09900.
   3. Mechanical Joints:
      a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
      b. Lubricate the gasket, bell, and spigot by washing with soapy water.

c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.
e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
   i. Range or Torque: 60-90 ft.-lbs.
   ii. Length of Wrench: l0 inches.
g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.

4. Bell and Spigot Joints:
   a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
   b. Insert the spigot firmly into place and hold securely until the joint has been properly completed.

C. Fabrication:
1. Tapped Connections:
   a. Make all tapped connections as shown on the Drawings or as required by the Engineer.
   b. Make all connections watertight and of adequate strength to prevent pullout.
   c. Drill and tap normal to the longitudinal axis of the pipe.
   d. Taps in fittings shall be located where indicated by the manufacturer for that particular type of fitting.
   e. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANS A2l.5l based on 2 full threads for ductile iron and 3 full threads for cast iron.
2. Cutting:
   a. Perform all cutting as set forth in AWWA C600.
   b. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.

D. Pipe Deflection:
1. Push-on and Mechanical Joints:
   a. The maximum permissible deflection of alignment at joints shall be limited to that given in AWWA C600.
2. Flexible Joints:
   a. The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 02622

POLYVINYL CHLORIDE (PVC) NON-PRESSURE PIPE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Provide and install PVC non-pressure pipe and fittings of the size(s) and type(s) and in the location(s) shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere: (When Applicable)
   1. Excavation and backfill, dewatering, pavement, borrow and bedding material, and cleaning and testing requirements are specified in the appropriate sections of this division.
   2. Pipe & Pipe Fittings - General is specified in Division 2.

1.2 QUALITY ASSURANCE

A. Manufacturers:
   1. Certain-Teed.
   2. J-M Manufacturing.
   3. Or equivalent.

1.3 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.

B. Submit manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these Specifications.

C. Submit other documents as specified in the appropriate Sections of this Division.

1.4 DELIVERY STORAGE AND HANDLING

A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets and other materials.

B. Carefully inspect all materials at the time of delivery and just prior to installation.

C. Carefully inspect all pipe and fittings for:
   1. Defects and damage
   2. Deviations beyond allowable tolerances for joint dimensions.
   3. Removal of debris and foreign matter.

D. Examine area and structures to receive piping for:
   1. Defects, such as weak structural components that adversely affect the execution and quality of work.
   2. Deviations beyond allowable tolerance for pipe clearances.

E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.

F. Immediately remove all rejected materials from the project site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pipe and Fittings:
   1. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM standard specification for PVC Sewer Pipe and Fittings, Designation D 3034 (SDR 35) (4" to 15").
   2. Straight pipe shall be furnished in lengths of not more than 14 feet.
   3. Saddles will not be allowed.

B. Joints:
   1. Joints for the polyvinyl chloride pipe shall be push-on joints using factory installed elastomeric ring gaskets.
   2. The gaskets shall be securely fixed into place by the manufacturer so that they cannot be dislodged during joint assembly.
   3. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and ground water, and which will endure permanently under the conditions of the proposed use.
   4. The joints shall conform to ASTM Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals, Designation D3212-76.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspection:
   1. Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight.
   2. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length.
   3. If a piece of pipe fails to meet this requirement for straightness it shall be rejected and removed from the site.
   4. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. Jointing:
   1. All pipe and fittings shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.
   2. Pipe and fittings shall be installed to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to insure true alignments and gradients.
   3. All joint surfaces shall be cleaned. Immediately before joining the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
   4. Each pipe unit shall than be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.
   5. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

C. Service Connections:
   1. All service connections to new pipe shall utilize a wye fitting.
   2. All service connections must enter the top half of the mainline pipe.
   3. Minimum size of the service connection shall be six (6) inches. The Contractor shall furnish and install the necessary fittings, adapters, and couplings to connect to existing sewer service lateral connection.
   4. The slope of the existing lateral toward the newly installed sewer main shall be maintained at the existing percent. For reconstructed laterals, a minimum slope of two percent or as specified by the Engineer is required.
   5. The Contractor shall permit the Engineer ample (at least 1 working day) time to obtain the exact location of each connection before it is covered up and shall furnish a man to assist.
   6. Connections which are covered before the Engineer has had time to obtain their location shall be exposed at the Contractor's expense, so that the location measurement can be taken.
   7.

D. Pipe Deflection:
   1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
   2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
   3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

E. Testing and CCTV Requirements:
   1. Clean and test pipe in accordance with appropriate sections of this division.
   2. CCTV as specified in Section 02610 – Pipe & Pipe Fittings –General.

END OF SECTION

SECTION 02626

COPPER SERVICE PIPE & FITTINGS (BURIED APPLICATIONS)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install copper pipe of the type and size and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. Seamless copper water tube, ASTM B88.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe use:
   1. American manufactured.
   2. Domestic Water (buried exterior).
      a. Type K, soft annealed.
      b. Minimum 1-inch diameter.

B. Fittings:
   1. Buried Fittings: “Lead free” compression fittings in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417 with BUNA-N gasket. Lead free fittings shall contain less than 0.25% lead on a weighted average, and installed using flux and solder containing not more than 0.2% lead.
   2. Acceptable manufacturer: Mueller Co., Decatur, IL. or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Jointing
   1. Packed on compression joints
      a. Cut pipe squarely.
      b. Ream or file pipe to remove burrs.
      c. Seat pipe in fittings and tighten nut.
   2. Adapters: Use as required to connect to existing services.

B. Bending Pipe
   1. Bend pipe by the method and to the radius to comply with the manufacturer's recommendations.
   2. Bend pipe with suitable tools to provide smooth bend free of any cracks or buckles.
   3. Provide "goose neck" in new services as shown on Drawings.

END OF SECTION

SECTION 02641

GATE VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish, install and test gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified.

B. The City of Waltham has standardized their gate valves around one manufacturer.

C. Related Work Specified Elsewhere:

1. "Valve Box" and "Ductile Iron Pipe & Fittings for Buried Applications" are specified in this Division.
2. "Valves and Specialties - General" is specified in Division 15.
3. "Gate Valves for Interior Applications" are specified in Division 15.

1.2 QUALITY ASSURANCE

A. All gate valves of same type and style shall be manufactured by one manufacturer.

B. Acceptable Manufacturers:

1. Mueller

PART 2 - PRODUCTS

2.1 MATERIALS

A. Waterworks type NRS valves (AWWA):

1. Valve Body, bonnet and stuffing box - Cast iron (ASTM A126, C1B), or Ductile iron (ASTM A536), coated inside and out with fusion bonded epoxy meeting AWWA C550. Face-to-face dimensions shall comply with ANSI B16.10 and flanges to comply with ANSI B16.1.
2. Resilient Wedge - Ductile iron wedge with bonded Nitrile elastomer covering.
3. Stem - Manganese bronze, ASTM B584
4. Stuffing box O-rings
   a. Two O-rings, each nitrile rubber.
   b. Capable of changing under pressure.
5. Wedgenut - Bronze, ASTM B62
6. Bolting - stainless steel Type 18-8, ASTM F593, GP1
7. End Connections
   a. Buried valves - mechanical joints
8. Operation
   a. Buried valves - 2-inch square nut, cast iron, ASTM A126, C1B
   b. Opening Direction – counterclockwise (Right)
9. Water working pressure: 250 psi
10. Standards - valves shall meet or exceed AWWA C509, latest edition.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install valves with stem position vertical.
B. Valve box vertical and centered over operating nut.
C. Valve box supported during backfilling and maintained vertical.
D. Install and test in accordance with AWWA C500 and AWWA C-509, latest revision.

END OF SECTION

SECTION 02642

CORPORATION STOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install corporation stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

B. The City of Waltham has standardized their corporation stops around one manufacturer.

1.2 QUALITY ASSURANCE

A. All corporation stops shall be manufactured by one manufacturer.

B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Constructed of "Lead free" brass in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417. Lead free fittings shall contain less than 0.25% lead on a weighted average, and installed using flux and solder containing not more than 0.2% lead.

B. Outlet shall be conductive compression connection for CTS O.D. tubing.

C. Inlet shall have AWWA (CC) standard thread.

D. Acceptable Manufacturers:

1. Mueller, Model H-15008N

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.

B. Check and adjust all corporation stops for smooth operation.

C. 1-inch service taps on a main 6-inches or smaller and 1 ½" – 2" service taps will require a saddle (double band type). 1-inch connections on mains 8-inches or larger shall be a direct tap.

END OF SECTION

SECTION 02643

CURB STOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install curb stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

B. The City of Waltham has standardized their curb stops around one manufacturer.

1.2 QUALITY ASSURANCE

A. All curb stops shall be manufactured by one manufacturer.

B. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.

C. Acceptable Manufacturers:

1. Mueller (Model H-15219N)

PART 2 - PRODUCTS

2.1 PRODUCT CONSTRUCTION

A. Constructed of "Lead free" brass in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417. Lead free fittings shall contain less than 0.25% lead on a weighted average, and installed using flux and solder containing not more than 0.2% lead.

B. Inlet and outlet shall be conductive compression connection for CTS O.D. tubing.

C. Quarter turn check with drain.

D. Open right.

E. Working pressure of 175 psi shall be required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install at locations shown on the Drawings and in accordance with manufacturer's instructions.

3.2 ADJUSTMENTS

A. Check and adjust all curb stops for smooth operation.

END OF SECTION

SECTION 02645

CURB BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install curb boxes of type (s) and size (s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. All curb boxes shall be manufactured by one manufacturer.

B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.

C. Acceptable Manufacturers:

1. A.Y. McDonald
2. Bingham & Taylor
3. Or equivalent.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION

A. Cast iron, tar coated, telescoping “Buffalo” type, cast iron lid, and threaded bronze plug with pentagon nut (Rope Thread).

B. 1/2" diameter stainless steel minimum, 30" stationary rod.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install as shown on the Drawings and/or as requested by the Engineer.

1. When installation is complete no pressure shall be exerted by the curb box on either the curb stops or the service pipe.

END OF SECTION

SECTION 02646

VALVE BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install valve boxes of type(s) and size(s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. All valve boxes shall be manufactured by one manufacturer.

B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.

C. Acceptable Manufacturers:

1. East Jordan Iron Works
2. Tyler Union
3. Bingham & Taylor
4. Or Equivalent

PART 2 - PRODUCTS

2.1 MATERIALS

A. The valve box shall be ductile iron, slip type two-piece integral base, 5-1/4 inch shaft. Top section with flanges.

B. Cast or Ductile iron, with the word "Water" cast in covers.

C. Belled Base Section.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation as shown on the Drawings and/or as specified herein.

1. When installation is complete, no pressure shall be exerted by valve box on the water main or on the valve.
2. Be of such length as required without full extension. Minimum lap 6 inches.

END OF SECTION

SECTION 02650

BURIED UTILITY MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. This work shall consist of providing and installing utility line markings above all buried lines installed as part of this contract and replacing existing markings disturbed as part of this contract. Buried utilities are indicated on the Civil and Electrical Drawings.

B. Related Work Specified Elsewhere:
   1. Pipe, excavation, backfill, insulation are specified in the appropriate Sections in this Division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.

B. Marking tape color shall be in accordance with latest American Public Works Association (APWA) Uniform Color Code and American National Standards Institute ANSI Standard Z535.1, Safety Color Code specifications for buried utility marking as noted in the Schedule below.
   1. Schedule

Marker Color	**Buried Utility**
Blue	Potable Water &Associated lines
Green	Sanitary Sewers, Storm Drain and other Drain lines
Orange	Telecommunication, signal, alarm
Purple	Reclaimed, Recycled, Irrigation Water and Slurry Lines
Red	Electric Power lines cables conduits and lighting cables
Yellow	Gas, Oil, Steam, Petroleum or Gaseous Material Lines

   2. Warning Information shall be in Black Letters with typical wording of:
      a. "CAUTION: BURIED (NAME OF UTILITY LINE) BELOW"

C. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility.

D. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.

E. Seton Identification Products, New Haven, CT, Utility Safeguard LLC or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Marking tape shall be installed over utility lines centerline and buried 24" below grade.

B. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF SECTION

SECTION 02655

COUPLINGS & CONNECTORS FOR BURIED APPLICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install couplings and connectors of the type and size in the location shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. Minimum pressure rating equal to that of the pipeline in which they are to be installed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All Couplings and Connectors:
   1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
   2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.

B. Sleeve Type Transition Couplings
   1. Buried Couplings:
      a. Ductile iron center sleeve and end rings made per ASTM A536, Grade 65-45-12.
      b. Two wedge-section virgin SBR rubber gaskets compounded for water service in accordance with ASTM D2000,
      c. Nuts and bolts shall be 304 Stainless Steel with Anti-galling protection.
      d. Acceptable Manufacturers:
         i. Dresser Style 153
         ii. Smith Blair Style 441
         iii. Or Equivalent

C. Solid Sleeve Couplings
   1. Solid sleeves shall be ductile iron with mechanical joint ends.
   2. Couplings shall meet AWWA/ANSI C-153/A21.53 and C-111/A21.11 for joints, and C-104/A21.4 for cement lining in sizes 3"-24".
   3. Nuts and bolts shall be ductile iron low alloy steel per ANSI/AWWA A21.11/C-111.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Sleeve Type Couplings:
   1. Thoroughly clean pipe ends a minimum of 12-inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.

2. Slip an end ring and gasket over each pipe and place the center sleeve centered over the joint.
3. Insert the other pipe length into the center sleeve the proper distance.
4. Press the gaskets and end rings evenly and firmly into the center sleeve flares.
5. Insert the bolts, finger tighten and progressively tighten diametrically opposite nuts uniformly around the adapter with a torque wrench applying the torque recommended by the manufacturer.
6. Insert and tighten the tapered threaded lock pins.

B. Install thrust rods, supports, and other provisions to properly support pipe weight and axial equipment loads.

END OF SECTION

SECTION 02675

CLEANING, TESTING AND DISINFECTION OF WATER MAINS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work of this section includes the furnishing of all labor, tools, equipment and materials and performing all operations necessary for the flushing, pressure testing, leakage testing and chlorination of water mains as specified herein and as required to complete the work.

1.2 QUALITY ASSURANCE

A. Standards (as applicable):
   1. All work shall be in accordance with this specification and AWWA C651. Where conflicts appear between these specifications and AWWA C651 the more stringent requirement shall apply.
   2. Chlorine solution for disinfecting water mains and appurtenances shall be made from either liquid sodium hypochlorite, or solid calcium hypochlorite, which shall conform to the latest AWWA B300 Standard for Hypochlorite.
   3. Chlorine test kits shall be as described in the current edition of AWWA M12 - Simplified Procedures for Water Examination.
   4. Disposal of chlorinated water as per AWWA C651, Appendix B.

1.3 COORDINATION

A. Use of water will only be as approved and coordinated by the Owner.

B. The Contractor shall employ an independent third party testing agency to conduct all flushing, pressure and leakage testing and chlorinating.

C. All flushing, pressure and leakage testing and chlorinating shall be done by the Contractor in the presence of the Engineer and in the presence of the Owner or Owner's Representative in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Each temporary blow-off shall consist of a corporation cock, type K copper tubing and a curb stop, each of not less than 1-inch diameter.

B. A pumping unit or proportionate feeder suitable for delivering a hypochlorite solution to the isolated main shall be provided. The unit used shall prevent chlorine solution from flowing back into the existing system.

PART 3 - EXECUTION

3.1 GENERAL

A. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.

B. Supply all labor, equipment, materials, gages, and pumps required to conduct the tests. The drawings do not detail taps, gages, plugs and other related materials required to perform testing. These materials are the responsibility of the Contractor.

C. Flushing, testing and chlorinating of the mainline shall closely follow main laying work. As the mainline is installed, it shall be tested approximately every 1,000 feet, or between line valves, whichever is less. Should the mainlines fail to be flushed, tested, and chlorinated as specified, the main laying work shall be suspended until the flushing, testing and chlorinating is done.

D. Final acceptance of the water main shall be based on successful (negative) results of bacteriological tests, which shall be done on samples taken from the main following chlorination and final flushing. Locations of samples shall be determined by the Engineer.

E. The testing and related procedures described herein, shall be performed in the order listed.

F. The Contractor, with the assistance of the Owner, shall fill mains as slowly as practicable so as not to cause dirty water and serious pressure drops within the existing system.

3.2 FLUSHING

A. All new water mains, and existing water mains that have been drained and cut-into for making connections, shall be thoroughly flushed prior to pressure or leakage testing or final chlorination. Flushing shall be accomplished by partially opening and closing valves, hydrants, and blowoffs, several times, under expected line pressure, with flow velocities of not less than 2.5 feet per second, in the main. The size and number of hydrant outlets and/or main taps to provide the required flow (at 40 psi residual pressure) is as follows:

Minimum Required Flow and Openings Required to Flush Water Mains
(Assuming 40 psi Residual Pressure in Water Mains)

Main Diameter (in.)	Flow Required to Produce 2.5 fps in Main (gpm)	Minimum Size of Taps (in.)	Hydrant Outlets	
			Number	Size (in.)
4	100	15/16	1	2-1/2
6	220	1-3/8	1	2-1/2
8	390	1-7/8	1	2-1/2
10	610	2-5/16	1	2-1/2
12	880	2-13/16	1	2-1/2
16	1565	3-5/8	2	2-1/2

1. If less than a 40 psi residual is available in the main, with the size tap shown above then a larger, or more tap(s) or hydrant outlets will be required, as determined by the Engineer.

2. The length of time for flushing, at or above the minimum allowable velocity, shall be computed to allow a minimum of 3 times the total volume of water in the main to be flushed to waste. Flushing shall be done in the presence of the Engineer.

3.3 AIR REMOVAL

A. Following flushing, and before applying the specified test pressure, air shall be completely expelled from the mains, valves, and hydrants. After all air has been expelled, the air blowoffs can be closed, and the test pressure applied.

3.4 PRESSURE TEST

A. All new water mains, or any sections thereof, shall be subjected to a hydrostatic pressure of 200 psi. Test pressures shall meet the following requirements:
   1. Be of at least 2-hour duration.
   2. Not exceed main or thrust-restraint design pressures.
   3. Not vary by more than + 5 psi for the duration of the test.
   4. Not exceed 2-times the rated pressure of the valves or hydrants when the pressure boundary includes closed valves or hydrants. Valves shall not be operated in either direction at differential pressure greater than the rated pressure.
   5. Not exceed 1.5-times the rated pressure of the valves when the pressure boundary of the test section includes closed butterfly valves or resilient seated gate valves.

B. Each section of main shall be slowly raised to the specified test pressure for two separate periods. The first period shall be for 15-minutes, after which the pressure shall be allowed to drop slowly back to system pressure. The pressure shall then be slowly raised again to the specified test pressure and maintained for 2-hours. The test pressure shall be based on the elevation of the lowest point of the main, in the test section and shall be corrected to the elevation of the test gauge, as directed by the Engineer. The test pressure shall be applied by means of a pump connected to the main, in an approved manner, and which will prevent any backflow into the existing system. Valves shall not be operated in either the closing or opening direction, at differential pressure greater than the rated pressure.

C. Any exposed main, fittings, valves, hydrants and joints shall be carefully examined during the test. Any damaged or defective main, fittings, hydrants, or valves discovered following, or as a result of the pressure test shall be repaired or replaced with sound material. If faulty materials are removed and replaced, the pressure testing procedure shall be repeated.

3.5 LEAKAGE TEST

A. Leakage testing shall be conducted concurrently with the pressure test.

B. Leakage is defined as the quantity of water that must be pumped into the new main during the test, or any section thereof, required to maintain pressure within 5 psi of the starting test pressure. Leakage shall be recorded to the nearest one-tenth of a gallon. The Contractor shall employ qualified personnel throughout the testing. Leakage shall not be measured by a drop in pressure over a period of time.

C. Leakage in the test section must be less than an amount determined as follows:

$$L = \frac{SD(P^{0.5})}{148{,}000}, \text{ where}$$

L = allowable gallons of leakage per hour

S = the length of main tested, in feet
D = the nominal main diameter in inches
P = the average test pressure during the test, in psi

D. The leakage formula is based allowable leakage of 11.65 gallons per day, per mile of main, per inch (nominal) of main diameter, at a pressure of 150 psi. Allowable leakage under various conditions is shown below.

Allowable Leakage (gph) per 1,000 Feet of Mainline

Average Test Pressure(psi)	Nominal Diameter (inches)						
	6	8	10	12	16	20	24
250	0.64	0.85	1.07	1.28	1.71	2.14	2.56
225	0.61	0.81	1.01	1.22	1.62	2.03	2.43
200	0.57	0.76	0.96	1.15	1.53	1.91	2.29
175	0.54	0.72	0.89	1.07	1.43	1.79	2.15
150	0.50	0.66	0.83	0.99	1.32	1.66	1.99
125	0.45	0.60	0.76	0.91	1.21	1.51	1.81
100	0.41	0.54	0.68	0.81	1.08	1.35	1.62

1. If the mainline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
2. When testing against closed metal seated valves, an additional leakage shall be allowed per closed valve of 0.0078 gallons per hour, per inch of nominal valve diameter.
3. When hydrants are in the test section, the test shall be made against the closed hydrant(s).

E. Acceptance shall be determined on the basis of allowable leakage. If leakage in any test is greater than that specified, the Contractor shall locate and make repairs as necessary until the leakage is within the specified allowance.
1. All visible leaks are to be repaired regardless of the amount of leakage.
2. All water mains shall be pressure and leakage tested in the presence of the Engineer, in order to qualify for acceptance.

3.6 CHLORINATION

A. The method of chlorination shall be the Continuous Feed Method as described hereinafter. Chlorination procedures will not be allowed until acceptable flushing and pressure testing has been performed and accepted. The continuous feed method consists of the following steps:
1. Prior to the application of chlorine, confirm that valves are closed to prevent back-feeding chlorine solution into the existing system.
2. At a point not more than 10 feet downstream from the beginning of the new main, fill the main with chlorinated potable water, having an initial concentration of 25 mg/l free chlorine residual.
a. Water from the existing distribution system or other approved source of supply shall flow at a constant measured rate, into the new main. In the

absence of a meter, the rate may be approximated by measuring the discharge rate at the end of the test section with a pito-gauge or by measuring the time to fill a container of known volume.

3. The application of chlorine solution shall continue until the entire main is filled with water having 25 mg/l of free available chlorine. To assure that 10 mg/l free chlorine residual concentration is achieved throughout the test section, the Contractor shall measure chlorine concentration at regular intervals.

B. The amount of chlorine required to obtain a concentration of 25 mg/l per 100 feet of various diameter mains is as follows.

Chlorine Required to Obtain 25 mg/l per 100 feet of Various Diameters

Main Diameter (inches)	Sodium Hypochlorite (gallons) 5% Available	10% Available Chlorine	12.5% Available Chlorine	15% Available Chlorine	Calcium Hypochlorite (ounces) 65% Available
4	0.03	0.02	0.02	0.01	0.02
6	0.08	0.04	0.03	0.03	0.75
8	0.13	0.07	0.06	0.06	1.30
10	0.20	0.10	0.09	0.07	2.10
12	0.28	0.15	0.12	0.10	2.90
16	0.50	0.25	0.22	0.17	5.30
20	0.80	0.40	0.34	0.28	8.40
24	1.30	0.60	0.50	0.40	12.00

1. The above quantities are to be added to a sufficient quantity of water, dissolved, and mixed. The solution shall be injected into the main as specified.
2. The quantities shown are based on concentrations of available chlorine by volume. Extended or improper storage may have caused a loss of available chlorine.

C. The chlorinated water shall be retained in the main for a minimum of 24-hours. At the end of this 24-hour period, retest portions of the main to confirm that a minimum of 10 mg/l free available chlorine residual exists in the main. If the residual chlorine is less than 10 mg/L, acceptable bacteria results may not be obtained.

3.7 FINAL FLUSHING OF CHLORINATED WATER

A. After the initial 24-hour period, the heavily chlorinated water shall be flushed from the main until chlorine measurements show the concentration in water leaving the main is no higher than that generally prevailing in the system.

B. The Contractor shall obtain approval of location(s) for discharging the heavily chlorinated water, which will result from the chlorination procedures. Great care shall be exercised in the selection of the rate of flow and the discharge points, in order to minimize complaints, and damage to public or private property.

C. The heavily chlorinated water shall be suitably and thoroughly neutralized prior to disposal into the environment. In no case shall chlorinated or neutralized water be discharged directly into a water body. If necessary, state, federal, and local regulatory

agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

3.8 BACTERIOLOGICAL TESTS

A. After final flushing and before the water main is placed in service, water samples shall be collected twice (24-hours apart) by the Engineer or Owner and tested for bacteriological quality in accordance with standard methods. Water samples shall show the absence of coliform organisms and background bacteria.

B. If, during construction, trench water has entered the main, or if in the opinion of the Engineer excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at intervals of approximately 200 feet and shall be identified as to location. Samples shall be taken of water that has stood in the main for at least 24-hours after final flushing has been completed.

C. Samples shall be obtained through a corporation cock and copper tubing installed by the Contractor.

D. The Engineer or Owner shall deliver samples to a laboratory approved by the Department of Health Services for bacterial analysis. The Owner shall pay for the cost of analysis. Only after each consecutive sample is approved shall the mains be incorporated into the water system. In the event that positive reports of contamination are received, the mains shall be flushed and chlorinated as many times as may be necessary to obtain approved (negative) results.

3.9 RE-CHLORINATION

A. If the initial chlorination fails to produce satisfactory bacteriological samples, the main shall be re-flushed and re-sampled.

3.10 CHLORINATION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS

A. Trench Treatment. If during excavation the trench is either wet or filled with water, it is recommended that liberal quantities of hypochlorite tablets be applied to open trench areas to lessen the danger from pollution.

B. The interior of all main and fittings used in making a repair shall be swabbed or sprayed with a 1 percent hypochlorite solution before they are installed.

C. If valve and hydrant locations permit thorough flushing toward the work location from both directions, it shall be done. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

D. Slug Chlorination. Where practical and in addition to the procedures above, a section of main in which the break is located shall be isolated. All service connections shall be shut off, and the section flushed and chlorinated by the Slug Chlorination method. This method allows the chlorine dose to be increased to as much as 300 mg/l, and the contact time reduced to as little as 1-hour. After chlorination, the section shall be properly flushed until discolored water is eliminated and the water is free of noticeable chlorine odor.

E. Bacteriological samples shall be taken after repairs. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive samples are recorded, daily sampling shall be continued until two consecutive negative samples are recorded.

END OF SECTION

SECTION 02751

SEWER FLOW CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: During the installation of sanitary sewers and sanitary sewer manholes, the Contractor shall provide piping, pumps, and equipment to maintain conveyance through the wastewater system.

B. The Contractor is required to maintain the flow path through the collection system at all times during construction including maintaining all live service connections.

C. The Contractor shall schedule operations to conform to the requirements specified herein and shall include in the construction schedule (Section 01310) these flow control operations and all events which will impact operation of the existing wastewater collection system.

D. The Contractor shall submit to the Engineer a detailed sequence of construction to complete the work while maintaining the temporary bypass pumps in operation.

E. The Contractor shall furnish, install, operate, maintain and remove temporary bypass pumping systems as specified herein. The temporary system(s) shall be able to reliably pump all wastewater flows.

F. Temporary systems shall only be permitted during active construction operations.

G. Operation of temporary systems shall not be permitted during wet weather events.

H. Related Work Specified Elsewhere:
   1. Summary of Work: Section 01010
   2. Submittals: Section 01340
   3. Sewer Line Cleaning: Section 02752
   4. Television Inspection of Sewers: Section 02753
   5. Final Sewer Testing: Section 02755

1.2 SUBMITTALS

A. Submit in accordance with the provisions of Section 01310, a complete description of procedures to maintain flows to supplement the construction schedule developed. The description shall include step-by-step procedures, and required duration.

B. Submit in accordance with the provisions of Section 01310, complete plans of temporary systems required as part of this contract to maintain wastewater collection operation.

C. Submit the following in accordance with Section 01340 and as specified herein.
   1. Proposed sequence of construction.
   2. Coordination Drawings showing detailed layout of equipment, pumps, suction and discharge piping, piping fittings, valves, supports, materials, temporary enclosure and temporary odor control provided under this section. Provide catalog cut sheets/technical data for equipment and appurtenances.
   3. System or method used to provide wastewater flow monitoring data during the period of time when the bypass pumping system is in operation.
   4. List of equipment, pumps, piping, fittings, valves, and materials to be utilized by the Contactor for the temporary bypass pumping system.
      a. If equipment is furnished under another section, the list shall identify the equipment and section reference. Work shall not proceed until shop drawings

submitted under this section and related sections have been returned with no exceptions taken.

5. List of standby equipment and spare parts available on-site and off-site.
6. Performance curves for wastewater bypass pumps and suction lift, static head, headloss, and total dynamic head (TDH) calculations.
7. List of contact persons and communications equipment to be utilized.

PART 2 - PRODUCTS

2.1 WASTEWATER BYPASS PUMPING SYSTEMS

A. General

1. The Contractor shall furnish, install, operate, and maintain bypass pumping systems for wastewater that will be capable of handling maximum conveyance of the existing pipe as calculated using Manning's equation.

Manning's Equation: $Q = A\ v = A\ k_n / n\ R^{2/3}\ S^{1/2}$

where:
Q = volume flow (ft^3/s, m^3/s)
v = cross-sectional mean velocity (ft/s)
A = cross-sectional area of flow (ft^2, m^2)
k_n = 1.486 for English units and k_n = 1.0 for SI units
n = Manning coefficient of roughness
S = slope of pipe (ft/ft)
R = hydraulic radius (ft) = A/P = $\frac{\text{cross sectional area of flow } (ft^2)}{\text{wetted perimeter (ft)}}$

The following is an example of calculating conveyance of a 10-inch diameter PVC pipe with full flow and S = 0.010 and n = 0.013 using Manning's Equation shown above.

$Q = A\ v = A\ k_n / n\ R^{2/3}\ S^{1/2}$
$Q = ((\pi * 0.833\ ft^2)/4) * (1.486/0.013) * ((1/4)^{2/3}) * ((0.010)^{1/2})$
$Q = 7.82\ cfs = 4.21\ mgd$

2. The Contractor shall not conduct temporary bypassing during wet weather.
4. The Contractor may utilize upstream manholes to draw wastewater. The bypassed flow will be discharged into a downstream manhole. Contractor shall provide all plugs, bulkheads or other flow diversionary devices to allow the construction of the work during the bypass pumping operation.

B. Equipment

1. The pump priming system shall be fully automatic, needing no form of adjustment or manual addition of water. The priming system shall be capable of priming the pump from a completely dry casing.
2. The pumps shall be centrifugal trash pumps suitable for handling raw sewage with solids up to 4 inches in diameter, and capable of running completely dry for extended periods of time without damage. Pumps shall be capable of static suction lifts to 25 vertical feet, at sea level unless written approval is obtained from the Engineer.

3. Contractor to provide portable spill guard containment dikes for supplied pumps capable of containing any fuel spilled from the pumpsets.
4. The services of a representative of the bypass pumping system supplier shall be provided to inspect the installation and supervise the startup and testing of the system.
5. The bypass system shall be sound-attenuated (maximum 65 dBA at 21 ft), automatic, self-priming, fuel driven pumpset. Each pump shall be a skid-mounted unit.
6. The pumpset shall be furnished with float or transducer level controls, and be equipped with a weatherproof, microprocessor-based controller. The controller shall start/stop the pumps based on signals from high and low level floats or a transducer. The controller shall be capable of automatically varying the pump speed to match varying flow conditions and maintain a constant level at the manhole.
7. The backup pumping system shall be an automatic, self-priming, fuel driven, 12-inch pumpset including one primary pump and one backup unit. Each pump shall be a skid-mounted unit.
8. The Contractor shall annunciate and log alarm conditions including high water level in the manhole and loss of primary pump. The alarm log shall include the type of alarm, time of alarm, time alarm acknowledged, and time alarm condition cleared.
9. The bypass pumpset shall be supplied by:
    a. Godwin Pumps, Bridgeport, New Jersey
    b. Baker Corporation, Oxford, Massachusetts
    c. Or equal.

C. The equipment required for the wastewater bypass pumping system shall be furnished, installed, maintained and removed as follows:
1. The Contractor shall coordinate all Work as specified in Paragraph 3.2.
2. The Contractor shall furnish, install, test and maintain temporary bypass pumping discharge pipelines.
    a. The discharge piping shall be run aboveground. The Contractor shall trench the road and/or driveway at all crossings and or bury piping a minimum of 24- inches below grade with cold patch covering the surfaces. Where written approved by the Engineer is obtained, ramps shall be used over the pipes in lieu of burying the pipes. The ramps shall be sized appropriately to allow vehicles to drive over the pipes.
    b. Discharge piping shall be constructed of SDR 32.5 HDPE pipe. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed.
3. The Contractor shall take necessary precautions to prevent flow from freezing in the temporary pipes.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall install, test and debug all systems and verify that all necessary equipment, materials, spare parts, and labor are available on-site prior to operation of the system.
B. The Contractor shall operate and maintain the bypass pumping system at all times by providing an on-site operator.

C. Any pumps, piping, fuel storage, or other appurtenances associated with the bypass pumping system shall be either located above the 100-year flood elevation, or protected against flotation or other damage which would be caused by a flood event.
D. The Contractor shall be solely responsible for clean-up, repair, property damage costs and claims resulting from failure of the diversion system.

3.2 COORDINATION OF WORK

A. Provide all labor and equipment necessary to coordinate work of this section and maintain communications.
B. Notify all personnel, including but not limited to the Owner, Engineer, and Utility Companies seven days in advance of any temporary bypass pumping work.

3.3 PERFORMANCE

A. Plugging or Blocking:
    1. Insert temporary plug at a manhole upstream of line to be replaced.
    2. Temporary plug shall be so designed that all or any portion of the sewage flows can be released if required by the Owner.
B. Pumping and Bypassing:
    1. Furnish the necessary labor and 24-hour on-call supervision to set up and operate the pumping and bypassing system in addition to providing the on-site operator. The on call supervision and necessary labor shall be able to arrive onsite within 30 minutes.
    2. When required to operate at night or on a 24-hour basis, all engines shall be equipped with silencers.

END OF SECTION

SECTION 02752

SEWER LINE CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide all equipment necessary for the proper cleaning of the sewers prior to the joint testing operations and/or closed-circuit television inspection.

B. Related Work Specified Elsewhere: Sewer line joint testing and closed-circuit television inspection are specified in this Division.

1.2 DEFINITIONS

A. Light cleaning (per NASSCO) – Removal of settled deposits: 25% for pipes up to 12-inches in diameter, and 15% for pipes between 13-inches and 24-inches.

B. Heavy cleaning (per NASSCO) – Removal of obstructions and settled deposits that exceed percentage established for light cleaning. This also includes attached grease deposits if able to remove with rotating nozzle or other mechanical means; not to include saws or cutters. Compliance with this section requires substantial effort towards cleaning.

PART 2 - PRODUCTS

2.1 MATERIALS

A. High Velocity Hydro-Cleaning Equipment shall:

1. Have a minimum of 400 feet of high pressure hose.
2. Have multiple high velocity nozzles, as follows:
   a. Standard 35-degree nozzle with multiple rear jets and one front jet.
   b. Sand nozzle capable of transporting sand and gravel to the downstream manhole; and
   c. Rotating nozzle for removal of grease and scale.
3. Include a high velocity gun for washing and scouring manhole walls and floor.
4. Be capable of producing flows from a fine spray to a long distance solid stream.
5. Include a water tank, auxiliary engines and pumps, and a hydraulically driven hose reel.
6. Have equipment operating controls located above ground.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Select cleaning equipment based on the conditions of the lines at the time the work commences.

1. Light cleaning (small amounts of debris exist within the sewer line): Use high pressure water jetting equipment, brushes and swabs. The Contractor shall clean the sewer and associated manholes, including drop connections and benches, to remove all settled deposits, so that the sewer is ready for televising. This will require an unlimited amount of passes of a hydraulic flusher to remove all loose debris and collect it for removal in the downstream manhole. All debris must be removed from the sewer, including any debris that may have been washed up into any service connections (does not include

known pre-existing conditions in service connections), drop connections or the bench wall of the manholes.

2. Heavy cleaning (large deposits of debris or heavy root growth exist within the sewer line): Use high pressure water jetting equipment specifically designed for the intended use. The Contractor shall remove all obstructions in the sewer. This work will include an unlimited number of passes by high velocity hydro-cleaning equipment. All debris must be removed from the sewer, including any debris that may have been washed up into any service connections (does not include known pre-existing conditions in service connections), drop connections or the bench wall of the manholes. This includes all grease, rocks, debris, sticks, etc. that will reduce the hydraulic capacity of the sewer and limit future maintenance access of remote equipment.

B. Use selected equipment to remove all dirt, grease, rock and other deleterious materials and obstructions.

C. Protect existing pipes from damage caused by improper use of cleaning equipment. The Contractor shall be responsible for any damage to the sewer or any service connections at no additional cost to the Owner.

D. Take precautions to avoid damage or flooding to public or private property being served by the line being cleaned.

E. Removal of Materials:
   1. Remove all solids and semi-solids at the downstream manhole of the section being cleaned.
   2. Passing material from one section of a line to another will not be permitted.

F. Disposal of Materials: Remove from the site and dispose of all solids or other waste materials recovered during the cleaning operations in an approved manner. The City of Waltham will not be providing location for debris disposal.

3.2 FIELD QUALITY CONTROL

A. Acceptance of this portion of the work may be made upon completion of subsequent television inspection and shall be to the complete satisfaction of the Engineer.

END OF SECTION

SECTION 02753

TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish all necessary labor, materials, supervision and equipment to satisfactorily inspect gravity sewer lines and sewer service pipes as required by the Contract Documents by means of a closed-circuit television (CCTV) system.

B. Related Work Specified Elsewhere: Sewer line cleaning and sewer flow control are specified in the appropriate sections in this Division.

1.2 QUALITY ASSURANCE

A. CCTV work shall be completed and delivered per the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) standards. Operators of CCTV equipment shall be NASSCO PACP certified.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. The cameras shall be designed and constructed for sewer line inspection work. The mechanical design of the lens shall allow it to turn and rotate 360 degrees to provide a close up view of sewer pipe walls and sewer service pipes. The camera shall be designed to maintain proper orientation of the picture while the lens is turning and rotating.

B. The cameras shall be operative in 100% humidity conditions.

C. The lighting for the cameras shall be suitable to allow a clear picture of service pipes and the entire periphery of the mainline sewer pipe, such that joints, root intrusions, cracks, offset joints, deposits, etc. can be seen and identified by the Engineer.

D. The lens focus and rotational capabilities and the light intensity will be remotely controlled from an above ground television "studio".

E. The cameras shall produce a continuous, full color picture with a quality acceptable to the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Flow Control:

1. A minimum of 75% of the periphery of the sewer line shall be visible at all times.
2. The Engineer may require that the line be plugged so that the entire periphery can be inspected. For details on sewer flow control, see Section 02751.

B. Operation:

1. Perform inspection of sewer lines after lines have been suitably cleaned.
2. When inspecting newly constructed sewer lines, introduce water into the sewer lines to be tested from the upstream manhole prior to the television inspection, but no more than 24 hours in advance of the inspection.
3. Lines will be suitably isolated from the remainder of the sewer line as required.

4. Move the cameras through the line in either direction at a moderate rate, not to exceed 30 feet per minute, as recommended by NASSCO.
5. The Engineer may require Contractor to pull cameras back to get a second view of a section of the pipe.
6. Use manual winches, power winches, television cable reel powered rewinds, high-pressure hose and reels on jet-cleaning trucks, or a flexible pole, to move the camera through the sewer.
7. If, during the inspection operation, the camera will not pass through the entire pipe section, the Contractor shall set up the equipment so that the inspection can be performed from the opposite manhole on the pipe segment.
8. The screen monitor and winch operators shall be in full communication at all times.
9. Remove all wires, screens, sand bags, etc. used in the television inspection process from the sewers at the completion of inspection of each sewer section.

C. Measurement:
1. Measurement for location of defects, service connections, etc., shall be accurate to two tenths (0.2) of a foot over the length of the section being inspected.

D. Records:
1. Printed records shall be provided, reflecting location of defects, service connections, etc., and shall be recorded per PACP standards and stored to a NASSCO-certified digital reporting software:
   a. Keep records and supply to the Engineer when the work has been completed.
   b. Show the exact location in relation to adjacent manholes, of each infiltration point discovered by the television camera.
   c. Show locations of laterals, unusual conditions, roots, break-in storm sewer connections, collapsed sections, presence of scale and corrosion, and other discernible features.
2. Inventory the houses and apparent empty lots bordering each section of sewer line that is inspected and compare results to the number and location of house services found during the inspection. Log inconsistencies and report them to the Engineer.
3. Video / Photographs:
   a. Two copies of the video shall be provided in DVD format, downloaded or output from a NASSCO certified software: one copy to the Engineer and one copy to the Owner.
   b. The video shall be digitally recorded, indexed by pipe section (labeled by manhole number or other means acceptable to Engineer) and allow for printing of still photographs.
   c. Photographs shall be printed at Engineer's request and shall be identified on the back as follows:

      Date_____; Section: MH#_____to MH#_____
      Diameter of Sewer ; Distance from MH#_____is_____LF
      Description of item photographed_____
      _____
4. Provide Owner with a Access database of all of the CCTV data on a portable hard drive.

END OF SECTION

SECTION 02755

FINAL SEWER TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
2. Perform testing at a time acceptable to the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
3. Provide all labor, pumps, pipe, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

B. Related Work Specified Elsewhere (When Applicable):

1. Excavation, backfill, dewatering, pipe, pipe fittings and manholes are specified in the appropriate Sections in this Division and/or Division 15.
2. Manhole testing is specified in Section 02601 - Manholes, Covers and Frames.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:

1. All sewers, manholes, and appurtenant work, in order to be eligible for acceptance by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Thoroughly clean and/or flush all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
3. Perform all tests and inspections in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes.
4. Perform testing by test patterns determined by or acceptable to the Engineer.
5. Remedial Work:
   a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
   b. Completely retest all portions of the original construction on which remedial work has been performed.
   c. Perform all remedial work and retesting in a manner and at a time acceptable to by the Engineer at no additional cost to the Owner.

B. Line Acceptance Tests (Gravity sewers with no active service connections):

1. Test all gravity sewer lines with no active service connections for leakage by conducting a low pressure air test.
2. Equipment:
   a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
   b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
   c. All air used shall pass through a single central panel.
   d. Connect 3 individual hoses:
      i. From the control panel to the pneumatic plugs for inflation.
      ii. From the control panel to the sealed sewer line for introducing the low pressure air.
      iii. From the sealed sewer line to the control panel for continually monitoring the air pressure rise in the sealed line.
3. Testing Pneumatic Plugs:
   a. Seal test all pneumatic plugs prior to using them in the actual test.
   b. Lay one length of pipe on the ground and seal both ends with the pneumatic plugs to be tested.
   c. Pressurize the sealed pipe to 5 psig.
   d. The pneumatic plugs are acceptable if they remain in place without bracing.
4. Testing Sewer Pipeline:
   a. After the sewer pipe has been cleaned and the pneumatic plugs checked, place the plugs in the sewer line at each manhole and inflate them.
   b. Introduce low pressure air into the sealed sewer pipeline until the air pressure reaches 4 psig greater than the average groundwater pressure.
   c. Allow a minimum of 2 minutes for the air pressure to stabilize to a minimum of 3.5 psig greater than the groundwater pressure. Groundwater is assumed to be at ground surface unless the Contractor can prove by otherwise by test pitting.
   d. After the stabilization period, disconnect the air hose from the control panel to the air supply.
   e. The pipeline will be acceptable if the pressure decrease is not greater than l/2 psig in the time stated in the following table for the length of pipe being tested:

	Time (Min.) for Length of Pipe			
Pipe Diameter (inches)	0-100 ft	101-200 ft	201-300 ft	301-400 ft
4	2.0	2.0	2.0	2.0
6	3.0	3.0	3.0	3.0
8	4.0	4.0	4.0	5.0
10	5.0	5.0	6.0	8.0
12	5.5	5.5	8.5	11.5
15	7.0	8.5	13.0	17.0
18	8.5	12.0	19.0	25.0
21	10.0	17.5	26.0	35.0
24	11.5	23.0	34.0	45.5

Pipe Diameter (inches)	Time (Min.) for Length of Pipe 0-100 ft	101-200 ft	201-300 ft	301-400 ft
27 and larger	14.5	29	43.0	58.0

5. Test Results:
   a. If the installation fails the low pressure air test, determine the source of leakage.
   b. Repair or replace all defective materials and/or workmanship and repeat low pressure air test at no additional cost to the Owner.

C. Line Acceptance Tests (Gravity sewers with active services):
1. Test all new gravity sewer lines with active services by conducting a low-pressure air test on all joints using a packer after all services have been connected or capped at the property line and all trenches backfilled but before the surface course of permanent pavement is installed.
2. Equipment:
   a. Closed-circuit television system.
   b. Testing devices (packer):
      i. Capable of isolating individual joints by creating a sealed void space around the joint being tested.
      ii. Constructed such that low pressure air can be admitted into the void area.
      iii. Shall contain a pressure gauge accurate to one tenth (0.1) psi in-line with the feed line to monitor the void pressure.
      iv. Capable of performing in sewer lines where flows do not exceed 1/4 of the pipe diameter without resorting to any method of flow control.
3. Testing Sewer Pipeline Joints:
   a. Test all joints except those with visible infiltration.
   b. Procedure:
      i. Pull television camera through sewer line in front of the packer.
      ii. Position the packer on each joint to be tested.
      iii. Inflate the sleeves on each end of the packer.
      iv. Apply four (4.0) psi pressure above the existing hydrostatic pressure on the outside of the joint to the void area created around the inside perimeter of the joint.
      v. Shut off the supply of air once the pressure has stabilized at the required amount.
      vi. Monitor the void pressure for thirty (30) seconds.
      vii. Repair the joint if the pressure drops more than one half (1/2) psi in the thirty (30) seconds.
   c. Water or chemical pressure testing may be used in lieu of air testing subject to review and approval by the Engineer.
   d. Re-clean and re-inspect all lines not approved by the Engineer at no additional cost to the Owner.
   e. Repairing of Joints:

i. When a joint fails the pressure test, excavate and repair the failed joint. Repairing joints with chemical grout will not be permitted.

f. The Engineer may request checking of the testing equipment for accuracy.
   i. Perform standard air test on a clean continuous section of pipe.
   ii. Repair the equipment if the void pressure drops.

g. Testing Operation Inspection:
   i. Reset each joint, as specified herein, prior to acceptance and final payment for joint testing. Retest all joints that fail until the test requirements are met.

h. The contractor will supply a black and white photograph of every joint that fails the pressure test.

D. Alignment Tests (Gravity Sewers):
1. Perform tests for the correctness of horizontal and vertical alignment on each and every length of gravity sewer pipeline between manholes.
2. Alignment tests to be conducted after all pipe has been installed and backfilled.
3. The observation test shall be conducted after all upstream work has been completed and the pipeline cleaned of debris.
4. Notify the Engineer at least 24 hours in advance of the proposed observation testing.
5. Introduce water into the sewer lines to be tested from the upstream manhole prior to the observation test but no more than 24 hours in advance of the test.
6. Beam a source of light, acceptable to the Engineer, through the pipeline from both ends and the Engineer will directly observe the light in the downstream, and/or upstream manhole of each test section.
7. The length of pipe between manholes, diameter of pipe and amount of light observed in the manhole at the end of each pipe section will determine acceptance of the alignment test by the Engineer.
8. The amount of vertical and horizontal deflection shall not be greater than the ASTM allowance and (manufacturer's recommendations) for the pipe being tested.
9. No standing water shall be allowed. The presence of standing water shall be cause for rejection of that pipe (including manhole) section.
10. Improper alignment will be corrected by re-excavation and resetting of pipe at no additional cost to the Owner.

E. Pipe Deflection: (Gravity Sewers)
1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

F. Television Inspection Tests (Gravity Sewers)

1. Where television inspection testing is required, test procedures shall be in compliance with the requirements outlined in Specification Section 02753.
2. No standing water shall be allowed. The presence of standing water may be cause for rejection of that pipe.
3. Any standing water, detectable leaks, improper joints or any other unacceptable feature detected by the television inspection will be corrected by re-excavation and resetting pipe at no additional cost to the Owner.

G. Inspection of Appurtenant Installations:
1. Completely inspect, at a time determined by the Engineer, all manholes and inlets to ascertain their compliance with the Drawings and Specifications.
2. Provide access to each manhole and inlet and check the following characteristics:
   a. Shape and finish of invert channels,
   b. Watertightness and finish of masonry structures,
   c. Location, type, and attachment of stops,
   d. Elevation and attachment of frames, covers, and openings,
   e. Pattern and machining of covers, and
   f. Drop connection arrangements.

H. Manhole Leakage Testing:
1. Specified in the "Manholes, Covers and Frames" Section in Division 2.

END OF SECTION

SECTION 02756A

SEWER PIPE LINING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide all equipment necessary for the manhole-to-manhole lining and spot lining of sanitary sewer by the cured-in-place-pipe (CIPP) method and the reinstatement of sewer services.

B. The system shall provide for the rehabilitation of pipes by the installation of an epoxy resin impregnated fiberglass or polyester felt patch inserted against the inside of the existing pipe utilizing hydrostatic pressure (manhole-to-manhole lining) or an inflatable element and air pressure (spot lining). Curing shall be accomplished by circulating steam or another approved method to cure the resin into a hard impermeable pipe within a pipe. The cured-in-place pipe should extend over the length of the patch in a continuous tight fitting watertight pipe within a pipe.

C. Related Work Specified Elsewhere: Sewer flow control, sewer line cleaning, and television inspection of sewers are specified in this Division.

1.2 QUALITY ASSURANCE

A. Standards:

1. Cured-in-place-pipe (CIPP) shall meet all the requirements of ASTM F1216 and ASTM F1743.

A. References:

1. NASSCO (National Association of Sewer Service Companies) Recommended Specifications for Sewer Collection System Maintenance and Rehabilitation.

B. Acceptable Contractors:

1. Layne Inliner, LLC. (manhole-to-manhole lining)
2. Reynolds Inliner, LLC. (manhole-to-manhole lining)
3. Insituform Technologies, Inc. (manhole-to-manhole lining)
4. Green Mountain Pipeline Services, Inc. (manhole-to-manhole lining)
5. Or qualified equivalent contractor with a minimum of 5 years of experience in sewer pipe lining and a minimum of 100,000 feet of installed CIPP liner.

1.3 SUBMITTALS

A. The Contractor shall submit to the Owner and/or Engineer, complete design calculations for the liner that meet the requirements of ASTM F1216 or ASTM F 1743. The design shall be based on the following physical conditions of the existing pipe to be rehabilitated:

1. All pipes shall be considered fully deteriorated.
2. All pipes are subjected to a soil load of 120 lbs/cf with an H-20 live traffic load.
3. The water table is assumed to be 3 feet below the ground surface.
4. Pipe lengths and depths are shown on the Plans.
5. The maximum pipe ovality is 2%.
6. The minimum wall thickness for CIPP liner is 6 mm.
7. The minimum flexural modulus of elasticity of the cured liner shall be 250,000 psi, with a flexural strength of 4,500 psi, as tested in accordance with ASTM D-790.

B. Contractor to submit materials and installation procedures for review by Owner and/or Engineer, including information on resin, tube, coatings, and manhole and service sealants, an installation schedule, the manufacturer's recommended curing schedule, means of obtaining and collecting samples for testing, method of monitoring liner temperature during curing, and other quality management programs, plans for by-passing or handling of sewer flows, and traffic control.
C. Contractor to submit video tapes of pre-installation TV inspection and post-lining TV inspection as specified in Section 02753.
D. Contractor to submit an outreach plan to the Engineer at least 1 week prior to the commencement of lining activities, this plan shall at minimum include a schedule for 1 week and 24-hour advance notices to residents who will be affected by the pipe relining, samples of notices to be provided to residents, and an odor and noise mitigation plan.
E. Contractor to submit documentation relative to the qualifications, training and experience of the installers.
F. Contractor to supply an equipment listing including redundant tools and spare parts to be on site during the lining work.
G. Contractor to supply information on proposed or potential repair and/or rehabilitation methods in the event of a failed liner installation.
H. Following liner installation, contractor shall supply wet-out logs, curing schedules, including temperature measurements, and collected samples for testing.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe Liner
1. The liner shall be fabricated from materials that are chemically resistant to exposure to domestic sewage and septic tank effluent.
2. The completed liner shall be continuous, seamless, and jointless from manhole to manhole.
3. Liner shall be sized to provide a tight fit to the host pipe.
4. The interior surface of the liner shall be a relatively light reflective color so that a clear detailed examination with closed circuit television equipment can be made.
5. Liner thickness calculations are discussed in Part 1 above.
6. Liner material shall meet the requirements of ASTM F1216, ASTM F1743 and ASTM F2019.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall be done in compliance with all current OSHA safety regulations.
B. Prior to conducting any work, Contractor shall deliver notices to all residents and/or building owners within the area of the pipe relining. Notice shall indicate when the work will take place and who to call with questions or in the event of an emergency. Notice to be approved by the Owner prior to distribution.

C. Contractor to control sewer flows and bypass pump per Section 02751.

D. Prior to relining the sewer pipe, the sewer shall be cleaned in accordance with Section 02752 and inspected with CCTV equipment per Section 02753. Contractor to verify that the conditions of the sewers are acceptable for the methods of liner installation required. Prior to lining of pipe, Contractor shall trim back any protruding pipes/services extending into the pipe. Pipes shall be trimmed back to within ½-inch of the pipe wall, or as close as possible to avoid damaging the host pipe and also to prevent bulges in the liner to be installed.

3.2 LINING METHOD

A. The resin impregnated tube shall be installed in accordance with manufacturer's instructions using a hydrostatically inflated tube or other method acceptable to the Engineer.

B. The resin shall be cured in accordance with the resin manufacturer's instructions using circulated steam or other methods acceptable to the Engineer. Maintain a continuous log of temperature and pressure during curing.

C. Water used for installation shall be provided by the Contractor. The Contractor shall notify Owner's Sewer Department staff prior to disposal or water into the sewer system.

D. Following liner installation, leakage testing shall be performed on the liner according to the requirements of ASTM F1216.

E. After liner installation and curing, Contractor shall cool the liner down to at least 100 degrees Fahrenheit prior to commencing service re-instatement and collection of samples. Liner temperature during curing and cool-down shall be monitored by a thermocouple or temperature monitoring strip and recorded at least at 15 minute intervals.

F. After liner installation and curing, the Contractor shall reinstate the existing service connections, using remote controlled equipment including a television camera meeting the requirements of Section 02753. The opening created for the service lateral shall be at least 95% of the original opening. After creating the hole in the liner, polish the edges of the hole to remove sharp edges and improve flow conditions from the service pipe into the lined sewer main. Coupons of the lining material removed during service reinstatement shall be collected at the downstream manhole, and shall not be left within the sewer system.

G. The Contractor shall grout and seal each service connection to prevent leakage between the existing pipe, the existing service connection, and the new liner. The Contractor shall remove all excess grout in the sewer service laterals.

H. Any connections to the sewer main that are not to be reinstated after liner installation shall be coordinated with the Owner. It is the Contractor's sole responsibility to confirm with the Owner that a connection is to be abandoned and not reinstated to the main. For each connection not reinstated, the Contractor shall obtain a sign-off from the Owner, using the form included at the end of this Section.

I. Provide a watertight seal at the insertion and termination points in the manholes. Seal any annular space between the liner and host pipe in the manholes and provide for smooth merging of flows from other pipelines entering the manhole.

J. After completion of the work, perform post-installation TV inspection of the completed liner and the restored service connections per the requirements of Section 02753. Any of the following defects that are observed shall be repaired immediately at the expense of the Contractor:

1. Visible leaks, weeping or pinholes
2. Fins, bulges, wrinkles or other obstructions of more than 5% of the cross-sectional area that were not identified on the pre-installation TV inspection
3. soft or uncured sections of the liner
4. visual discoloration or other visual anomalies.

K. During the one-year warranty period, any defects which will affect the integrity or the strength of the liner shall be repaired at the expense of the Contractor.

CONFIRMATION TO ABANDON AN EXISTING CONNECTION TO THE SEWER MAIN

Complete this form for each connection to the sewer main that is not reinstated after relining.

Connection Location:

Street Address: _____

_____LF upstream/downstream (circle one) of MH_____ as indicated on CCTV inspection prior to relining of the main.

Purpose for Abandonment (check all that apply):

_____	Service No Longer Active	_____	Served by Separate Lateral
_____	Connection to Storm Drain	_____	Other:_____

Method of Determining Connection can be Abandoned:

_____	Dye Test	_____	Direction from Owner
_____	CCTV Inspection	_____	Visual Inspection
_____	Building Inspection	_____	Other:_____

Confirmation that Connection is to be Abandoned (not reinstated):

_____	_____
Owner	Contractor
_____	_____
Date	Date

Submit copy of the signed form to the Engineer.

END OF SECTION

SECTION 02757

SEWER REPAIRS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Intent: It is the intent of this section to provide a basis upon which a contractor can successfully and completely accomplish a sewer repair. This basis shall describe methods of repair, material and equipment.

B. A sewer repair shall be defined as a repair made at a specified location on a sanitary or storm sewer line as determined by TV inspection of the sewer line or as required by the Engineer.

C. This section applies to all repairs, replacements or disconnections which may be made under the various items of work included in the contract.

D. Related Work Specified Elsewhere:

1. Summary of Work: Section 01010

1.2 TYPES OF SEWER REPAIRS

A. The repair or replacement of any service connection, cleanout, cap or plug, tee or wye connection, or plugging of a sewer line to be abandoned.

B. The removal of obstructions from sewer lines which cannot be removed by cleaning equipment or similar means and which requires excavation.

C. The repair or replacement of sections of a sewer main as determined by the Engineer.

D. The disconnection of storm drains, roof leaders, catch basins, etc., from a sanitary sewer line and the repairs and plugging required to prevent water from entering the sanitary sewer.

1.3 SUBMITTAL TO ENGINEER

A. Submit shop drawings in accordance with the General Conditions for all piping, fittings and couplings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe and connections shall be manufactured of the following materials:

1. Replacement Pipe for Sewer Repairs
   a. Polyvinyl Chloride (PVC) Non-Pressure Pipe, SDR 35
2. Standard adaptors for P.V.C., Vitrified Clay Pipe, and ACP
3. Flexible couplings with all stainless steel clamps equivalent to a Series 1002 Flexible Coupling by Fernco Joint Sealer Co. of Davison, Mich. and approved by the Engineer.
4. Bell donuts equivalent to Fernco Donut Sewer Pipe Compression Joint Sealers, by Fernco Joint Sealer Co. of Davison, Mich. and approved by the Engineer.
5. PVC Wyes and saddles
6. Installation of 90° saddles will not be allowed except as approved by the Engineer.

B. Joint material shall meet all requirements of the current ASTM standards.

C. Sewer Connections and Appurtenances shall conform to the pipe manufacturer's recommendations and specifications and applicable ASTM standards.

D. The contractor shall have on hand at all times a sufficient amount of material and fittings of appropriate sizes to make proper connections including: adaptors; 4", 6" and 8" wyes and saddles; 22½°, 45° and other bends and fittings; short and long nipples; neoprene connectors with various size bushings; an approved non-shrink grout material; mortar mix; reinforcing wire mesh; oakum; pipe saw; hole cutter.

PART 3 - EXECUTION

3.1 REPAIR METHOD

A. The method used shall include all supervision, labor, equipment and materials necessary to complete a sewer repair including, but not limited to, the items listed below.

1. Excavate and uncover the sewer line carefully to allow examination of the pipe and to reveal the extent of damage. Handwork will be necessary near pipes and structures.
2. Remove and replace any fences, base materials, storm sewers, etc., which might interfere with the repair, or in the case of utilities such as water lines or telephone cable, to carefully work around these while maintaining close contact with repre- sentatives of these utilities.
3. Replace and reshape pipe bedding so that pipe grades match existing sewer lines.
4. Repair or replace sewer pipe at the direction of the Engineer exercising due caution with undamaged existing sewer lines. Pipe broken by the Contractor shall be replaced at the Contractor's expense. Pipe joints shall be made by one of the following methods:
    a. Adjustable full circle stainless steel collar with rubber gaskets, such as dresser coupling.
    b. Rubber coupling with stainless steel bands.
5. Repair or replace any service connection encountered to the satisfaction of the Engineer.
6. Seal any open joints revealed by the excavation, removing any visible roots prior to sealing.
7. Make all connections watertight to prevent any inflow/infiltration.
8. Dewater the excavation to permit repairs to be made. If necessary, coarse granular bedding such as crushed stone may be required by the Engineer.
9. Use adequate sheeting, bracing and/or shoring to protect employees and existing structures and to remove same prior to backfilling.
10. Plug and seal all lines to be abandoned as directed by the Engineer. Unless otherwise directed, all service connections to be abandoned shall be blocked off at the sewer main.
11. Backfill according to procedures specified in Division 2 of these specifications.
12. Clean up work area so that no trash or salvage pipe is left.

END OF SECTION

SECTION 02758

MANHOLE REHABILITATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: The work includes the rehabilitation of sewer manholes, including but not limited to:
   1. the removal of roots, mineral build-up and debris;
   2. the replacement of frames and covers;
   3. the injection of curtain grout;
   4. the lining of various manhole components;
   5. the removal of cross bore pipes;
   6. the point repair of manhole components;
   7. the adjustment to grade of frames and covers;

B. The locations of the manholes to be rehabilitated are shown in Appendix A. The intent of the manhole rehabilitation work is to correct the observed defect and prevent future deterioration using various products and procedures and methods either singularly or in combination.

C. Related Work Specified Elsewhere:
   1. Summary of Work - Section 01010
   2. Bituminous Concrete Pavement – Section 02513
   3. Manholes, Covers and Frames - Section 02601
   4. PVC Non-Pressure Pipe – Section 02622
   5. Sewer Flow Control – Section 02751
   6. Final Sewer Testing – Section 02755

1.2 DESCRIPTION OF METHODS

A. Seal manhole (Chemical Grout): Manhole sealing (grouting) involves injection grouting to stop leakage includes surface preparation where required, drilling through the manhole walls, bench or table as identified, injecting grout material into the voids and earthen materials outside the structure; patching of the drill and grouting holes; and other associated work to stop leaks.

B. Line Manhole (cementitious coating): Cementitious coating for precast, block or brick manholes includes the pressure washing of manhole and removal of all roots, deposits and loose debris and the lining of the manhole through the spray application and/or centrifugally spincasting a cementitious based liner to the inside of the manhole.

C. Line Manhole (protective coating): Epoxy coating includes the cleaning and surface preparation of the manhole, application of an epoxy coating system on the wall surfaces, and associated work.

D. Repair/Replacement of Manhole Chimney, Wall, and Pipe Seals: Replacement or construction of manhole chimney, wall, and pipe seals in sewer manholes including surface preparation, masonry work and disposal of excess materials.

E. Replacement of manhole frame and cover: Replacement of the manhole frame and cover includes sawcutting the pavement, removing and disposing of the frame and cover, and installing a new frame and cover to grade including any required chimney adjustments,

and restoring the disturbed area to grade by matching the pavement depth, or loaming and seeding.

F. Miscellaneous Manhole Cleaning, including pressure washing, debris removal and other necessary work to properly prepare surfaces and manholes for the work to be performed. Protect pipe inlets and outlets to prevent debris from entering the collection system.

G. Final Acceptance: After the rehabilitation work has been completed, the manholes shall be visually inspected by the Engineer and tested (as required) in the presence of the Owner and/or Engineer.

1.3 QUALITY ASSURANCE

A. All work shall be performed in accordance with the National Association of Sewer Service Companies (NASSCO) Specification Guidelines, latest edition. Workmanship shall be first-class in all respects.

B. Contractor's personnel involved in the installation of material shall be certified by the manufacturer that they have successfully completed training in handling, applying and finishing the materials being used.

C. The Contractor shall inspect pre-rehabilitation work, surface preparation, rehabilitation operations, and post-rehabilitation work.

1.4 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General Conditions of the Contract Documents and Section 01340 - Submittals.

B. Submit all catalog data sheets, ASTM references, material composition, component physical properties and chemical resistance for all materials as applicable.

C. Submit detailed descriptions of the recommended procedures for handling and storing materials including a proposed method for monitoring temperatures of the storage location.

D. Submit a detailed description of all required field testing processes and procedures as applicable from the manufacturer.

E. Submit a certified statement from the manufacturer that the contractor / installer is an approved installer and tester of the rehabilitation product with certificates of completed training for each crew member involved in each rehabilitation component.

F. Submit the contact information and documentation for the third-party National Association of Corrosion Engineers (NACE) accredited inspector or manufacturer's representative who shall to perform holiday (spark) testing on the liner.

G. Submit manufacturer's "Certification of Conformance" that lining materials meet or exceed the requirements of these Specifications.

H. Submit other documents as specified in the appropriate Sections of this Division.

I. Submit a minimum of five recent verifiable references for similar project work in the United States indicating the successful application of the manhole rehabilitation as specified herein or to be furnished by the Contractor and applied in a similar project environment as included in these contract specifications.

J. Submit documentation of a minimum of a three-year successful installation history of the products to be used.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Rehabilitation component materials are to be kept dry, protected from weather and stored under cover and in accordance with manufacturer's recommendations.

B. Polymer and Cementitious protective coating materials are to be stored at temperatures as recommended by the manufacturer and handled according to their SDS. Do not store near flame, heat, or strong oxidants.

PART 2 - PRODUCTS

2.1 SEAL MANHOLE (CHEMICAL GROUT)

A. Equipment: The basic equipment shall consist of pumps, containers, injection packers, hoses, valves, and all necessary equipment and tools required to seal manhole joints and leaks. The chemical grout injection pumps shall be equipped with pressure meters that will provide for monitoring pressure during the injection of the chemical sealants. When necessary, liquid bypass lines equipped with pressure-regulating bypass valves will be incorporated into the pumping system.

B. Materials:

1. Hydrophilic Polyurethane Chemical Grout: consists of premeasured, prepackaged polyurethane chemical grout with root inhibitor. The grout shall be non-toxic, non-flammable, high flash point (225˚ F) hydrophilic polymer of the type which is applied in a crack or open joint by use of a packer. When mixed with water, the material shall expand up to 4 times its original volume and cure to a closed cell polyurethane foam.
2. Hydrophobic Polyurethane Chemical Grout: consists of premeasured, prepackaged polyurethane chemical grout with root inhibitor. The grout shall be non-toxic, non-flammable, high flash point (225˚ F) hydrophobic polymer of the type which is applied in a crack or open joint by use of a packer. Acrylamide Chemical Grout: consists of a low viscosity chemically reactive gel which is applied in a crack or open joint by use of a packer.
3. Acrylamide Chemical Grout: consists of a low viscosity chemically reactive gel which is applied in a crack or open joint by use of a packer.
4. Water: Potable from municipal/public water supply.
5. Filler Gaskets: Oakum, use strong fibrous jute material, saturated with grout for use in plugging larger opening in combination with the polyurethane grout.
6. Utilize proper grout for the intended application as recommended by the manufacturer. Grout conditions may be adjusted for catalyzing the reaction, inhibiting the reaction, lowering the freezing temperature of the grout solution, adding fillers, providing strength, or for inhibiting root growth according to the instructions of the grout manufacturer and in the specified quantities as recommended by the grout manufacturer.
7. Non-shrink grout:
    a. Cementitious non-shrink grout consists of premeasured, pre-packed cement based grouting material with aggregate requiring the addition of water
    b. Non-shrink grout shall achieve minimum 28-day strength of 6,000 psi according to ASTM C109.

C. Acceptable Sealant Grout Manufacturers and Products are:

1. Avanti Grout - AV-275 (hydrophobic polyurethane)
2. DeNeef Construction Chemicals - Hydro-Active Flex (hydrophobic polyurethane)
3. Sika Corporation - Fix HH LV (hydrophobic polyurethane)
4. Or approved equal.

D. Acceptable non-shrink grout manufacturers are:

1. Five Star Products, Inc.
2. Chemrex/Master Builders
3. Euclid Chemical Company
4. L&M Construction Chemicals, Inc.
5. A.H. Harris
6. Or approved equivalent

2.2 LINE MANHOLE (CEMENTITIOUS COATING)

A. Cementitious Liner for entire manhole or chimney:

1. Equipment: The basic equipment shall consist of pumps, containers, packers, hoses, nozzles, valves, and all necessary equipment and tools required to line manholes as required by the manufacturer.
2. Materials: The liner mix shall be cement-based, fiber-reinforced calcium aluminate mortar specifically designed to prevent infiltration and restore structural integrity, and to be spray applied to form a structurally enhanced, monolithic cementitious liner covering all interior manhole surfaces. Minimum applied thickness shall be ½ inch but application thickness must provide structurally stable manhole and form a barrier to water and gases. Material shall be premixed and specially formulated to resist hydrogen sulfide bacterial corrosion and abrasion in municipal sanitary sewer systems. The liner shall have the following properties as determined by laboratory testing:
3. The lining material shall meet the following minimum requirements at 28 days:

Compressive Strength	ASTM C109	9,000 psi
Flexural Strength	ASTM C293	700 psi
Shrinkage @ 90% Humidity	ASTM C596	0%
Tensile Strength	ASTM C496	>600 psi
Sulfide Resistance	ASTM C267	no visible attack at pH 2 or greater

4. Acceptable manufacturers and products are:
   a. Strong Systems, Inc. - Strong Seal QSR
   b. AP/M Permaform - Permacast Process
   c. Quadex - QM-1s Restore
   d. Or approved equal.

2.3 LINE MANHOLE (PROTECTIVE COATING)

A. High Build Epoxy Coating System**:**

1. Equipment: The basic equipment shall consist of pumps, containers, hoses, valves, and all necessary equipment and tools required to coat manholes as required by the manufacturer.
2. Base Coat Liner Materials – A cementitious liner shall be utilized as the base coat liner to uniformly resurface and provide a barrier coat and structural reinforcement for rehabilitative conditions prior to the final coat utilizing the urethane-modified epoxy (UME). The same material specified in Section 2.2 for manhole lining can be used for this base coat, provided it meets both specifications.
   a. Material will be an ultra-high density strength, high build, silica fume, fiber-reinforced, corrosion resistant mortar, based on Portland cement fortified with micro silica.
   b. Approved material shall exhibit the following physical properties:

Set Time at 77F ASTM C-403	24 hours
Modulus of Elasticity ASTM C-469	
24 hours	3,000,000+ psi
28 days	4,000,000+ psi
Flexural Strength ASTM C-293	
24 hours	600+ psi
28 days	800+ psi
Compressive Strength ASTM C-109	
24 hours	2,000+ psi
28 days	10,000+ psi
Tensile Strength ASTM C-307	600+ psi
Shear Bond ASTM C-882	>1,000 psi
Shrinkage ASTM C-157	<0.005
Chloride Permeability ASTM C-1202	<250 Coulombs

c. Acceptable Products and Manufacturers are**:**

i. Epoxytec International, Inc. - Epoxytec Mortartec Silicate (#RCHA1)

ii. Or approved equal.

3. Final Coat Liner Materials - Epoxy coating shall be resistant to all forms of chemical or bacteriological attack found in municipal sanitary sewer systems, including severe hydrogen sulfide (up to 600ppm).

a. Epoxy coating must be moisture tolerant to moisture levels of concrete up to 90%.

b. Epoxy coating must adhere to concrete with adhesion testing results in PSI that outperformed the cohesion of concrete (CIGMAT CT-2/3).

c. Epoxy coating shall be self-priming.

d. Approved material shall exhibit the following physical properties:

Solids by Volume ASTM D2697	100%
Solvent (VOC) ASTM D3960	0%
Water Absorption ASTM D1653	< 0.1 g/sq.m.
Tensile Strength ASTM D638	5,500 psi (min)
Flexural Modulus ASTM D790	55,000 psi
Flexural Strength ASTM D790	8,000 psi (min)
Compressive Strength ASTM D695	7,000 psi (min)
Elongation ASTM D2370	30-40%
Complete Cure (min)	18 hours (77F)

e. Acceptable Products and Manufacturers are:

i. Epoxytec International, Inc - Uroflex (#UME38-G4T)

ii. Raven Lining Systems - Raven 405

iii. Warren Environmental, Inc. - S-301 Epoxy Spray System

iv. Parson Environmental Products - Parsonpoxy SEL-80

v. Or approved equal.

2.4 REPAIR/REPLACEMENT OF MANHOLE CHIMNEY, WALL, AND PIPE SEALS

A. Equipment

1. Refer to Sections 02601.

B. Materials

1. Refer to Section 02601.

2.5 REPLACEMENT OF MANHOLE FRAME AND COVER

A. Equipment
   1. Refer to Section 02601.
B. Materials
   1. Refer to Section 02601.

2.6 APPLIED POLYMER CHIMNEY SEAL FOR MANHOLE CHIMNEY

A. Equipment
   1. The basic equipment shall consist of pumps, containers, injection packers, hoses, nozzles, brushes, valves, and all necessary equipment and tools required to apply polymer chimney seal as required by the manufacturer.
B. Materials
   1. The polymer chimney seal materials shall be corrosion resistant.
   2. Mil thickness shall be determined by the manufacturer.
   3. The polymer chimney seal may require a primer resin applied to the entire surface before application. The sealing system shall line the interior of the adjustment area from the cone / top of the manhole and onto the inside of the casting.
      a. If the manhole has been relined prior to the seal installation, the seal shall cover a maximum of 6 vertical inches to cover casting cone interface.
C. Acceptable Manufacturers and Products include:
   1. S.S.I. – FLEXSEAL
   2. Cladliner - Cladseal
   3. Or approved equal.

PART 3 - EXECUTION

3.1 MANHOLE PRE-REHABILITATION INSPECTIONS

A. Prior to rehabilitation of manholes, the Contractor and Engineer will inspect each manhole to determine or confirm the scope of rehabilitation as outlined herein:
   1. Open each manhole with the Engineer present and look for visible cracks, leaks, or evidence of past leaks. Areas of particular interest are manhole section joints and pipe openings.
      a. If available compare to the existing inspection and note any condition changes or discrepancies.
   2. Clean each manhole as outlined below. After cleaning, again look for visible cracks, leaks or evidence of past leaks, and general condition of the manhole.
   3. Provide Engineer a written list of manhole defects at least three weeks before the scheduled work.
   4. The Engineer shall review and confirm the scope of required rehabilitation prior to work commencing. The Owner and Engineer reserve the right to modify the scope at each manhole as needed to obtain the proper rehabilitation. The Engineer shall provide written direction to the Contractor for any scope changes.

3.2 SEAL MANHOLE (CHEMICAL GROUT)

A. Sealing Procedures for Precast, Brick and Block Manholes:

1. A high pressure washing of the manhole.
2. Removal and disposal of all roots, deposits, and loose debris.
3. At each point of leakage within the manhole structure (including at pipe penetrations), a hole shall be carefully drilled from within the manhole and shall extend through the entire manhole wall. In cases where there are multiple leaks around the circumference of the manhole, fewer holes may be drilled, providing all leakage is stopped from these holes.
4. Grout ports or sealant injection devices shall be placed in these previously drilled holes in such a way as to provide a watertight seal between the holes and the injection device.
5. A hose, or hoses, shall be attached to the injection device from an injection pump. Chemical sealing materials as specified shall then be pumped through the hose until material refusal is recorded on the pressure gage mounted on the pumping unit or a predetermined quantity of sealant has been injected. Care shall be taken during the pumping operation to ensure that excessive pressures do not develop and cause damage to the manhole structure.
6. Upon completion of the injection, the ports shall be removed and the remaining holes filled with mortar and troweled flush with the surface of the manhole walls or other surfaces. The mortar used shall be a non-shrink hydraulic cement.

B. Manhole Joint Sealing Procedures:
1. Set grout ports or injectors at 90° intervals at each joint in the manhole, as well as at each pipe penetration, or similarly evenly spaced around identified leak location, if different from examples above.
2. Inject chemical grout. Ensure that chemical grout fills entire circumference of each manhole joint or pipe penetration, or other identified leakage point.
3. Cut out all loose or protruding wall joints, mastic and fill all interior lift holes and pipe penetrations with hydraulic cement. Finish shall be trowel smooth.

C. Temporarily bypass pump wastewater around manholes, use flow through plugs, or otherwise divert flows as necessary. Refer to Section 02751.

3.3 LINE MANHOLE (CEMENTIITUOUS COATING)

A. Lining Procedures (Precast, Block and Brick Manholes): Liner materials shall be mixed per manufacturer's written specifications and applied using equipment specifically designed to meet required thickness and application requirements as set forth by the manufacturer.
B. Any active sewer flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be lined. Any active infiltration sources must be identified and stopped or handled in accordance with manufacturer recommendations prior to lining operations.
1. All surface preparations must be performed to meet or exceed manufacturer’s recommendations prior to application
C. Repair and lining materials must be applied by an experienced Applicator of the specified cementitious material and in accordance with the manufacturer's recommendations.
D. Minimum placement thickness shall be ½-inch.
E. Immediately following application, the cementitious liner material shall be troweled or brushed to achieve an even consistent surface.
F. Cementitious liner material shall be permitted to cure according to manufacturer recommendations.

G. In areas where the manhole walls are identified to be lined, the lining shall extend up beyond the top of the manhole chimney and onto the manhole frame, unless an internal mechanical seal is to be applied, in which case the lining shall continue to a point contained within the mechanical seal. At the lower extent, the manhole should be lined to the junction of the manhole wall and table.
H. Temporarily bypass pump wastewater around manholes, use flow through plugs, or otherwise divert flows as necessary. Refer to Section 02751.

3.4 LINE MANHOLE (PROTECTIVE COATING)

A. Epoxy Coating Procedures: Epoxy coating shall be mixed per manufacturer's written specifications and spray applied using equipment specifically designed to meet required thickness and safety precautions.
B. Contractor shall protect the uncured epoxy coating from water damage and in accordance with manufacturer recommendations.
C. All Surface preparations or base coat installations must be performed to meet or exceed manufacturer's recommendations prior to application
D. An approved certified applicator shall apply the protective epoxy coating.
E. Minimum placement thickness, maximum application thickness and multiple coats, if required, shall be in accordance with manufacturer's recommendations.
F. Epoxy coating shall be permitted to cure according to manufacturer recommendations.
G. Temporarily bypass pump wastewater around manholes, use flow through plugs, or otherwise divert flows as necessary. Refer to Section 02751.

3.5 REPAIR/REPLACEMENT OF MANHOLE CHIMNEY, WALL, AND PIPE SEALS

A. Temporarily bypass pump wastewater around manholes, use flow through plugs, or otherwise divert flows as necessary. Refer to Section 02751.
B. Remove debris from manhole and clean surfaces.
C. Remove damaged parts of chimney, wall, and pipe seals from manhole and clean surfaces.
D. Prepare and install chimney, wall, and pipe seals.
   1. Chimney, wall, and pipe seals: Construct per Section 02601.
   2. Masonry:
      a. Laying Brick: Refer to Section 02601.
      b. Curing: Refer to Section 02601.

3.6 REPLACEMENT OF MANHOLE FRAME AND COVER

A. Sawcut pavement.
B. Remove and dispose of frame, and cover.
C. Inspect the integrity of the chimney (brick and/or concrete ring and mortar).
D. Cleaning the chimney surfaces to be re-mortared
E. Furnish and set the new frame and cover with mortar on chimney to match grades
F. Repair pavement, as necessary.
G. Perform all manhole work in accordance with Section 02601
H. Perform pavement restoration in accordance with Section 02513

3.7 ADJUST MANHOLE FRAME AND COVER

A. Sawcut pavement.
B. Carefully remove frame and cover. Any damage to the chimney shall be repaired by the Contractor at no additional cost to the Owner.

C. Dispose of chimney off-site, as necessary.
D. Cleaning the surfaces to be re-mortared
E. Adjust the elevation by providing additional height as required and as indicated in the Contract Documents.
F. Prepare and reset frame and cover on new brickwork to match new grades.
G. Repair pavement, as necessary.
H. Perform all manhole work in accordance with Section 02601
I. Perform pavement restoration in accordance with Section 02513

3.8 APPLIED POLYMER SEAL OF MANHOLE CHIMNEY

A. All loose and protruding mortar and brick that would interfere with the chimney seal's performance shall be removed. All loose materials or excessive voids shall be repaired using a single component quick set repair mortar to create a smooth surface prior to installation.
B. The Contractor shall obtain from the polymer chimney seal manufacturer in writing the materials compatibility and the recommended time required for the mortar to properly cure prior to installing the polymer chimney seal.
C. Preparation of the chimney surface and casting may include using high pressure water, sandblasting, wire brushing, or other methods as described by the manufacturer to ensure a clean surface. The substrate surface must be dry and free of sand, loose debris, dust, oil, grease, or chemical contamination.
D. The polymer chimney seal shall require the proper mixing of several components.
E. If a primer is required, the primer shall cure properly before applying the polymer seal. The polymer chimney seal may be applied evenly by brush over the entire chimney area, including the frame joint area and the area above the manhole cone including all extensions to the chimney area.
   If the manhole has been relined prior to the seal installation, the seal shall cover a maximum of 6 vertical inches to cover casting cone interface.
F. Installation procedures shall be in accordance with the manufacturer's recommended instructions.

3.9 TESTING

A. Manhole Structure Sealing Test: Manhole structure sealing shall be visually inspected in the presence of the Engineer for watertightness against leakage of water into the manhole. All visible leaks and defects observed during inspection shall be repaired to the Engineer's satisfaction and at no additional cost to the Owner.
B. Manhole Liner Test: Manhole cementitious liner shall be visually inspected in the presence of the Contractor for watertightness against leakage of water into the manhole. All visible leaks and defects observed during inspection shall be repaired to the Engineer's satisfaction and at no additional cost to the Owner.
C. Mechanical seals shall be visually inspected for water-tightness and quality workmanship following successful installation.
D. Manhole Protective Coating: Manhole epoxy coating shall be visually inspected in the presence of the Contractor on the same day of application. Any visible leaks and defects observed during inspection shall be repaired to the Engineer's satisfaction and at no additional cost to the Owner.
E. Holiday Testing of Manhole Protective Coating or Applied Polymer Chimney Seal

1. The Contractor shall use an approved third-party National Association of Corrosion Engineers (NACE) accredited inspector or manufacturer's representative to perform holiday (spark) tests in accordance with the coating manufacturer's recommendations and check for voids. These tests shall be performed in the presence of the Engineer. Up on final completion of the work, the manufacturer shall provide a written certification to the Owner and the Engineer that the repair materials were applied per the manufacturer's recommendations**.**

2. After the epoxy coating product has properly set and cured in accordance with manufacturer instructions, all surfaces shall be inspected for holidays with high-voltage holiday detection equipment. Reference NACE RPO 188-99 for performing holiday detection.

3. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional coatings can be hand applied to the repair area.

4. All touch-up/repair procedures shall follow the coating manufacturer's recommendations and at no additional cost to the Owner.

5. Documentation on areas tested, results, and repairs made shall be provided to the Owner and Engineer in writing by the General Contractor.

F. The Engineer and Owner reserve the right to inspect the rehabilitated manholes during the warranty period (including during periods when the groundwater table is higher than at the time the work is completed). The Owner or Engineer shall notify the Contractor prior to inspection and the Contractor shall be present during the inspection. Any leakage or defects in the work found by this inspection shall be corrected by the Contractor at no additional cost to the Owner.

END OF SECTION

APPENDICES

APPENDIX A
Sewer Pipe and Manhole Rehabilitation Plans and Details

REVISED: 1/29/2019

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

N

0 0.125 0.25 0.5 Miles

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO:	DATE:
13487A	6/21/2018

WRIGHT-PIERCE Engineering a Better Environment

FIGURE: Index

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RehabMapbook2-Index-100Scale-v6-11x17-L.mxd

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

Manhole Recommendations

Manhole	Location	Recommendations
R58_11565	Weston Street	Remove Cross Bore
R58_11585	Weston Street	Replace Manhole
R58_07615	Weston Street	Repair Chimney, Repair Wall
R58_03025	Vernon Street	Grout Wall, Line Manhole
R58_03030	Vernon Street	Grout Wall, Repair Wall
R58_11645	Vernon Street	Repair Chimney
R58_06635	Weston Street	Replace Manhole

Pipe Recommendations

Upstream MH	Downstream MH	Location	Recommendation
R58_11590	R58_11585	Eddy Street	Replace pipe
R58_11650	R58_11645	Cabot Street	Structural liner
R58_11565	R58_11560	Weston Street	Structural liner
R58_03025	R58_03020	Vernon Street	Structural liner
R58_03030	R58_03025	Vernon Street	Structural liner
R58_07620	R58_07615	Vernon Street	Point repair replace
R58_11580	R58_07620	Vernon Street	Structural liner
R58_09995	R58_06635	Everett Street	Replace pipe

LIMIT OF WORK

LIMIT OF WORK

Upsize to 8" Diameter

Upsize to 8-inch diameter

Point replace at 61 ft from R58_07615

MAIN ST
EVERETT ST
EDDY ST
ELM AVE
WESTON ST
VERNON ST
CABOT ST
BOYNTON ST
FISKE AVE
THAN RD
CAL

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
FIGURE: A-8

WRIGHT-PIERCE
Engineering a Better Environment

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REVISED: 1/29/2019

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

Manhole Recommendations

Manhole	Location	Recommendations
R58_11610	Vernon Street	Replace Manhole

Pipe Recommendations

Upstream MH	Downstream MH	Location	Recommendation
R58_11615	R58_11610	Auburn Street	Replace pipe

Upsize to 8-inch diameter

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
FIGURE: A-9

WRIGHT-PIERCE
Engineering a Better Environment

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RehabMapbook2-PageA9-100Scale-v6-11x17-L.mxd

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

Manhole Recommendations

Manhole	Location	Recommendations
R58_11615	Auburn Street	Replace Manhole
R58_11620	Auburn Street	Replace Manhole
R58_11630	Auburn Street	Replace Manhole
R58_11635	Auburn Street	Replace Manhole
R58_11670	Cabot Street	Replace Manhole
R58_07630	Winthrop Street	Replace Manhole
R58_07635	Winthrop Street	Replace Manhole
R58_07640	Winthrop Street	Replace Manhole
R58_11675	Cabot Street	Replace Manhole
R58_07645	Pearl Street	Cross Bore Removal, Replace Manhole
R67_11680	Cabot Street	Replace Manhole
R67_11710	Boynton Street	Replace Manhole
R67_07665	Bedford Street	Cross Bore Removal, Replace Manhole
R58_11650	Cabot Street	Clean
R58_11660	Winthrop Street	Replace Manhole
R58_11665	Winthrop Street	Replace Manhole
R58_11700	Winthrop Street	Replace Manhole
R58_11705	Winthrop Street	Replace Manhole
R67_07660	Bedford Street	Replace Manhole
R67_11715	Boynton Street	Replace Manhole

Pipe Recommendations

Upstream MH	Downstream MH	Location	Recommendation
R58_11655	R58_11650	Cabot Street	Structural liner
R58_11695	R58_11690	Boynton Street	Point repair replace and structural liner
R58_11635	R58_11630	Auburn Street	Replace pipe with 8" PVC
R58_11630	R58_11620	Auburn Street	Replace pipe with 8" PVC
R58_11620	R58_11615	Auburn Street	Replace pipe with 8" PVC
R58_07635	R58_07630	Winthrop Street	Replace pipe with 8" PVC
R58_07640	R58_07635	Winthrop Street	Replace pipe with 8" PVC
R58_07645	R58_07635	Pearl Street	Replace pipe with 8" PVC
R58_11665	R58_11660	Winthrop Street	Replace pipe with 8" PVC
R58_11705	R58_11700	Winthrop Street	Replace pipe with 8" PVC
R58_11675	R58_11670	Cabot Street	Replace pipe
R67_11680	R58_11675	Cabot Street	Replace pipe
R67_11710	R58_11700	Boynton Street	Replace pipe
R67_07665	R67_07660	Bedford Street	Replace pipe
R67_07660	R67_07655	Bedford Street	Replace pipe
R67_11715	R67_11710	Boynton Street	Replace pipe

Point replace at 17 ft from R58_11695, cut roots & structural liner from 62-66 ft from R58_11695

Water Main Relocation

N

0 50 100 200 Feet

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Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
FIGURE: A-10

WRIGHT-PIERCE
Engineering a Better Environment

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Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

Replace Manholes on Auburn St

Upsize to 8-inch diameter

Replace with 8" PVC

Replace with 8" PVC

Replace Manholes

AUBURN ST

WINTHROP ST

SOUTH ST

BEDFORD ST

CHARLES ST

PROSPECT ST

CURTIS ST

PRATT AV

ARLES ST

Manhole Recommendations		
Manhole	Location	Recommendations
R59_02995	South Street	Seal Chimney/Frame
R58_07630	Winthrop Street	Replace Manhole
R58_11615	Auburn Street	Replace Manhole
R58_11620	Auburn Street	Replace Manhole
R58_11615	Auburn Street	Replace Manhole
R67_07655	Bedford Street	Replace Manhole

Pipe Recommendations			
Upstream MH	Downstream MH	Location	Recommendation
R58_11630	R58_11620	Auburn Street	Replace pipe with 8" PVC
R58_11620	R58_11615	Auburn Street	Replace pipe with 8" PVC
R58_11615	R58_11610	Auburn Street	Replace pipe with 8" PVC
R58_07635	R58_07630	Winthrop Street	Replace pipe with 8" PVC
R58_07630	R58_07625	Winthrop Street	Replace pipe with 8" PVC

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: A-11

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhaseRehabMapbook2-PageA11-100Scale-v6-11x17-L.mxd

REVISED: 1/29/2019

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

Manhole Recommendations

Manhole	Location	Recommendations
R67_11740	Andrea Road	Replace Manhole
R67_11720	Boynton Street	Replace Manhole
R67_11725	Boynton Street	Replace Manhole

Pipe Recommendations

Upstream MH	Downstream MH	Location	Recommendation
R67_11725	R67_11720	Boynton Street	Replace pipe
R67_11720	R67_11715	Boynton Street	Replace pipe

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: A-12

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RehabMapbook2-PageA12-100Scale-v6-11x17-L.mxd

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

Manhole Recommendations

Manhole	Location	Recommendations
R67_07670	South Street	Seal Chimney/Frame
R67_07735	South Street	Repair Chimney, Repair Wall

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: A-13

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RehabMapbook2-PageA13-100Scale-v6-11x17-L.mxd

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

Manhole Recommendations

Manhole	Location	Recommendations
R67_07770	South Street	Replace Manhole
R67_07825	Wheelock Road	Line Manhole
R67_07820	South Street	Repair Chimney, Replace Frame and Cover
R67_07840	South Street	Replace Manhole
R67_07815	South Street	Repair Chimney, Repair Wall, Seal Chimney/Frame

Pipe Recommendations

Upstream MH	Downstream MH	Location	Recommendation
R67_07825	R67_07820	South Street	Structural liner
R67_07840	R67_07825	South Street	Structural liner
R67_07815	R67_07810	South Street	Structural liner

Note:
MH R67_07860 listed in Table 3 of Section 01010 is located approx. 450' upstream of MH R67_07841 (4th MH upstream) and is not shown on these plans.

N

0 50 100 200 Feet

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Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
FIGURE: A-14

WRIGHT-PIERCE
Engineering a Better Environment

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhase-RehabMapbook2-PageA14-100Scale-v6-11x17-L.mxd

Sewershed
Sewer Pump Station
Line Manhole
Point Repair, Line
Point Repair, Root Removal
Replace Manhole
Remove Cross Bore
Replace Frame & Cover
Point Repair
Point Repair, Replace Frame & Cover
Point Repair, Replace Manhole
Clean
Root Removal, Replace Frame & Cover
Sewer Manhole
Unknown Lateral
Other Sewer Structure
CB/Inlet
DMH
Outfall/Outlet
Other Storm Structure
Hydrant
Water Pump Station
Private Sewer
Cut roots
Replace pipe
Structural liner
Point repair line, Point repair replace
Point repair replace
Heavy clean
City Sewer
Lateral
Drain Line
Water Line
Water Service
City Boundary

REVISED: 1/29/2019

139R
17
15
MORRIS ST
195-97
12
201-03
207-09
211
13-15
217
225
227-29
218-2
250
246
SOUTH ST
R67_07750
R67_07751
R67_07765
R67_27815
R67_27820
R67_07760
R67_07765
R67_26990
R67_27825
R67_25995
9
R68_07720
R68_07725
R68_07730
R68_07731
HOPE AVE
60
70-80
216R
218R
203
R68_00010
R68_00015
6"
8"
4"
18"

Manhole Recommendations		
Manhole	Location	Recommendations
R67_07750	South Street	Repair Bench
R67_25995	South Street	Grout Wall
R67_07751	South Street	Repair Chimney, Seal Chimney/Frame

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/25/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: A-15

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhase\DesignPhaseRehab\DesignPhase-RehabMapbook2-PageA15-100Scale-v6-11x17-L.mxd

GENERAL NOTES

1. THE CONTRACTOR IS REFERRED TO SECTION 01050 OF THE SPECIFICATIONS REGARDING COORDINATION WITH OTHERS, INCLUDING RESPONSIBILITIES AND RELATED COSTS.

2. BELOW GRADE UTILITY INFORMATION FROM GIS DATA. LOCATION OF PUBLIC UTILITIES SHOWN IS ONLY APPROXIMATE AND MAY NOT BE COMPLETE. PRIVATE UNDERGROUND UTILITIES SUCH AS, BUT NOT LIMITED TO, SEWER LINES, WATER LINES AND BURIED ELECTRICAL SERVICE ENTRANCES ARE NOT SHOWN. THE CONTRACTOR SHALL ASCERTAIN THE LOCATION AND SIZE OF EXISTING UTILITIES IN THE FIELD WITH THE RESPECTIVE UTILITY COMPANY REPRESENTATIVE PRIOR TO COMMENCING WORK. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THE DRAWINGS (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR TO DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORING, OR RE-PAVING. REFER TO SPECIFICATION SECTION 01050. ADDITIONAL TEST PITS, BEYOND THOSE SHOWN, MAY BE REQUIRED. PER MASSACHUSETTS GENERAL LAW, THE CONTRACTOR SHALL CALL DIG SAFE (811), AND THE CITY WATER AND SEWER DEPARTMENTS BEFORE ANY EXCAVATION, CONTACTS ARE AS FOLLOWS:

POLICE DEPARTMENT: 155 LEXINGTON STREET WALTHAM, MA 02452 TEL: (781) 314-3600	TREE WARDEN 165 LEXINGTON ST. WALTHAM, MA 02452 (781) 314-3850 KEVIN THOMPSON	WIRES DEPARTMENT 119 SCHOOL ST. RM 12 WALTHAM, MA 02452 (781) 314-3175, TIMOTHY KELLY
FIRE DEPARTMENT: 175 LEXINGTON STREET WALTHAM, MA 02452 TEL: (781) 314-371 TEL: 1-800-233-5325	WATER & SEWER DIVISION: 169 LEXINGTON ST WALTHAM, MA 02452 TEL: (781) 314-3810	GAS: NATIONAL GRID NORTHBOROUGH, MA 01532
ELECTRIC: NSTAR ONE NSTAR WAY WESTWOOD, MA 02090 TEL: 1-800-592-2000	CABLE: VERIZON: 1-800-837-4966 RCN: 1-800-746-4726 COMCAST: 1-800-266-2278	TELEPHONE: VERIZON TEL: 1-800-837-4966

3. THE CONTRACTOR SHALL NOTIFY RESIDENTS 48 HOURS IN ADVANCE OF WHEN CONSTRUCTION WILL BE OCCURRING IN PROXIMITY TO THEIR RESIDENCE OR BUSINESS.

4. PLANS DEVELOPED BASED ON CITY OF WALTHAM GIS DATA.

5. THE CONTRACTOR SHALL EMPLOY A MASSACHUSETTS LICENSED SURVEYOR TO ESTABLISH VERTICAL CONTROL POINTS FOR CONSTRUCTION PURPOSES. THE ELEVATION OF EXISTING STRUCTURES TO BE TIED INTO SHALL BE CONFIRMED OR ESTABLISHED. VERTICAL CONTROL POINTS.

6. TO THE EXTENT POSSIBLE ASBESTOS CEMENT (AC) PIPE MATERIAL IS IDENTIFIED. CONTRACTOR MAY ENCOUNTER AC MATERIALS OUTSIDE OF THOSE IDENTIFIED. CONTRACTOR SHALL CONFORM TO ALL APPLICABLE PROVISIONS OF OSHA AND ALL OTHER FEDERAL, STATE AND LOCAL REGULATIONS WHEN HANDLING, REMOVING AND DISPOSING OF ASBESTOS CEMENT PIPES. A BID ITEM HAS BEEN INCLUDED IN THE BID FORM TO ESTABLISH A UNIT PRICE FOR THE REMOVAL AND DISPOSAL OF ASBESTOS CEMENT PIPE. SEE SPECIFICATION SECTION 02076.

7. DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSIONS AND STATIONING SHALL PREVAIL.

8. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TRAFFIC FLOW AT ALL TIMES. THE CONTRACTOR IS REQUIRED TO SUBMIT A TRAFFIC CONTROL PLAN TO THE OWNER PRIOR TO COMMENCING CONSTRUCTION. THE WALTHAM POLICE DEPARTMENT AND FIRE DEPARTMENT ARE TO BE NOTIFIED AT LEAST 24 HOURS IN ADVANCE OF ANY WORK. IN ADDITION, CONTRACTOR IS TO COORDINATE WITH WALTHAM POLICE DEPARTMENT FOR UNIFORMED TRAFFIC CONTROL FOR ALL WORK ON STREETS. THE CONTRACTOR SHALL COMPLY WITH ANY CONDITIONS SET BY THE PUBLIC SAFETY OFFICIALS. CONTRACTOR SHALL INSTALL AND MAINTAIN PERMANENT AND TEMPORARY TRAFFIC CONTROL DEVICES AS NECESSARY AND IN A MANNER CONSISTENT WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).

9. THE OWNER WILL BE RESPONSIBLE FOR OBTAINING ANY PERMITS REQUIRED TO PERFORM THE WORK INCLUDING THOSE PERMITS LISTED IN THE SUPPLEMENTARY OR SPECIAL CONDITIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE APPLICABLE PROVISIONS OF EACH PERMIT AS THEY APPLY TO THE WORK PRIOR TO BIDDING AND ABIDE BY THOSE PROVISIONS DURING CONSTRUCTION. ALL OTHER PERMITS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

10. THE OWNER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY RIGHTS OF WAY AND EASEMENTS. THE CONTRACTOR SHALL VERIFY THAT THE NECESSARY EASEMENTS HAVE BEEN SECURED BY THE OWNER. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE APPLICABLE PROVISIONS OF EACH EASEMENT AS THEY APPLY TO THE WORK PRIOR TO BIDDING AND ABIDE BY THOSE PROVISIONS DURING CONSTRUCTION. COPIES OF ALL RIGHTS-OF-WAY AND EASEMENTS ARE AVAILABLE FOR REVIEW FROM THE WALTHAM ENGINEERING DEPARTMENT.

11. EXCAVATION WITHIN 18" OF ANY UTILITY SHALL BE COMPLETED BY HAND TO EXPOSE THE UTILITY LOCATION. AFTER VERIFYING THE UTILITY LOCATION AND DEPTH, MECHANICAL EXCAVATION METHODS CAN RESUME, TAKING CARE NOT TO DAMAGE THE UTILITY.

12. ALL TEST PITS SHALL BE EXCAVATED PRIOR TO CONSTRUCTION LAYOUT AND RESULTS REPORTED TO THE ENGINEER FOR REVIEW FOR CONFORMANCE TO THE PLANS. TEST PITS ARE REQUIRED WHERE SHOWN ON THE PLANS AND AS DIRECTED BY THE ENGINEER. NOT ALL REQUIRED TEST PITS ARE SHOWN ON THE PLANS. TEST PITS WILL BE DUG AT LEAST 15 DAYS PRIOR TO CONNECTING PROPOSED SEWERS TO EXISTING SEWERS. THE RESULTS OF TEST PITS DUG TO DETERMINE EXISTING SEWER/DRAIN ELEVATIONS AND LOCATIONS WILL BE REPORTED TO THE ENGINEER AT LEAST TEN DAYS PRIOR TO ANY WORK. ADJUSTMENTS TO INVERTS, LENGTHS, AND SLOPES OF PROPOSED SEWER/DRAIN MAY BE REQUIRED AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF ALL PROPOSED LINES AND STRUCTURES AS SHOWN ON THE DRAWINGS. THE LAYOUT PLAN SHALL BE REVIEWED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE HORIZONTAL ALIGNMENT OF THE NEW SEWERS MAY BE ADJUSTED IN THE FIELD SUBJECT TO PRIOR APPROVAL BY THE ENGINEER. ALL ELEVATIONS REFER TO THE NATIONAL GEODETIC VERTICAL DATUM. ORIENTATION IS GRID NORTH MASSACHUSETTS STATE PLANE COORDINATE SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ALL ELEVATION REFERENCE INFORMATION PRIOR TO USE IN CONSTRUCTION.

13. CONTRACTOR SHALL MINIMIZE CLEARING OPERATIONS. CLEARING AND GRUBBING SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02110. CLEARING LIMITS SHALL BE AS INDICATED ON THE DRAWINGS, BUT AT ALL TIMES WITHIN EXISTING ROAD RIGHTS-OF-WAY AND PROPERTY LINES ON STATE OR COUNTY-OWNED PROPERTY OR EASEMENTS. ALL GRUBBINGS AND EXCESS EXCAVATED MATERIAL ARE THE PROPERTY OF THE CONTRACTOR AND WILL BE DISPOSED OF AT A SITE PROVIDED BY THE CONTRACTOR IN COMPLIANCE WITH ALL STATE AND LOCAL LAWS.

14. NO TREE OR LIMB SHALL BE CUT WITHOUT THE PRIOR APPROVAL OF THE CITY OF WALTHAM. TREES ALLOWED TO BE CUT WILL BE FLAGGED BY THE CONTRACTOR AND PAINT MARKED BY THE CITY FOR VERIFICATION PRIOR TO CUTTING. FOR TREES THAT ARE ALLOWED TO BE CUT, CONTRACTORS SHALL REMOVE TREE AND STUMP, AND REPAIR SIDEWALK AND CURB. THE CONTRACTOR IS TO TAKE SPECIAL CARE NOT TO DAMAGE TREES WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED.

15. LOCATION OF PROPOSED STORM DRAIN OR SANITARY SEWER SHALL MINIMIZE DISTURBANCE OF ROOT SYSTEMS OF EXISTING TREES OR SHRUBS. CONTRACTOR SHALL EXERCISE CARE TO PREVENT DAMAGE THERETO.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREVENTION OF EROSION. ALL DISTURBED EARTH SURFACES ARE TO BE STABILIZED IN THE SHORTEST PRACTICAL TIME AND TEMPORARY EROSION CONTROL DEVICES SHALL BE EMPLOYED UNTIL SUCH TIME AS ADEQUATE SOIL STABILIZATION HAS BEEN ACHIEVED. TEMPORARY STORAGE OF EXCAVATED MATERIAL IS TO BE IN A MANNER THAT WILL MINIMIZE EROSION. THE CONTRACTOR SHALL DISPOSE OF UNSUITABLE EXCAVATED MATERIAL AT A SITE PROVIDED BY HIM WHICH IS IN COMPLIANCE WITH ALL STATE AND LOCAL LAWS. REFER TO EROSION CONTROL SHEET AND SPECIFICATION SECTIONS 02226 AND 02270 FOR MORE INFORMATION.

17. COMPACTION TESTS SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION SECTION 02200. ANY SETTLEMENT OCCURRING WITHIN ONE YEAR OF SUBSTANTIAL COMPLETION OF THE PROJECT WILL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.

18. OPEN TRENCHES MUST BE BACKFILLED AND PAVED AT THE END OF EACH WORKDAY, REFER TO THE TEMPORARY PAVING DETAIL

19. CONTRACTOR SHALL CONTROL DUST TO A TOLERABLE LIMIT AS OUTLINED IN SPECIFICATION SECTION 01562. CONTRACTOR SHALL NOT TRACK OR SPILL EARTH AND DEBRIS ON PUBLIC STREETS OUTSIDE THE PROJECT AREA. STREETS OPENED TO THE PUBLIC SHALL BE KEPT SWEPT AND FREE OF DEBRIS.

20. WHEREVER PROPOSED SEWER AND DRAIN MANHOLES ARE LOCATED PARTLY WITHIN A PAVED AREA AND PARTLY IN A NON-PAVED AREA, A BITUMINOUS CONCRETE PAVED APRON 2-FEET WIDE SHALL BE SUPPLIED AROUND THE PROPOSED COVER. PAVEMENT SHALL SLOPE AWAY FROM THE COVER.

21. SERVICE CONNECTIONS ARE NOT SHOWN ON DRAWINGS. THE ACTUAL NUMBER, LENGTH, AND LOCATION SHALL BE AS FIELD DETERMINED AT THE TIME OF CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THE LOCATION OF SERVICES BY EXPLORATORY EXCAVATION AND REVIEWING CITY TIE CARDS.

22. THE LOCATIONS AND DEPTHS OF EXISTING GAS, WATER AND SEWER SERVICES ARE UNKNOWN. FOR UTILITY PIPE CROSSINGS THAT ARE SHOWN IN THE PROFILE, WATER MAINS ARE SHOWN WITH 5 FEET OF COVER OVER THE PIPE, AND GAS MAINS ARE SHOWN WITH 3 FEET OF COVER OVER THE PIPE. ACTUAL FIELD ELEVATIONS MAY VARY, CONTRACTOR SHALL FIELD VERIFY. CONTRACTOR SHALL ANTICIPATE AT LEAST ONE GAS, WATER AND SEWER SERVICE FOR EACH BUILDING. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING GAS, WATER AND SEWER MAINS AND SERVICES. THE CONTRACTORS SCHEDULE SHALL TAKE INTO CONSIDERATION REASONABLE TIME TO CROSS AND IF REQUIRED TO RELOCATION EXISTING SERVICES AND WATER MAINS AFFECTED BY THE WORK AND HE SHALL HAVE NO CLAIMS FOR ADDITIONAL TIME OR COSTS ASSOCIATED WITH THESE ROUTINE RELOCATIONS. ADDITIONALLY, DEPTHS OF NEW PIPE MAY BE ADJUSTED AT THE DISCRETION OF THE ENGINEER TO MINIMIZE CONFLICTS WITH WATER, GAS AND SEWER SERVICES.

23. INSULATE OVER ANY GRAVITY SEWER PIPE WHEN COVER IS LESS THAN 4 FT, OR THERE IS LESS THAN 2 FT BETWEEN THE SEWER AND A CULVERT OR DRAIN LINE.

24. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

25. THE CONTRACTOR SHALL NOT HAVE ANY RIGHT OF PROPERTY IN ANY MATERIALS TAKEN FROM ANY EXCAVATION. SUITABLE EXCAVATED MATERIAL MAY BE INCORPORATED IN THE PROJECT, WITH EXCESS MATERIAL DISPOSED OF AT A LOCATION PROVIDED BY THE CONTRACTOR. THESE PROVISIONS SHALL IN NO WAY RELIEVE THE CONTRACTOR OF HIS OBLIGATIONS TO PROPERLY DISPOSE OF AND REPLACE ANY MATERIAL DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILLING. THE CONTRACTOR SHALL DISPOSE OF UNSUITABLE AND EXCESS MATERIAL IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE CONTRACT DOCUMENTS.

26. WATER MAIN CROSSING SEWER PIPE SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF THE SEWER PIPE. WHERE POSSIBLE, WATER MAINS SHOULD BE INSTALLED OVER SEWER PIPE. WHERE A WATER MAIN CROSSES UNDER A SEWER PIPE, A FULL LENGTH OF SEWER PIPE SHALL BE CENTERED ABOVE THE WATER LINE SO THAT BOTH JOINTS WILL BE AS FAR FROM THE WATER LINE AS POSSIBLE. THE FIRST SEWER JOINTS ON EITHER SIDE OF THE WATER MAIN SHALL BE ENCASED IN FLOWABLE FILL. WHERE IS IT IMPOSSIBLE TO OBTAIN 18 INCHES VERTICAL SEPARATION, BOTH THE WATER MAIN AND SEWER PIPE SHOULD BE ENCASED IN FLOWABLE FILL FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF THE CROSSING. THE WATER AND SEWER WILL BE TESTED FOR WATER TIGHTNESS BY THE CONTRACTOR. THE CROSSING MAY REQUIRE SPECIAL STRUCTURAL SUPPORTS FOR THE WATER MAIN AND SEWER PIPE. SEE WATER CROSSING DETAILS.

27. THE CONTRACTOR SHALL MAINTAIN RECORDS OF THE ACTUAL AS-BUILT LOCATIONS AND DIMENSIONS OF THE WORK.

28. THE CONTRACTOR SHALL RE-SHAPE INVERTS AS REQUIRED WHEN CONNECTING INTO EXISTING MANHOLES.

29. CONTRACTOR TO NOTE THAT IN GENERAL EXISTING CONDITIONS INFORMATION ON THE DRAWINGS ARE SHOWN IN LIGHTER WEIGHTS AND WITH A SLANTED TYPE TEXT. THE PROPOSED SANITARY SEWER PIPES AND STRUCTURES ON THE PROFILES ARE SHADED.

30. ALL PIPE LINES SHALL SLOPE UNIFORMLY BETWEEN MANHOLES. NO CRESTS OR SAGS IN PIPING WILL BE PERMITTED.

31. WHERE NEW PIPING IS TO BE CONNECTED TO EXISTING PIPING, THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ADAPTERS, FITTINGS, AND ADDITIONAL PIPE AS REQUIRED TO COMPLETE THE CONNECTION. CONTRACTOR SHALL VERIFY LOCATION, ELEVATION, ORIENTATION AND MATERIAL OF CONSTRUCTION.

32. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND DISPOSING OF ALL DEMOLISHED PIPING, AND MATERIALS. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL STATE AND LOCAL REGULATIONS. THE OWNER RESERVES THE RIGHT TO RETAIN ANY SUCH PIPING, AND MATERIALS DESIGNATED FOR DEMOLITION FOR HIS USE. SUCH MATERIALS TO BE RETAINED SHALL BE PROPERLY STORED IN AN APPROVED LOCATION. COORDINATE LOCATION AND MATERIALS TO BE SALVAGED WITH THE OWNER/ENGINEER.

33. THE CONTRACTOR SHALL KEEP A RECORD OF DEMOLITION AS PART OF THE PROJECT RECORD DOCUMENTS IN ACCORDANCE WITH SPECIFICATION SECTION 01720.

34. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO ENSURE THAT UTILITIES ARE MAINTAINED ACTIVE DURING CONSTRUCTION. GRAVITY OR PUMPED BYPASSES AND OTHER MEANS OF MAINTAINING FLOW SHALL BE SUBJECT TO THE REVIEW AND ACCEPTANCE OF THE ENGINEER. THE CONTRACTOR SHALL COORDINATE ANY TEMPORARY STOPPAGES OR BYPASSES WITH THE OWNER AND ENGINEER.

35. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE APPROPRIATE DISPOSAL OF FLOWS RESULTING FROM PRECIPITATION AND DEWATERING OPERATIONS. REFER TO SPECIFICATION SECTION 02401 FOR MORE INFORMATION.

36. CONTRACTOR SHALL REMOVE AND REPLACE, OR REPAIR, ALL CURBS, SIDEWALKS, PAVEMENT AND OTHER ITEMS DAMAGED BY HIS CONSTRUCTION ACTIVITIES TO AT LEAST THEIR ORIGINAL CONDITION, TO THE SATISFACTION OF THE OWNER AND ENGINEER.

37. WHERE EXISTING PAVEMENT IS REMOVED AND REPLACED, MATCH EXISTING GRADES TO THE EXTENT POSSIBLE.

38. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF ALL PROPOSED WORK AS SHOWN ON THE DRAWINGS.

39. THE RIGHT-OF-WAY FOR ROADS AND PERMANENT EASEMENT BOUNDARIES ARE THE TYPICAL CONSTRUCTION LIMITS.

40. ABANDON OR REMOVE EXISTING PIPING AS REQUIRED FOR CONSTRUCTION OF NEW UTILITIES. ALL PIPING TO BE ABANDONED OR REMOVED SHALL BE COORDINATED WITH THE OWNER AND ENGINEER BEFORE COMMENCING THAT WORK. SEVERING OF EXISTING UTILITIES FOR ABANDONMENT OR REMOVAL OF A SEGMENT FROM SERVICE SHALL BE PERFORMED IN SUCH A MANNER AS TO ALLOW THE REMAINING ACTIVE SEGMENT TO CONTINUE IN ITS INTENDED SERVICE. CAP ACTIVE SEGMENTS WITH APPROPRIATE FITTINGS, JOIN RESTRAIN, ETC TO ENSURE THEIR INTEGRITY. ABANDONING A PIPE IS DEFINED AS LEAVING THE PIPE IN ITS EXISTING LOCATION AND FILLING THE PIPE WITH FLOWABLE FILL AND CAPPING THE ENDS OF THE PIPE AS SHOWN ON THE DETAILS. WHERE CAPPING OF PIPE OCCURS NEAR A MANHOLE, THE PIPE CAPPING SHALL OCCUR INSIDE THE MANHOLE. REMOVING A PIPE IS DEFINED AS REMOVING AND DISPOSING OF THE BURIED PIPE. IF ABANDONED PIPE CONFLICTS WITH NEW PIPING THEN A PORTION OF THE ABANDONED PIPE SHALL BE REMOVED BEFORE THE NEW ENDS OF THE PIPE IS ABANDONED.

41. ALL STRUCTURES AND PIPELINES LOCATED ADJACENT TO THE TRENCH EXCAVATION SHALL BE PROTECTED AND FIRMLY SUPPORTED BY THE CONTRACTOR UNTIL THE TRENCH IS BACKFILLED. DAMAGE TO ANY SUCH STRUCTURES CAUSED BY, OR RESULTING FROM, THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. ALL UTILITIES REQUIRING REPAIR, RELOCATION OR ADJUSTMENT AS A RESULT OF THE PROJECT SHALL BE COORDINATED THROUGH THE RESPECTIVE UTILITY.

42. IN THOSE INSTANCES WHERE POWER OR TELEPHONE POLE SUPPORT IS REQUIRED, THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH UTILITY(S) ACCORDINGLY. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR TEMPORARY BRACING OF UTILITIES. THE CONTRACTOR SHALL COORDINATE RELOCATION OF TELEPHONE POLES WITH THE RESPECTIVE UTILITY.

43. ALL PIPING, AND/OR STRUCTURES TO BE DEMOLISHED AND/OR REMOVED FROM SERVICE AND REMAIN IN-PLACE SHALL BE PLUGGED AND FILLED IN IT'S ENTIRETY WITH FLOWABLE FILL.

44. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETTING ALL EXISTING PROPERTY MONUMENTATION THAT IS DISTURBED BY HIS OPERATIONS AT NO EXPENSE TO THE OWNER. THIS WORK IS TO BE DONE BY A LAND SURVEYOR LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS.

Sequencing Notes:

The Time of Completion shall be as follows. All work within Group 1 including final pavement and site restoration shall be completed no later than October 31, 2019. It is the intent of this Contract that work on Group 1 roadways will be performed and completed within the 2019 construction season. Final completion shall be within 210 calendar days after the date of the Notice to Proceed. Please refer to Section 01010, Paragraph 3.3 for further information.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			
5			

DESIGNED BY:
CAD COORD.: DXS
CAD:
CHECKED BY:
DATE:
APPROVED BY:
DATE:
PROJECT NO.: 13487A

WRIGHT-PIERCE
Engineering a Better Environment
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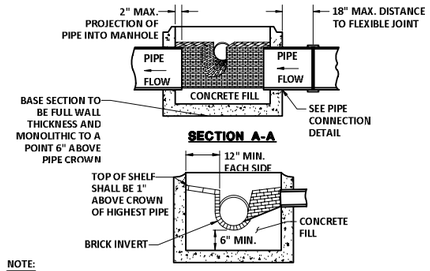
CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

NOTES, LEGEND, AND ABBEREVIATIONS

DRAWING
C-1

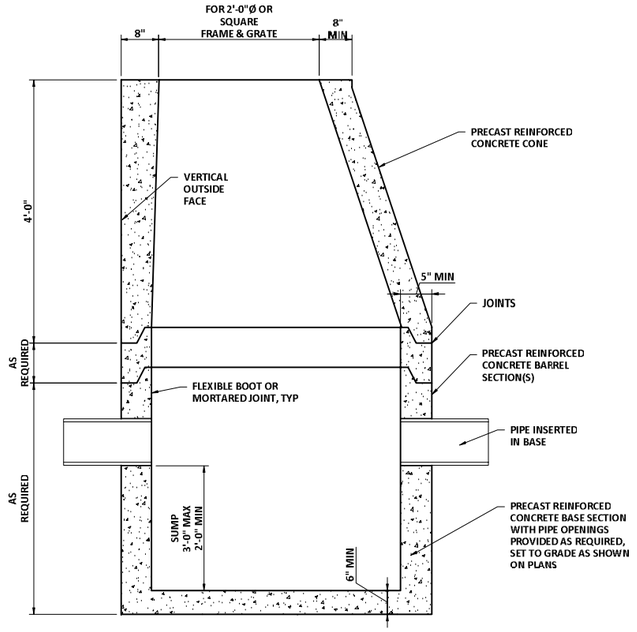


NOTE:

1. CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT. INVERT BRICKS SHALL BE LAID ON EDGE.
2. INVERT AND SHELF TO BE PLACED AFTER SUCCESSFUL VACUUM TEST.

SEWER INVERT DETAIL

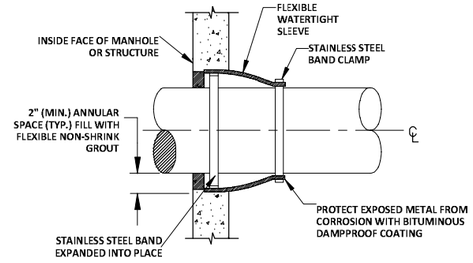
NTS



NOTE:
USE FLAT SLAB TOP CATCH BASIN WHERE REQUIRED TO MATCH GRADE

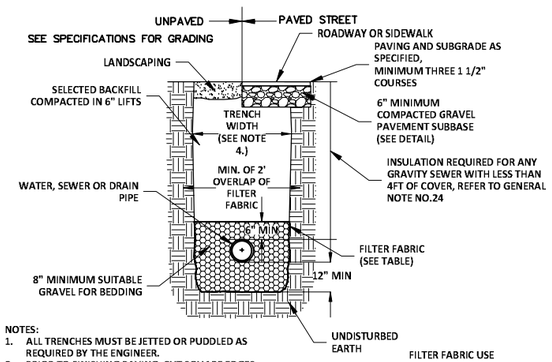
4-FT CATCH BASIN

SCALE: NTS



NOTE:
1. PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.

FLEXIBLE SLEEVE CONNECTION DETAIL

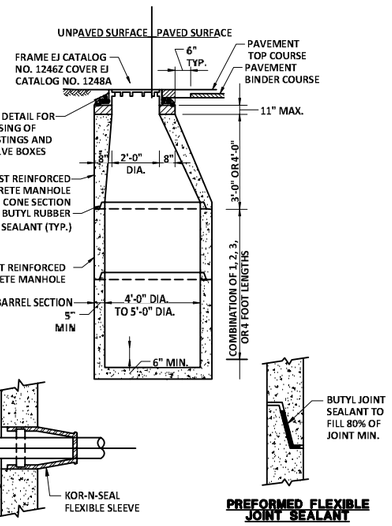


NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:
   - LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET
   - EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL



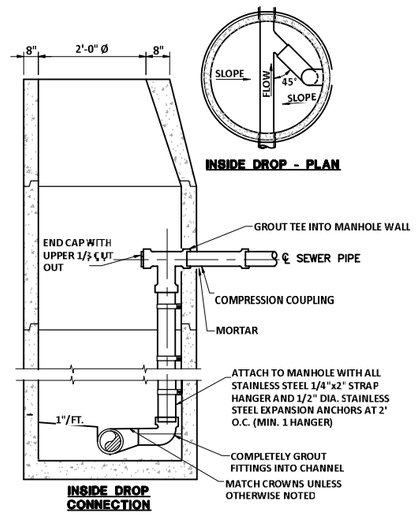
PIPE CONNECTION DETAIL
N.T.S.

PREFORMED FLEXIBLE JOINT SEALANT

MANHOLE JOINT DETAIL
N.T.S.

SEWER MANHOLE DETAIL

NTS

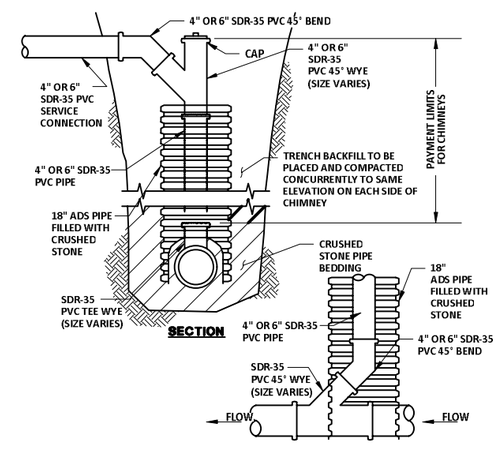


INSIDE DROP CONNECTION

INSIDE DROP MANHOLE WITH PVC PIPE

SCALE: NTS

NOTES:
1. PROVIDE DROP PIPE FOR A SEWER PIPE INVERT ENTERING A MANHOLE MORE THAN 24 INCHES ABOVE THE MANHOLE INVERT. WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE INCOMING SEWER AND THE MANHOLE INVERT IS LESS THAN 24 INCHES, THE INVERT IS TO BE FILLETED TO PREVENT SOLIDS DEPOSITION.
2. ALL INSIDE DROP CONNECTIONS FOR SERVICES AND COLLECTOR SEWERS SHALL USE THE DROP BOWL AS SHOWN.
3. SECURE DROP PIPE TO MANHOLE WALL WITH STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS.



ELEVATION

NOTES:
1. CHIMNEYS TO BE PAID FOR AT THE PRICE PER LINEAR FOOT OF PIPE MEASURED ALONG THE VERTICAL AXIS UNDER THE CORRESPONDING PIPE ITEM.

SEWER SERVICE CHIMNEY CONNECTION DETAIL

SCALE: NTS

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			

DESIGNED BY:
CAD COORD.: DXS
CAD:
CHECKED BY:
DATE:
APPROVED BY:
DATE:
PROJECT NO.: 13487A

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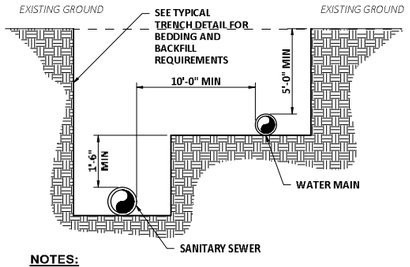
CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS I

DRAWING
C-2

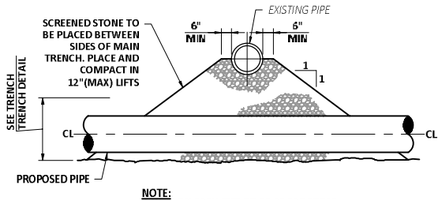


NOTES:

1. INSTALL WATER AND SEWER MAINS WITH 10-FOOT SPACING WHERE POSSIBLE.

MINIMUM WATER / SEWER PIPE SPACING

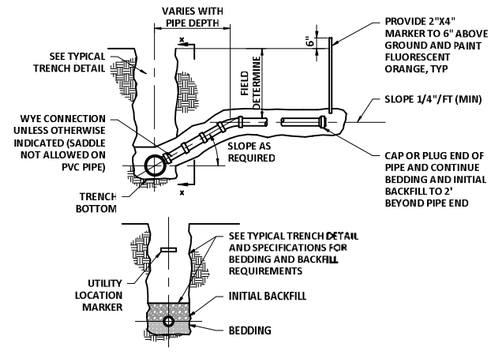
SCALE: NTS



NOTE:
JOINTS ON EACH PIPE TO BE AS FAR FROM INTERSECTION AS POSSIBLE

PIPE CROSSING

SCALE: "NTS"



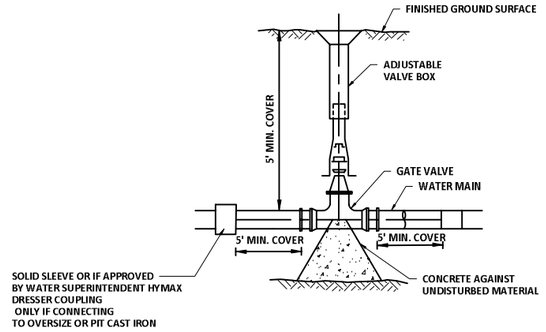
SECTION X-X

NOTES:

1. ALL SERVICE CONNECTIONS TO BE 6"Ø UNLESS OTHERWISE SHOWN ON THE PLANS.
2. USE CHIMNEY DETAIL WHERE SERVICE CONNECTION ENTERS SEWER AT GREATER THAN 60° TO THE HORIZONTAL.
3. EXTEND SERVICE 4'(MIN) BEYOND LIMIT OF SIDEWALK.

SEWER SERVICE CONNECTION

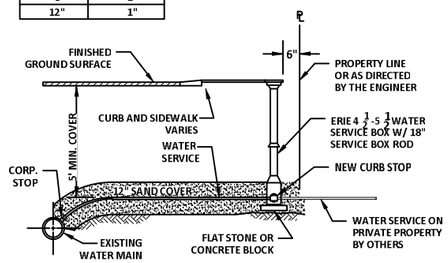
SCALE: "NTS"



NEW WATERGATE VALVE INSTALLED ON EXISTING WATER MAIN

SCALE: NTS

WATER MAIN DIAMETER	MAXIMUM TAP DIAMETER
4"	1/2"
6"	3/4"
8"	1"
12"	1"



NOTES:

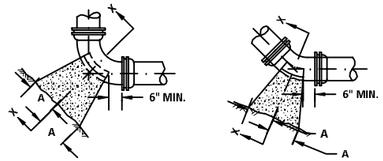
1. ALL WATER SERVICES SHALL BE 1" DIA. TYPE K COPPER TUBING UNLESS OTHERWISE NOTED. SERVICE SHALL BE ONE CONTINUOUS LENGTH FROM MAIN TO CURB STOP.
2. ALL WATER SERVICES SHALL BE REPLACED UP TO THE RIGHT OF WAY
3. WHERE THE SIZE OF THE CONNECTION EXCEEDS THAT GIVEN IN THE TABLE, THE CONNECTION SHALL BE MADE MEANS OF A TAPPED SADDLE OR TEE CONNECTION.
4. WHERE GATE BOX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO OPERATE VALVE WITH WRENCH.
5. REMOVE AND DISPOSED OF EXISTING PIPE AND GATE BOX.

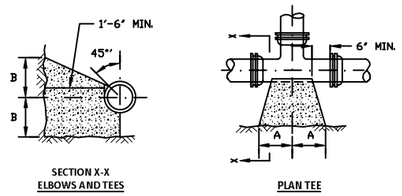
TYPICAL WATER SERVICE

SCALE: NTS

PIPE SIZE	90° ELBOW		45° ELBOW		22 1/2° ELBOW		TEE		PLUG	
	A	B	A	B	A	B	A	B	C	D
6"	8"	10"	6"	8"	3"	8"	8"	8"	10"	16"
8"	12"	12"	8"	10"	6"	8"	8"	12"	12"	20"

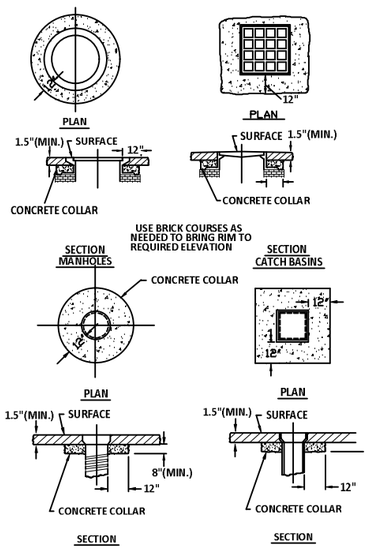
NOTE: ALL THRUST BLOCKS POURED AGAINST UNDISTURBED EARTH.





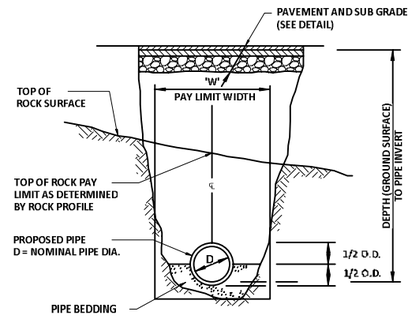
TYPICAL THRUST BLOCK

SCALE: NTS



RAISING CASTING DRAINAGE & WATER SERVICE BOXES

SCALE: NTS



MAXIMUM PAYMENT FOR ROCK EXCAVATION CHART		
DEPTH FROM GROUND SURFACE TO INVERT OF PIPE	PAY WIDTH 'W' NOMINAL PIPE DIA. 'D'	
	D < 24"	D > 24"
DEPTH ≤ 12'	5'-0"	D+3'-0"
12' < DEPTH ≤ 20'	7'-0"	D+5'-0"
DEPTH > 20'	9'-0"	D+7'-0"

NOTE:

1. THE MAXIMUM PAY LIMIT FOR ROCK REMOVAL OUTSIDE OF UTILITY STRUCTURES SHALL BE WITHIN A VERTICAL LINE OFFSET OF ONE FOOT (1') OUTSIDE THE WIDEST DIMENSION OF THE STRUCTURE OR SHALL BE THE MAXIMUM CONNECTING TRENCH WIDTH, WHICHEVER IS GREATER.

TYPICAL PAY LIMITS FOR ROCK EXCAVATION

SCALE: NTS

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			
5			

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DATE:
APPROVED BY:
DATE:
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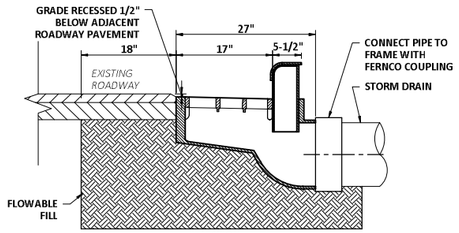
CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS II

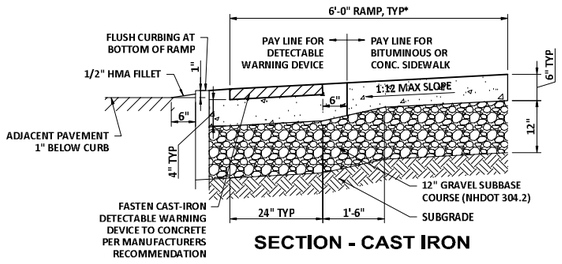
DRAWING
C-3



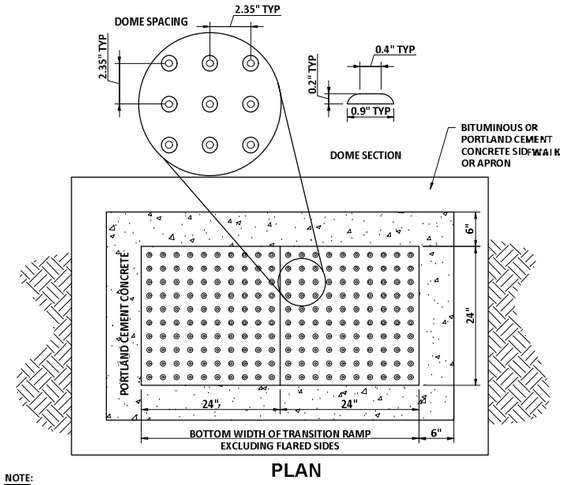
CURB INLET

SCALE: "NTS"

NOTE:
USE NEENAH FOUNDRY CURB INLET # 3165 WITH GRATE TYPE A, ASTM A-48, CLASS 35B MATERIAL - OR EQUAL AS APPROVED BY ENGINEER



SECTION - CAST IRON

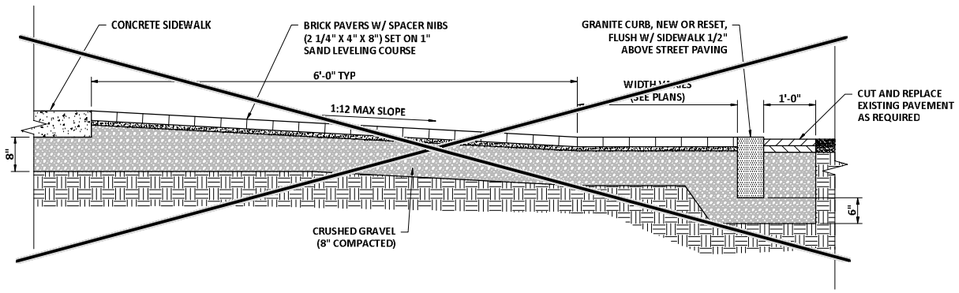


PLAN

NOTE:
1. ALL DETECTABLE WARNING DEVICES SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS OF WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG). 2'x2', 2'x4' AND RADIUS DEVICES ARE ACCEPTABLE.
2. INSTALL DETECTABLE WARNING DEVICES AT ALL ROADWAYS, HIGH USE ACCESS WAYS, OR AT THE DIRECTION OF THE ENGINEER.
3. ALL DEVICES SHALL HAVE A MIN. 6" WIDTH PORTLAND CEMENT CONCRETE SURROUND REGARDLESS OF THE SURROUNDING WALK OR APRON MATERIAL.

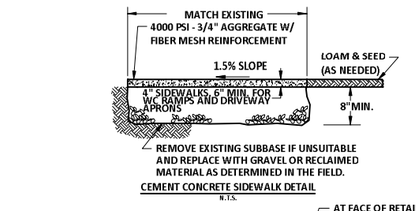
RECTANGULAR CAST IRON HANDICAP DETECTABLE WARNING DEVICE DETAIL

SCALE: NTS

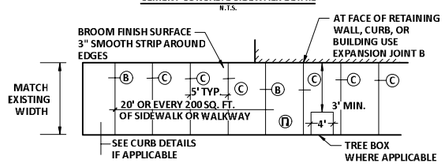


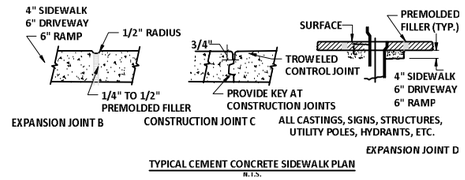
TYPICAL SECTION - HANDICAP RAMP

SCALE: NTS



CEMENT CONCRETE SIDEWALK DETAIL
N.T.S.

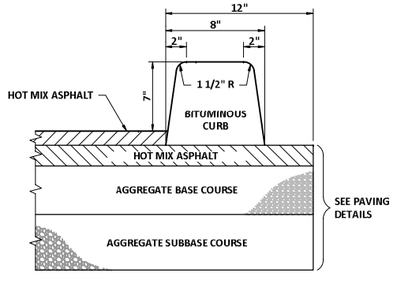




TYPICAL CEMENT CONCRETE SIDEWALK PLAN
N.T.S.

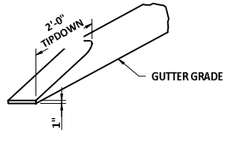
TYPICAL CEMENT CONCRETE SIDEWALK PLAN

SCALE: NTS



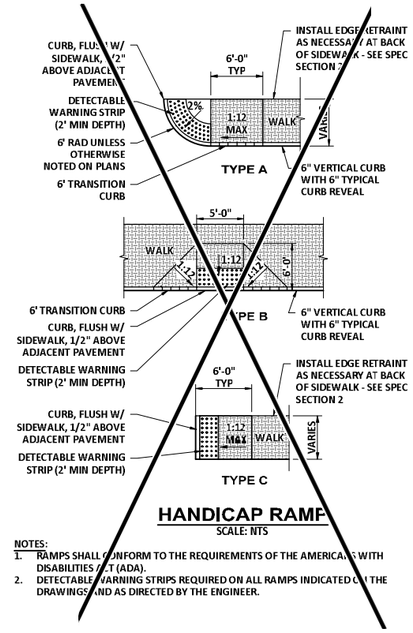
BITUMINOUS CURB

SCALE: NTS



BITUMINOUS TERMINAL CURB

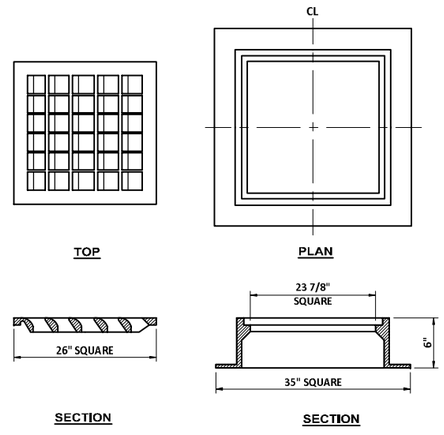
SCALE: NTS



HANDICAP RAMP

SCALE: NTS

NOTES:
1. RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA).
2. DETECTABLE WARNING STRIPS REQUIRED ON ALL RAMPS INDICATED ON THE DRAWINGS AND AS DIRECTED BY THE ENGINEER.



CASCADE GRATE AND FRAME

SCALE: NTS

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			

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DATE:
APPROVED BY:
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PROJECT NO.: 13487A

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CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS III

DRAWING
C-4

Arrow board
Arrow board support or trailer (shown facing down)
Changeable message sign or support trailer
Channelizing device
Crash cushion
Direction of temporary traffic detour
Direction of traffic
Flagger
High-level warning device (Flag tree)
Longitudinal channelizing device
Luminaire
Pavement markings that should be removed for a long-term project
Shadow vehicle
Sign (shown facing left)
Surveyor
Temporary barrier
Temporary barrier with warning light
Traffic or pedestrian signal
Truck-mounted attenuator
Type 3 barricade
Warning light
Work space
Work vehicle

TABLE 6H-2 - MEANING OF SYMBOLS

NTS

Table 6H-3. Meaning of Letter Codes on Typical Application Diagrams

Road Type	Distance Between Signs**		
	A	B	C
Other Conditions*	100 feet	100 feet	100 feet
Urban High Speed*	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	1640 feet
Expressway / Freeway	1,000 feet	1,000 feet	2,640 feet

* Speed category to be determined by highway agency

** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-45. The A dimension is the distance from the advance or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a downstream direction that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

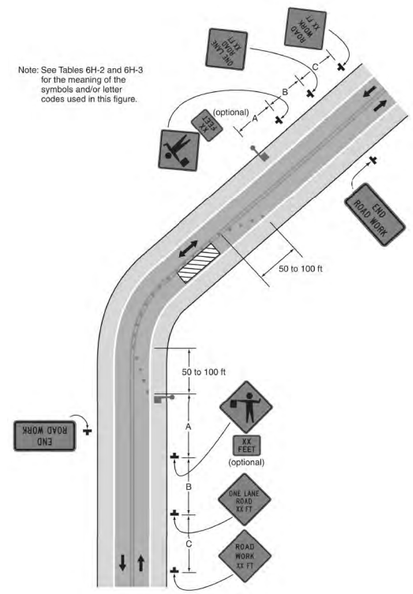
TABLE 6H-3 - MEANING OF LETTER CODES

NTS

Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
W = width of offset in feet
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.



TYPICAL TRAFFIC CONTROL PLAN

NTS

CONSTRUCTION SIGN

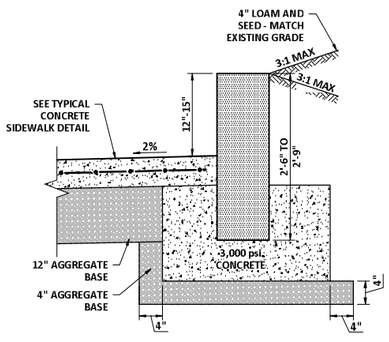
TEXT	SIZE OF SIGN	M.U.T.C.D. NO.
ROAD WORK AHEAD	36 X 36	W20–1
SPEED LIMIT 25	36 X 36	W3–5
BEGIN HIGHER FINES ZONE	24 X 30	R2–10a
ONE LANE ROAD AHEAD	36 X 36	W20–4
25 M.P.H.	24 X 24	W13–1
BE PREPARED TO STOP	36 X 36	W3–4
	36 X 36	W3–3
STOP HERE ON RED	24 X 36	R10–6L
DO NOT BLOCK INTERSECTION	24 X 30	R10–7
END ROAD WORK	36 X 18	G20–2
ROAD WORK 1500 FT	36 X 36	W20–1
COBURN STREET	60 X 24	D3–1

NOTES:

1. ALL SIGNS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE CURRENT EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", FHWA; AND TO "STANDARD HIGHWAY SIGNS", FHWA, 2000. REFER TO TO MUTCD, PART VI FOR ANY INFORMATION NOT SHOWN IN THESE DETAILS.
2. STEEL U–CHANNELS ARE REQUIRED AS SIGN POSTS.
3. MOUNT SIGNS THAT ARE WIDER THAN 900mm OR LARGER THAN ONE SQUARE METER IN AREA ON TWO OR MORE POSTS.
4. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. FINAL PLACEMENT OF SIGNS AND DEVICES MAY BE CHANGED TO FIT FIELD CONDITIONS AS APPROVED BY THE ENGINEER.

TRAFFIC CONTROL DETAILS

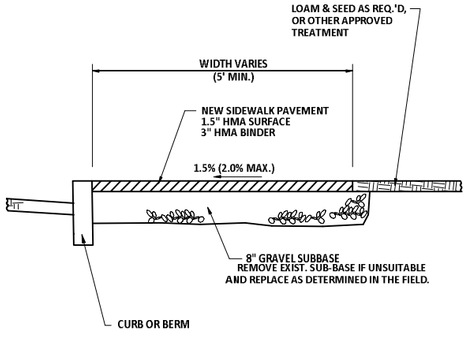
SCALE: "NTS"



VERTICAL GRANITE CURB WALL

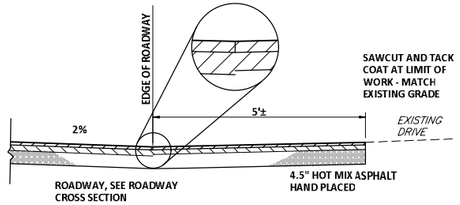
SCALE: NTS

CONCRETE FILL NOTE:
CONCRETE FILL MIX PROPERTIES SHALL BE PROPORTIONED TO A MINIMUM STRENGTH OF 3,000 PSI AT 28 DAYS.



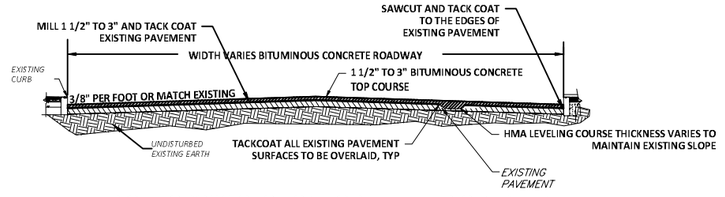
HOT MIX ASPHALT SIDEWALK DETAIL

SCALE: NTS



TYPICAL DRIVE SECTION

NTS



TYPICAL CROSS SECTION FOR MILL AND OVERLAY

N.T.S.

NOTE:

1. PAVEMENT WIDTH TO MATCH EXISTING. COORDINATE PAVEMENT WIDTH WITH OWNER AND ENGINEER
2. ALL STRUCTURES SUCH AS MANHOLES, CATCH BASINS AND VALVE BOXES SHALL BE ADJUSTED TO FINAL GRADE.
3. REVIEW GRADING WITH OWNER AND ENGINEER PRIOR TO PAVING.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			

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CAD:
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CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS IV

DRAWING
C-5

EROSION AND SEDIMENTATION CONTROL NOTES

THIS PLAN HAS BEEN DEVELOPED AS A STRATEGY TO CONTROL SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION. THIS PLAN IS BASED ON THE STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN URBAN AND SUBURBAN AREAS AS CONTAINED IN THE "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS", FRANKLIN, HAMPDEN, HAMPSHIRE CONSERVATION DISTRICTS, DATED MARCH, 1997.

1. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE DONE IN ACCORDANCE WITH THE "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS", FRANKLIN, HAMPDEN, HAMPSHIRE CONSERVATION DISTRICTS, DATED MARCH, 1997.
2. THOSE AREAS UNDERGOING ACTUAL CONSTRUCTION WILL BE MAINTAINED IN AN UNTREATED OR UNVEGETATED CONDITION FOR THE MINIMUM TIME REQUIRED. IN GENERAL, AREAS TO BE VEGETATED SHALL BE PERMANENTLY STABILIZED WITHIN 15 DAYS OF FINAL GRADING AND TEMPORARILY STABILIZED WITHIN 30 DAYS OF INITIAL DISTURBANCE OF THE SOIL.
3. SEDIMENT BARRIERS (SILT FENCE, STONE CHECK DAMS, ETC.) SHOULD BE INSTALLED PRIOR TO ANY SOIL DISTURBANCE OF UPGRADIENT DRAINAGE AREAS.
4. INSTALL SILT FENCE AT TOE OF SLOPES TO FILTER SILT FROM RUNOFF. SEE SILT FENCE DETAIL FOR PROPER INSTALLATION. SILT FENCE WILL REMAIN IN PLACE PER NOTE #5.
5. ALL EROSION CONTROL STRUCTURES WILL BE INSPECTED, REPLACED AND/OR REPAIRED EVERY 7 DAYS AND IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL OR SNOW MELT OR WHEN NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION OR DECOMPOSURE. SEDIMENT DEPOSITS MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER. SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL AREAS UPSLOPE ARE PERMANENTLY STABILIZED.
6. NO SLOPES, EITHER PERMANENT OR TEMPORARY, SHALL BE STEEPER THAN TWO HORIZONTAL TO ONE VERTICAL (2 TO 1) UNLESS STABILIZED WITH PERMANENT EROSION CONTROL MEASURES.
7. IF FINAL SEEDING OF THE DISTURBED AREAS IS NOT TO BE COMPLETED 30 DAYS PRIOR TO THE ANTICIPATED DATE OF THE FIRST KILLING FROST, USE TEMPORARY MULCHING (DORMANT SEEDING MAY BE ATTEMPTED AS WELL) TO PROTECT THE SITE AND DELAY PERMANENT SEEDING, UNTIL UPGRADIENT AREAS ARE STABILIZED.
8. WHEN FEASIBLE, TEMPORARY SEEDING OF DISTURBED AREAS THAT HAVE NOT BEEN FINISH GRADED SHALL BE COMPLETED 30 DAYS PRIOR TO THE FIRST KILLING FROST.
9. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT WILL BE RETURNED TO THE SITE AND REGRADED ONTO OPEN AREAS. POST SEEDING SEDIMENT, IF ANY, WILL BE DISPOSED OF IN AN ACCEPTABLE MANNER.
10. REVEGETATION MEASURES WILL COMMENCE UPON COMPLETION OF CONSTRUCTION EXCEPT AS NOTED ABOVE. ALL DISTURBED AREAS NOT OTHERWISE STABILIZED WILL BE GRADED, SMOOTHED, AND REVEGETATED AS FOLLOWS:
    - A. A MINIMUM OF FOUR (4) INCHES OF LOAM WILL BE SPREAD OVER DISTURBED AREAS AND SMOOTHED TO A UNIFORM SURFACE.
    - B. APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST. IF SOIL TESTING IS NOT DEEMED FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT THE RATE OF 800 POUNDS PER ACRE OR 18.4 POUNDS PER 1,000 SQUARE FEET USING 10-20-20 (N-P205-K20) OR EQUIVALENT. APPLY GROUND LIMESTONE (EQUIVALENT TO 50% CALCIUM PLUS MAGNESIUM OXIDE) AT A RATE OF 3 TONS PER ACRE (138 LB PER 1,000 SQ. FT.).
    - C. FOLLOWING SEED BED PREPARATION, DITCHES AND BACK SLOPES WILL BE SEEDED WITH A MIXTURE OF 47% CREEPING RED FESCUE, 5% REDTOP, AND 48% TALL FESCUE. THE LAWN AREAS WILL BE SEEDED WITH A PREMIUM TURF MIXTURE OF 44% KENTUCKY BLUEGRASS, 44% CREEPING RED FESCUE, AND 12% PERENNIAL RYE GRASS: SEEDING RATE IS 3.0 LBS PER 1000 SQ. FT. LAWN QUALITY SOD MAY BE SUBSTITUTED FOR SEED.
    - D. HAY MULCH AT THE RATE OF 70-90 LBS PER 1000 SQUARE FEET OR A HYDRO-APPLICATION OF CELLULOSE FIBER SHALL BE APPLIED FOLLOWING SEEDING. A SUITABLE BINDER WILL BE USED ON HAY MULCH FOR WIND CONTROL.
11. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED ONCE THE WORK AREA IS STABILIZED.
12. WETLANDS (EXCEPTING THOSE WHICH ARE TO BE FILLED IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS) WILL BE PROTECTED WITH SILT FENCE INSTALLED AT THE EDGE OF THE WETLAND OR THE BOUNDARY OF WETLAND DISTURBANCE.
13. IN GENERAL, AREAS WITHIN 100 FEET OF DELINEATED WETLANDS OR STREAMS SHALL HAVE A MAXIMUM PERIOD OF EXPOSURE OF NOT MORE THAN 15 DAYS.
14. FOLLOW APPROPRIATE EROSION CONTROL MEASURES PRIOR TO EACH STORM IN ALL AREAS WITHIN 100 FEET OF DELINEATED WETLANDS OR STREAMS.

EROSION CONTROL DURING WINTER CONSTRUCTION

1. WINTER CONSTRUCTION PERIOD DEFINED: NOVEMBER 1 THROUGH APRIL 15
2. WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE SITE IS WITHOUT STABILIZATION AT ANY ONE TIME.
3. EXPOSED AREA SHOULD BE LIMITED TO THAT THAT CAN BE MULCHED IN ONE DAY PRIOR TO ANY PRECIPITATION EVENT.
4. AN AREA SHALL BE CONSIDERED TO HAVE BEEN STABILIZED WHEN EXPOSED SURFACES HAVE BEEN EITHER MULCHED WITH STRAW OR HAY AT A RATE OF 100 LB. PER 1,000 SQUARE FEET (WITH OR WITHOUT SEEDING) OR DORMANT SEEDED, MULCHED AND ADEQUATELY ANCHORED BY AN APPROVED ANCHORING TECHNIQUE. IN ALL CASES, MULCH SHALL BE APPLIED SUCH THAT SOIL SURFACE IS NOT VISIBLE THROUGH THE MULCH.
5. BETWEEN THE DATES OF OCTOBER 15 AND APRIL 1ST, LOAM OR SEED WILL NOT BE REQUIRED. DURING PERIODS OF ABOVE-FREEZING TEMPERATURES, THE SLOPES SHALL BE FINE GRADED AND EITHER PROTECTED WITH MULCH OR TEMPORARILY SEEDED AND MULCHED UNTIL SUCH TIME AS THE FINAL TREATMENT CAN BE APPLIED. IF THE DATE IS AFTER NOVEMBER 1ST AND IF THE EXPOSED AREA HAS BEEN LOAMED, FINAL GRADED AND IS SMOOTH, THEN THE AREA MAY BE DORMANT SEEDED AT A RATE 200 - 300% HIGHER THAN SPECIFIED FOR PERMANENT SEED AND THEN MULCHED. IF CONSTRUCTION CONTINUES DURING FREEZING WEATHER, ALL EXPOSED AREAS SHALL BE GRADED BEFORE FREEZING AND THE SURFACE TEMPORARILY PROTECTED FROM EROSION BY THE APPLICATION OF MULCH. SLOPES SHALL NOT BE LEFT EXPOSED OVER THE WINTER OR ANY OTHER EXTENDED TIME OF WORK SUSPENSION UNLESS TREATED IN THE ABOVE MANNER. UNTIL SUCH TIME AS WEATHER CONDITIONS ALLOW DITCHES TO BE FINISHED WITH THE PERMANENT SURFACE TREATMENT, EROSION SHALL BE CONTROLLED BY THE INSTALLATION OF BALES OF HAY OR STONE CHECK DAMS IN ACCORDANCE WITH THE STANDARD DETAILS.
6. A) BETWEEN THE DATES OF NOVEMBER 1ST AND APRIL 15TH ALL MULCH SHALL BE EITHER WOOD CELLULOSE FIBER OR BE ANCHORED WITH MULCH NETTING OR CHEMICAL TACK.
    - B) MULCH NETTING SHALL BE USED TO ANCHOR MULCH IN ALL DRAINAGE WAYS WITH A SLOPE GREATER THAN 3%, FOR SLOPES EXPOSED TO DIRECT WINDS AND FOR ALL OTHER SLOPES GREATER THAN 8%.
    - C) MULCH NETTING SHALL BE USED TO ANCHOR MULCH IN ALL AREAS WITH SLOPES GREATER THAN 15%. AFTER OCTOBER 1ST, THE SAME APPLIES FOR ALL SLOPES GREATER THAN 8%.
7. AFTER NOVEMBER 1ST THE CONTRACTOR SHALL APPLY DORMANT SEEDING OR MULCH AND ANCHORING ON ALL BARE EARTH AT THE END OF EACH WORKING DAY.
8. DURING WINTER CONSTRUCTION PERIODS ALL SNOW SHALL BE REMOVED FROM AREAS OF SEEDING AND MULCHING PRIOR TO PLACEMENT.

MULCH ANCHORING

ANCHOR MULCH WITH: MULCH NETTING (AS PER MANUFACTURER); ASPHALT EMULSION (0.05 GALLONS PER SQ. YD.); CHEMICAL TACK (AS PER MANUFACTURER'S SPECIFICATIONS); OR BE WOOD CELLULOSE FIBER (2000 LBS/ACRE). WETTING FOR SMALL AREAS AND ROAD DITCHES MAY BE PERMITTED.

ADDITIONAL TEMPORARY SEED MIXTURE (OR PERIODS LESS THAN 12 MONTHS)

DATES	SEED	RATE
4/1/17 - 7/1/17 8/15/17 - 9/15/17	OATS	80 LBS/ACRE
4/1/17 - 6/1/17 (8/15/17 - 9/15/17)	ANNUAL RYE GRASS	40 LBS/ACRE
(8/15/17 - 10/15/17)	WINTER RYE	120 LBS/ACRE
(11/1/17 - 4/1/17)	MULCH W/ DORMANT SEED	80 LBS/ACRE*
(5/1/17 - 6/30/17	FOXTAIL MILLET	30 LBS/ACRE

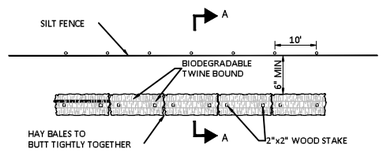
*SEED RATE ONLY

MULCH AND MULCH ANCHORING

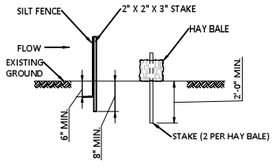
MULCH

LOCATION	MULCH	RATE (1000 S.F.)
PROTECTED AREA	STRAW OR HAY *	100 POUNDS
WINDY AREAS	STRAW OR HAY (ANCHORED) *	100 POUNDS
MODERATE TO HIGH VELOCITY AREAS OR STEEP SLOPES (GREATER THAN 3:1)	JUTE MESH,	AS REQUIRED
	EXCELSIOR MAT OR EQUIV.	AS REQUIRED

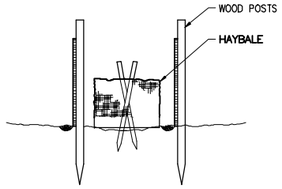
* A HYDRO-APPLICATION OF CELLULOSE FIBER MAY BE APPLIED FOLLOWING SEEDING. A SUITABLE BINDER SHALL BE USED ON HAY MULCH FOR WIND CONTROL.



EROSION BARRIER HAY BALES AND SILT FENCE PLAN

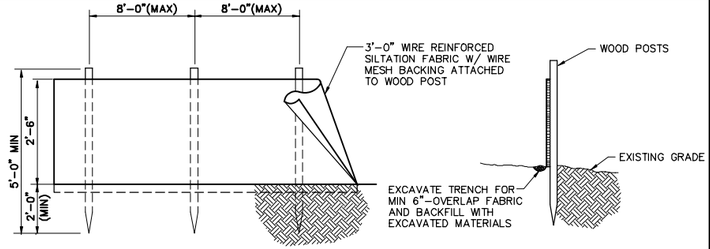


SECTION A-A



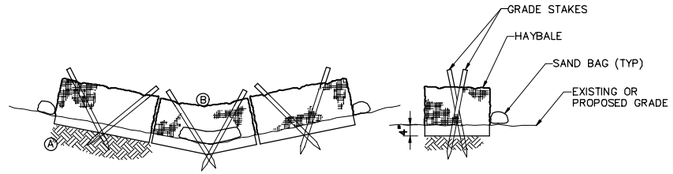
COMBINATION SILT FENCE AND HAY BALE BARRIER

SCALE: "NTS"



SILT FENCE INSTALLATION DETAIL

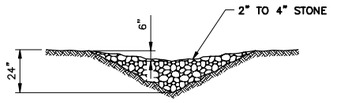
SCALE: "NTS"



EROSION CHECK TO BE BALES OF HAY SECURED TO THE GROUND WITH TWO 4' LONG GRADE STAKES FOR EACH BALE. SAND BAG AS REQUIRED, PLACE SUFFICIENT BALES TO ESTABLISH ELEVATIONS AT (A) AT LEAST 6 INCHES ABOVE OVERFLOW AT (B)

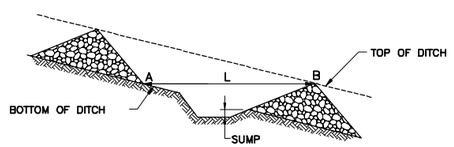
HAY BALE CHECK DAM

SCALE: "NTS"



CROSS SECTION

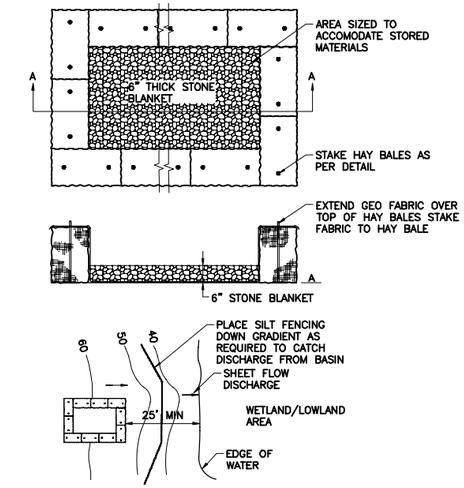
DITCH SLOPE (FT/FT)	L (FT)
0.020	100
0.030	66
0.040	50
0.050	40
0.080	25
0.100	20
0.120	17
0.150	13



PROFILE

STONE CHECK DAM DETAIL

SCALE: "NTS"



TEMPORARY HAY BALE SEDIMENT BASIN

SCALE: "NTS"

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			
4			

DESIGNED BY:
CAD COORD.: DXS
CAD:
CHECKED BY:
DATE:
APPROVED BY:
DATE:
PROJECT NO.: 13487A

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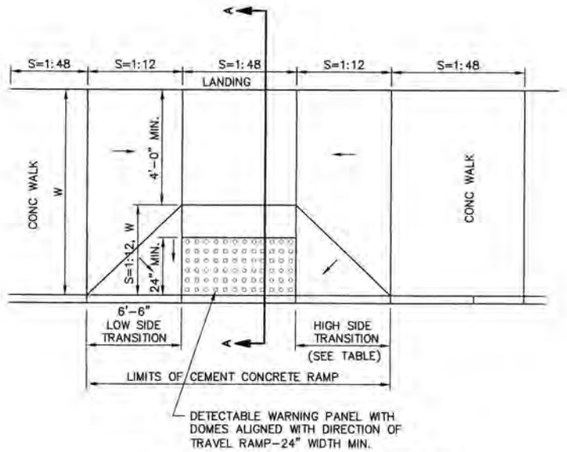
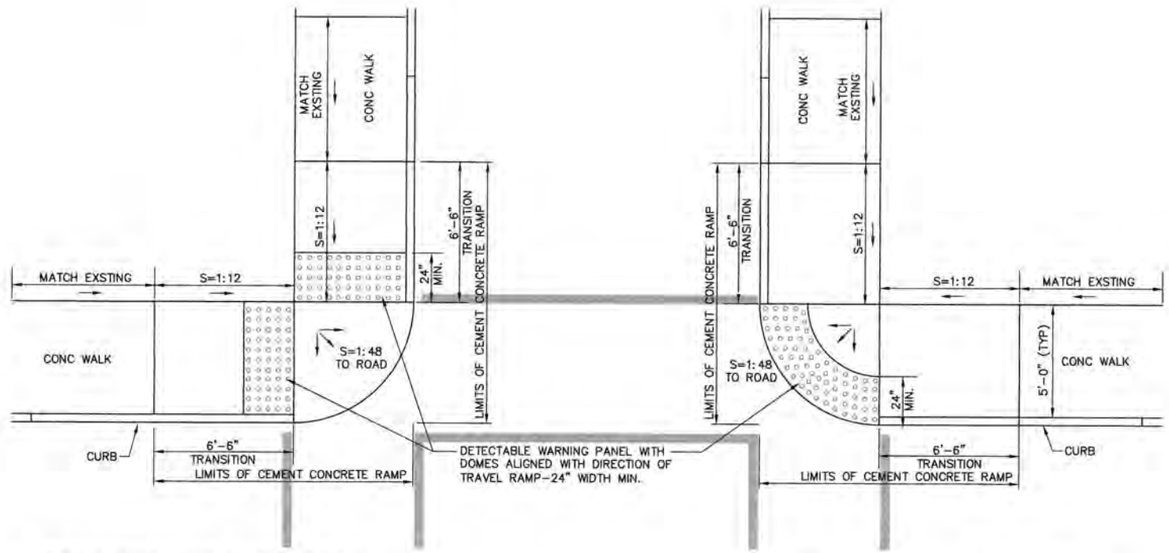
CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS V

DRAWING
C-6



TYPICAL WHEELCHAIR RAMP – TYPE 5
NO SCALE



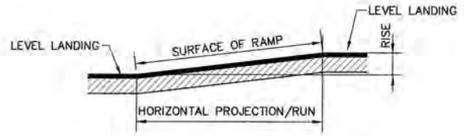
TYPICAL WHEELCHAIR RAMP – TYPE 1
NO SCALE

TYPICAL WHEELCHAIR RAMP – TYPE 2
NO SCALE

ROADWAY PROFILE GRADE	*HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'–6"
>0% TO 1%	7'–8"
>1% TO 2%	9'–0"
>2% TO 3%	11'–0"
>3% TO 4%	14'–0"
>4%	15'–0" MAX

* BASED ON A DESIGN SLOPE OF 7.5% AND A CURB REVEAL OF 6"

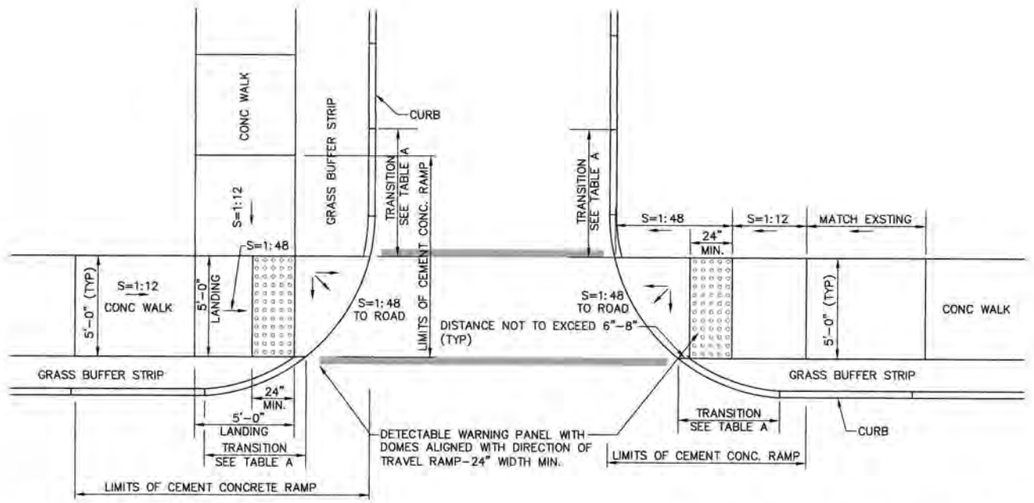
TABLE A
TRANSITION LENGTHS



SLOPE	MAXIMUM RISE INCHES	MAXIMUM RUN FEET
1:12 TO <1:16	30	30

RAMP DIMENSIONS

NOTES:
1. THE DISTANCE BETWEEN THE CLOSEST POINT OF THE DETECTABLE WARNING PANEL TO THE ROAD MUST BE WITHIN 8" OF THE EDGE OF PAVEMENT.
2. DETECTABLE WARNING PANEL DOME ALIGNMENT SHALL BE ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF TRAVEL.
3. DETECTABLE WARNING PANELS MUST EXTEND THE FULL WIDTH OF THE RAMP AND BE A MINIMUM OF 24" IN THE DIRECTION OF TRAVEL.
4. SLOPES INDICATED ARE MAXIMUMS. CONTRACTOR SHOULD PLAN FOR A MAX. RAMP SLOPE OF 7.5% WITH A SLOPE OF 1.5% ON LANDINGS AND CROSS SLOPES. RAMPS CONSTRUCTED IN EXCESS OF SLOPES INDICATED WILL NOT BE ACCEPTED AND SUBJECT TO REMOVAL.
5. RUNNING SLOPE – SLOPE IN THE DIRECTION OF TRAVEL AS INDICATED ON THE DETAIL ABOVE; CROSS-SLOPE – SLOPE PERPENDICULAR TO THE DIRECTION OF TRAVEL, NEVER TO EXCEED 1:48.
6. IN THE EVENT THE PROFILE GRADE OF A ROAD IS GREATER THAN 1:12, THE LENGTH OF THE RAMP SHALL BE RESTRICTED TO 15' MAX AT 1:12. SLOPE BEYOND THE INITIAL 15' LENGTH SHALL BE CONSISTENT WITH THE PROFILE OF THE ROAD.
7. CHANGES IN LEVEL SHALL NOT EXCEED 1/4".
8. HIGH SIDE TRANSITIONS SHALL BE CONSTRUCTED ACCORDING TO THE LENGTH SPECIFIED IN TABLE A.
9. LOW SIDE TRANSITIONS SHALL BE 6'–6" REGARDLESS OF PROFILE GRADE.



TYPICAL WHEELCHAIR RAMP – TYPE 3
NO SCALE

TYPICAL WHEELCHAIR RAMP – TYPE 4
NO SCALE

Note: For typical cross section of wheelchair ramps refer to detail on Sheet C-4.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1			
2			
3			

DESIGNED BY:
CAD COORD.: DXS
CAD:
CHECKED BY:
DATE:
APPROVED BY:
DATE:
PROJECT NO.: 13487A

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CITY OF WALTHAM MASSACHUSETTS
AREA 1314B SEWER RHABILITATION

DETAILS III

DRAWING
C-7

APPENDIX B
Sewer Pipes and Manholes to be Inspected

REVISED: 1/29/2019

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown. Water services and sewer services are not shown on the map.

X=NOT IN CONTRACT

DO NOT INSPECT MH
R58_06635
CALLED OUT FOR
REPLACEMENT

Legend

- Sewershed Area
- PS — Sewer Pump Station
- Manhole
- Manhole To Be Inspected
- Other Sewer Structure
- Private Sewer
- City Sewer
- Sewer Line To Be Inspected

R58_08595 R58_06590 R58_03620 R58_07925 R58_07930 R58_07920 R58_09970 R58_07910 R58_09965 R58_03060 R58_06620 R58_10000 R58_10005 R58_10010 R58_09990 R58_09985 R58_09980 R58_09975 R58_09960 R58_09955 R58_10015 R58_03055 R58_03050 R58_03045 R58_11600 R58_28125 R58_11595 R58_03040 R58_11590 R58_28120 R58_28135 R58_28130 R58_28140 R58_28110 R58_11580 R58_07620 R58_11585 R58_03035 R58_11645 R58_07615 R58_03030 R58_06630 R58_09995 R58_06635 R58_07450 R58_07440 R58_11650 R58_11655 R58_07445 R58_07415 R58_07425 R58_07430 R58_07435 R58_07400 R58_07405 R58_07410 R58_07395 R58_07390 R58_07385 R58_07380 R58_06645 R58_06640 R58_06650 R58_06655 R58_06660 R58_06665 R58_07305 R58_07310 R58_07315 R58_07320 R58_07325 R58_03605 R58_03600 R58_03595 R58_03590 R58_03086 R58_03090 R58_07915 R58_03069 R58_03070 R58_03075 R58_03080 R58_07915 R58_07940 R58_07945 R58_03640 R58_07950 R58_03635 R58_03630 R58_03625 R58_07935 R58_10045 R58_10040 R58_10030 R58_09950 R58_09945 R58_09940 R58_09935 R58_11560 R58_11570 R58_11565 R58_11575 R58_11580 R58_11540 R58_11535 R58_11530 R58_11525 R58_11610 R58_11605 R58_03025 R58_03020 R58_03015 R58_03010 R58_11640 R58_11690 R58_11695

MALONE ST · OVERLAND RD · LINDA LN · PHILIPS TERR · NATHAN RD · CALDWELL RD · EVERETT ST · MAIN ST · LANE ST · PROSPECT HILL RD · EDDY ST · ELM AVE · RUSSELL ST · WESTON ST · ELMWOOD AVE · SUMMIT AVE · FAIRMONT AVE · FISKE AVE · CABOT ST · BOYNTON ST · VERNON ST

N

0 75 150 300 Feet

Area 1314B

Pipes and Manholes To Be Inspected

PROJ NO:	DATE:
13487A	6/25/2018

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FIGURE: B-3

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-B3-ToBeInspected-v2-11x17-L.mxd

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown. Water services and sewer services are not shown on the map.

REVISED: 1/29/2019

Legend

- Sewershed Area
- Sewer Pump Station (PS)
- Manhole
- Manhole To Be Inspected
- Other Sewer Structure
- Private Sewer
- City Sewer
- Sewer Line To Be Inspected

R58_11655 R58_07450 R58_11695 R58_11620 R58_03005 R58_11665 R58_11635 R58_11630 R58_11625 R58_11660 R58_11700 R58_11705 R58_11670 R58_07640 R58_07635 R58_07630 R59_03090 R59_02995 R59_02980 R58_07455 R58_11675 R58_07645 R59_07625 R67_11680 R67_11710 R67_07665 R67_07660 R67_07655 R67_07650 R67_07865 R67_07651 R68_07875 R68_07870 R68_02945 R68_02950 R68_02940 R68_11175 R68_07900 R67_11685 R67_11715 R68_11380 R68_11475 R67_11740 R67_11720 R68_11395 R68_07880 R68_11170 R67_11735 R67_11730 R67_11725 R68_11383 R68_07890 R68_07885 R67_07675 R67_07670 R67_07895 R68_11385 R67_07475 R67_28185 R68_11390 R68_11400 R68_07705 R68_07700 R68_07685 R68_11405 R67_07680 R68_07690 R68_07695 R67_07740 R67_07745 R67_07735

FISKE AVE · PARK AVE · CABOT ST · BOYNTON ST · PEARL ST · WINTHROP ST · AUBURN ST · AUBURN TERR · CHARLES ST AVE · CHARLES ST · SOUTH ST · BEDFORD ST · ANDREA RD · VILLA ST · PLEASANT AVE · DARTMOUTH ST · HIGHLAND ST · DREW ST · PRATT AVE · BROOK AVE · FENTON ST · SHARON ST · HOPE AV

N

0 75 150 300 Feet

Area 1314B

Pipes and Manholes To Be Inspected

PROJ NO:	DATE:
13487A	6/25/2018

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FIGURE: B-4

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-B4-ToBeInspected-v2-11x17-L.mxd

REVISED: 1/29/2019

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and sewer services are not shown on the map.

Legend

- Sewershed Area
- Sewer Pump Station (PS)
- Manhole
- Manhole To Be Inspected
- Other Sewer Structure
- Private Sewer
- City Sewer
- Sewer Line To Be Inspected

R67_07805
R67_07795
WHEELOCK RD
WHEELOCK TERR
R67_07800
R67_07835
R67_07830
R67_07815
R67_07820
R67_07825
R67_07840
R67_07841
R67_07842
R67_07850
R67_07855
SOUTH ST
R67_07860
R67_01005
R67_08035
R67_01004
R67_01003
R67_07810
R67_25985
R67_01010
R67_27845
R67_27840
R67_27835
R67_27830
R67_27910
R67_27916
R67_28065
R67_28060
R67_27915
R67_27905
R67_27900
R67_27885
R67_27880
R67_27875
R67_27870
R67_27865
R67_27860
R67_27850
R67_27890

N

0 75 150 300 Feet

Area 1314B

Pipes and Manholes To Be Inspected

PROJ NO:	DATE:
13487A	6/25/2018

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: B-5

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-B5-ToBeInspected-v2-11x17-L.mxd

West End - Sewer Rehabilitation Project

Sewer Pipe and Manhole Inspections **at Weston Street (Rt. 20) & Vernon Street**

Sewer Pipe Inspection

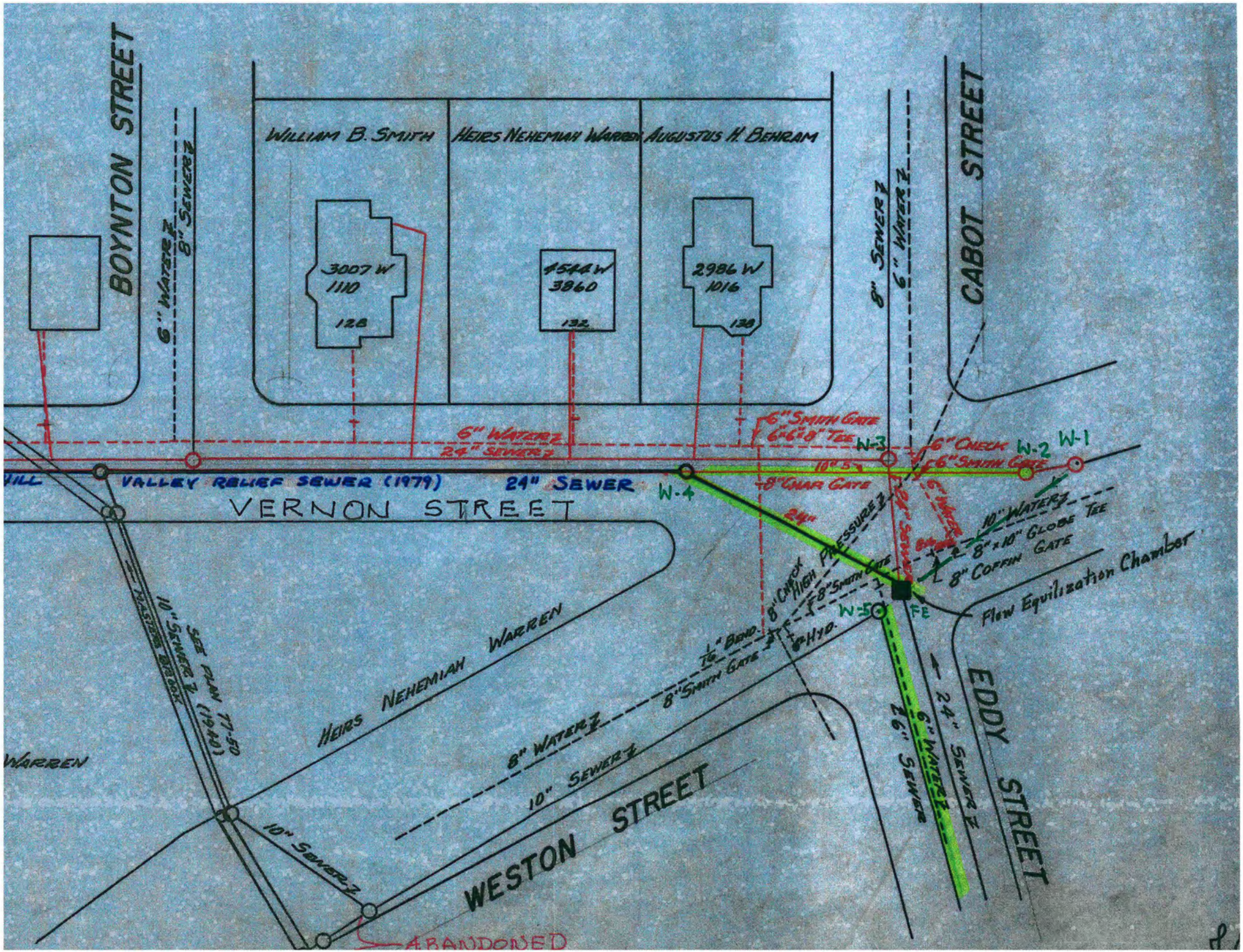
pipe #	Pipe Segment	Inspection work	size	type	length
1	W-1 to FE	CCTV	10-inch	unk	85 feet
2	FE to W-4	CCTV	24-inch	unk	85 feet
3	W-2 to W-4	CCTV	10- inch	unk	120 feet
4	W-3 to FE	CCTV	24 - inch	unk	45 feet

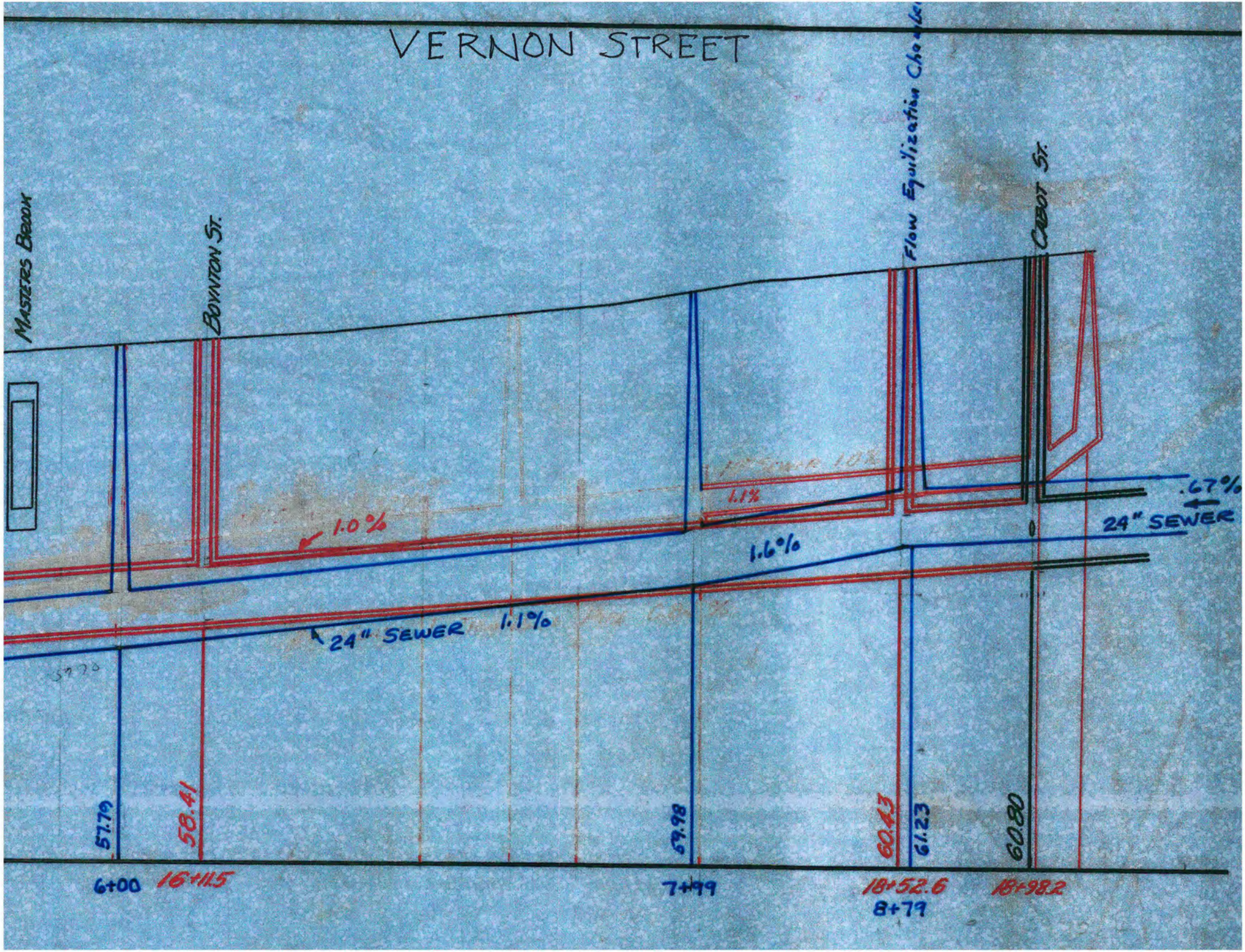
Sewer Manhole Inspection

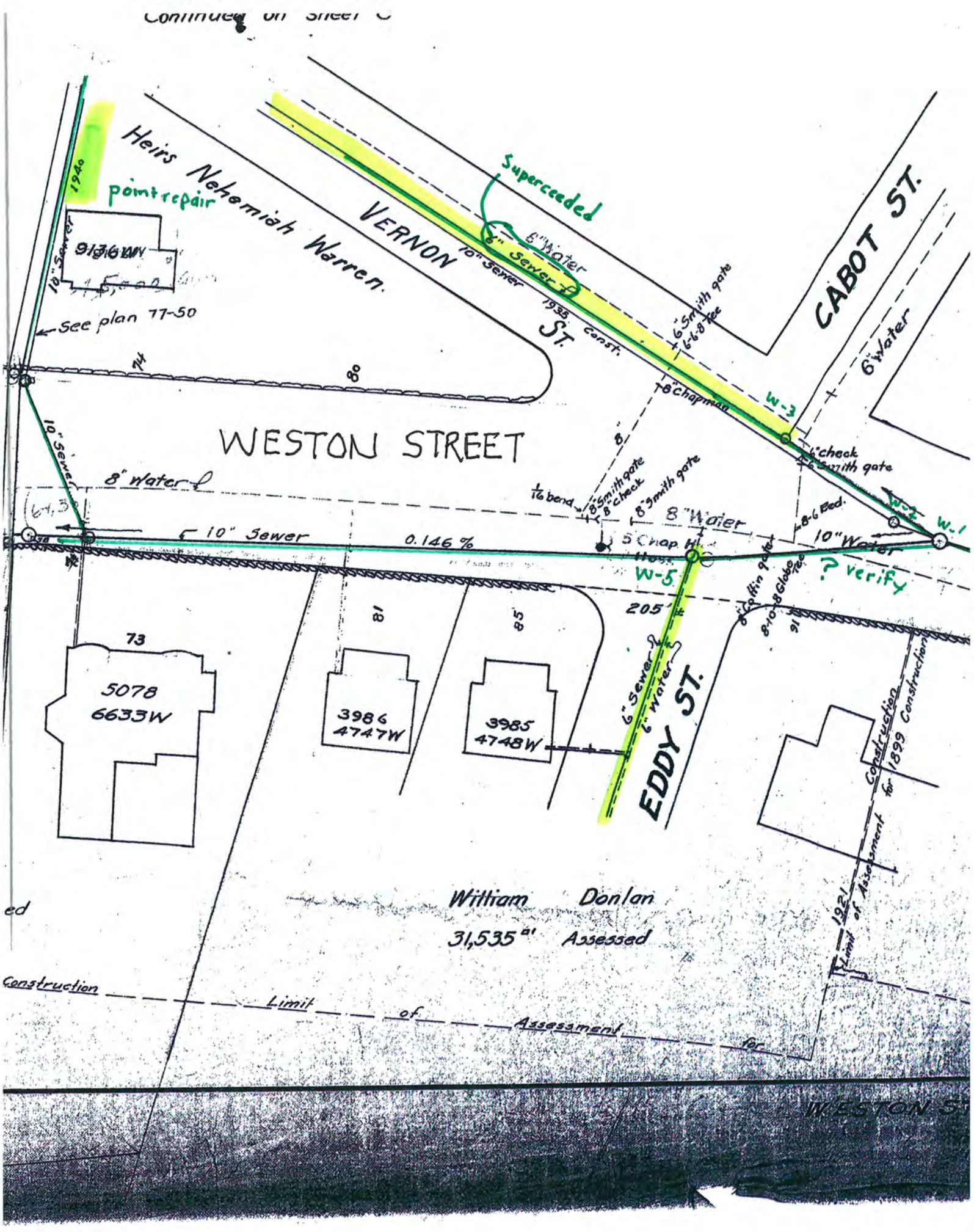
smh #	SMH	Inspection	dia.	type	vertical height
1	W-1	visual	4-foot	unk	8 vertical feet, vf
2	W-2	visual	4-foot	unk	7 vertical feet, vf
3	W-3	visual	unk	unk	11 vertical feet, vf
4	W-4	visual	unk	unk	11 vertical feet, vf
5	W-5	replace	4-foot	brick	7 vertical feet, vf

Note: all distances and vertical dimensions are scaled off the Engineering file Plans Contractor is responsible to physically measure all distances in the field prior to performing the work

Sewer pipe and Manhole inspections are to be done at night after 9 pm. Coordination with the Waltham Police Department one week before is required. Work is not to proceed after 5 am.


BOYNTON STREET
WILLIAM B. SMITH
HEIRS NEHEMIAH WARREN
AUGUSTUS H. BEHRAM
3007 W
1110
126
4544 W
3860
132
2986 W
1016
138
6" WATER
8" SEWER
6" WATER
8" SEWER
CABOT STREET
6" WATER
24" SEWER
6" SMITH GATE
6"x6"x8" TEE
W-3
6" CHECK
W-2
W-1
6" SMITH GATE
10" S
8" CHAR GATE
VALLEY RELIEF SEWER (1979)
24" SEWER
W-4
VERNON STREET
24"
PRESSURE
8" SEWER
6" WATER
10" WATER
8"x10" GLOBE TEE
8" COFFIN GATE
8" CHECK
HIGH
8" SMITH GATE
W-5
FE
Flow Equilization Chamber
EDDY STREET
10" SEWER
SEE PLAN (1940) 77-50
HEIRS NEHEMIAH WARREN
1/16 BEND
8" SMITH GATE
8" HYD.
8" WATER
10" SEWER
6" WATER
26" SEWER
24" SEWER
WESTON STREET
10" SEWER
ABANDONED


VERNON STREET
MASTERS BROOK
BOWMAN ST.
Flow Equilization Chamber
CABOT ST.
1.0%
1.1%
1.6%
.67%
24" SEWER
24" SEWER 1.1%
57.79
58.41
59.98
60.43
61.23
60.80
6+00
16+115
7+99
18+52.6
8+79
18+98.2


Continued on Sheet C
Heirs Nehemiah Warren
VERNON ST.
Superceded
point repair
1940
10" Sewer
6" Water
6" Sewer
1935 Const.
6" Smith gate
1-6-8 Tee
CABOT ST.
6" Water
9136 W
See plan 77-50
74
80
WESTON STREET
8" Water
10" Sewer
0.146 %
8" Water
8" Smith gate
8" Check
1/16 bend
8" Smith gate
8" Water
8" Chapman
W-3
6" Check
6" Smith gate
W-2
W-1
8-6 Red.
10" Water
W-5
? verify
6" Coffin gate
8-10-8 Globe
205
73
81
85
91
5078
6633W
3986
4747W
3985
4748W
6" Sewer
6" Water
EDDY ST.
Construction
Limit of Assessment for 1899 Construction
1921
William Donlan
31,535 sf Assessed
Construction Limit of Assessment for
WESTON ST

APPENDIX C
Water and Sewer Service Replacement

Note:
Not all service replacements are shown in Appendix C. Please refer to Table 6 in Section 01010 to supplement these drawings.

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations

Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Sewer Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

MAIN ST
NATHAN RD
CALDWELL RD
EVERETT ST
EDDY ST
ELM AVE
WESTON ST
VERNON ST
CABOT ST
BOYNTON ST
FISKE AVE

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
Water services and some sewer services are not shown on the map.
Contractor to coordinate with the Owner to review sewer services tie cards and water service tie cards.

Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
FIGURE: C-8

WRIGHT-PIERCE
Engineering a Better Environment

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RecommendationMapbookC-100Scale-v2-11x17-L.mxd

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations

Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Sewer Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

MAIN ST
WESTON ST
ELM AVE
SOUTH ST
VERNON ST
RUSSELL ST
PROSPECT ST
AUBURN ST

R58_11555 R58_11560 R58_11535 R58_11540 R58_11530 R58_11525 R58_03010 R58_03020 R58_03015 R58_11610 R58_11605
R59_10335 R59_10330 R59_10325 R59_11210 R59_11545 R59_11550 R59_11205 R59_11305 R59_11200 R59_22000 R59_11195 R59_11510 R59_11505 R59_11520 R59_11515

2-01 976-86 962 14 BEF 17 14 21-23 31-1 37 948 934-40 922-30 918 912-14 916 R 894 888-92 864 17-NX 880 55 105-11 119 113-15 17 127 123 129 137-39 133-35 147 143 20 42 48 27 29 32 35-37 54-1 105-1 93 91 89 83-85 79-81 43 162-68 160 158 154-56 150-52 146-48 136-38 134 132 128 124 116-18 110-12 23-33 92-94 86-88 80-82 5-1 34-1 36-1 9 38-40 38 1/2 15 42-44 44-R 21 50 29-31 60 88-1 98 45 46-48 64-66 60-62 52 48 44-1 40 32 28 24 18-20 16 8-1 49 53-55 57 10-12 53-57 54-56 17 44-46 R 59 55-57 51-53 47-1 45 41-43 35-39 31-33 25-27 21-23 17-19 15 43 15-17 25-27

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
FIGURE: C-9

WRIGHT-PIERCE Engineering a Better Environment

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RecommendationMapbookC-100Scale-v2-11x17-L.mxd

AI

City Boundary
Sewershed
Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations

Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Sewer Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

N

0 50 100 200 Feet

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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
FIGURE: C-10

WRIGHT-PIERCE
Engineering a Better Environment

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhase-RecommendationMapbookC-100Scale-v2-11x17-L.mxd

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations
Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Water Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

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TAH

N

0 50 100 200 Feet

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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO:	DATE:
13487A	6/26/2018

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: C-11

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations

Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Sewer Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

R67_07495 R67_07525 R67_07490 R67_07460 R67_07465 R67_07485 R67_07530 R67_07610 R67_07470 R67_07475 R67_28185 R67_07480 R67_11740 R67_11735 R67_11730 R67_11725 R67_11720 R67_07740 R67_07745

VILLA ST
FISHER AVE
FISKE AVE
ANDREA RD
CABOT ST
BOYNTON ST
PLEASANT AVE

75 79 76 91 150 141 147 97 88 11 96 153 157 161 165 94 173 179 183 189 190 194 196 195 205 12 16 16-AFT 139 R 131 63-65 62 157-1R 165-7R 169-71 11-15

89 90 85 30 36 17 21 27 31 37

N

0 50 100 200 Feet

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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: C-12

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhase-RecommendationMapbookC-100Scale-v2-11x17-L.mxd

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations
Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Sewer Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit

Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

DARTMOUTH ST
HIGHLAND ST
SOUTH ST
CURTIS ST
BROOK AVE
PROSPECT ST
HOPE AVE
SHARON ST
BELLEVUE ST
BELLEVUE PL
SUN ST
DREW ST
0 TERMIN

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: C-13

TAH W:\GIS_Development\Projects\MA\Waltham\13487_BearHillValleySewerArea1314B\MXDs\DesignPhaseRehab\DesignPhase-RecommendationMapbookC-100Scale-v2-11x17-L.mxd

City Boundary
Sewershed
PS Sewer Pump Station
SewerStructures
Other Sewer Structure
Hydrant
PS Water Pump Station
Private Sewer
City Sewer
Water Line
Parcel

Replacement Recommendations

Replace Sewer Service, Water Service Test Pit
Replace Water Service
Replace Water Service
Replace Sewer Service, Replace Water Service
Water Service Test Pit
Sewer Service Test Pit
Sewer Service Test Pit, Replace Water Service
Sewer Service Test Pit, Water Service Test Pit

REVISED: 1/29/2019

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TAH

N

0 50 100 200 Feet

Data from Waltham, MA. Map developed by Wright-Pierce 2018. These maps are schematic depictions of the City's buried utilities and no private utility companies' buried assets are shown; and therefore, buried utilities may not be in the locations as shown on the maps. The contractors shall perform their due diligence when excavating. Not all buried entities are shown.
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Area 1314B
Sewer and Manhole Rehabilitation
Waltham, MA

PROJ NO: 13487A
DATE: 6/26/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: C-14

APPENDIX D
CCTV Pipe and Manhole Inspection Reports

APPENDIX D.1
CCTV Pipe Inspection Reports

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03730	R48-06585	R48-03730-R48-06585	9/25/2017	Tower rd	Vitrified Clay Pipe	18	209.9	209.9

Pipe Size: 18 Total Ln.: 209.9 Inspected Ln.: 209.9

Project Total Ln.: 209.9 Project Inspected Ln.: 209.9

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

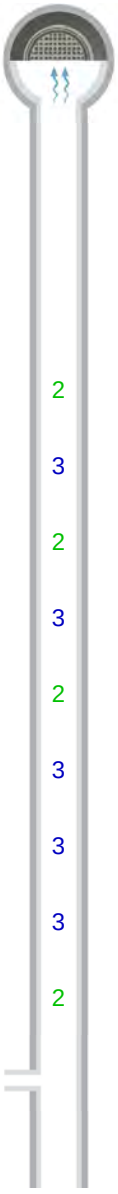
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	3321	R48-03730-R48-06585	
Quick Maint. Rating	3223	Upstream MH	Downstream MH
Quick Overall Rating	3524	R48-03730	R48-06585

Length surveyed	Material	Shape	Height	Width
209.9	Vitrified Clay Pipe	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R48-06585

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R48-06585		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
48.8 ft.	Water Level		0 - 0		15	
2 105.0 ft.	Crack Longitudinal		12 - 0		5	
3 105.6 ft.	Infiltration Dripper		12 - 0		5	
2 165.8 ft.	Deposits Attached Encrustation		1 - 12		5	
3 182.1 ft.	Fracture Longitudinal		12 - 0		5	
2 182.1 ft.	Deposits Attached Encrustation		12 - 0		0	
3 187.3 ft.	Fracture Longitudinal		12 - 0		5	
3 190.6 ft.	Fracture Longitudinal		11 - 0		5	
3 194.1 ft.	Infiltration Dripper		1 - 12		5	
2 194.1 ft.	Deposits Attached Encrustation		9 - 0		0	
206.2 ft.	Tap Factory Active		3 - 0	18	5	
209.9 ft.	End of Pipe capped ?		0 - 0		5	

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	3321	R48-03730-R48-06585	
Quick Maint. Rating	3223	Upstream MH	Downstream MH
Quick Overall Rating	3524	R48-03730	R48-06585

Length surveyed	Material	Shape	Height	Width
209.9	Vitrified Clay Pipe	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R48-03730

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

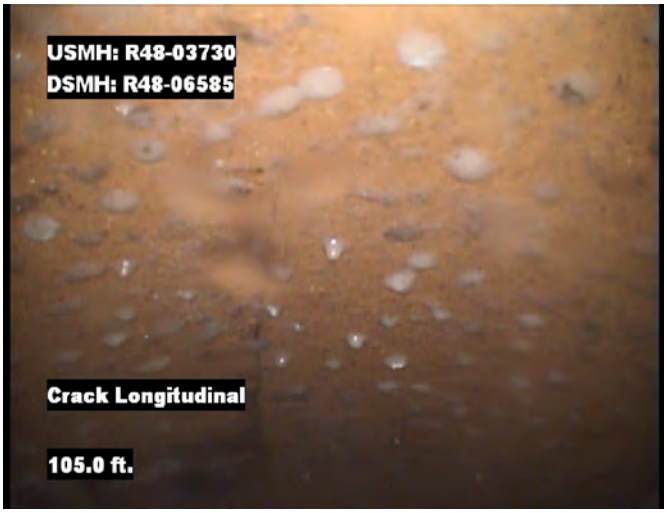
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-06585

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 48.8 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 105.0 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 105.6 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 165.8 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Distance: 182.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 182.1 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

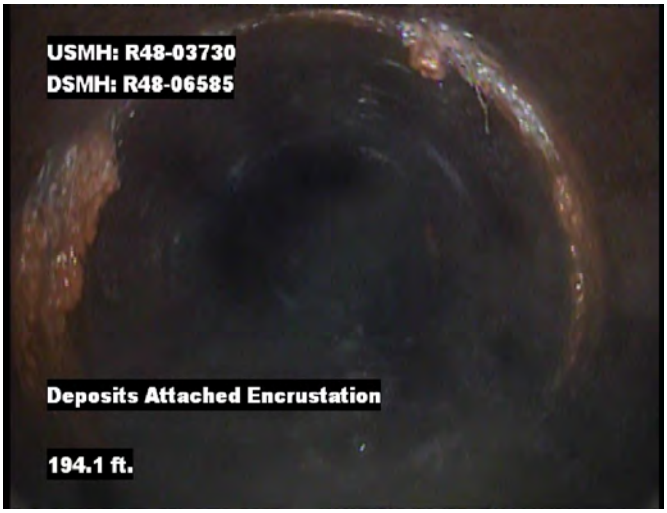
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 187.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 190.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 194.1 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A



Distance: 194.1 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 206.2 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 209.9 ft. Grade: 0
Condition: End of Pipe
Remarks: capped ?

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	3321	Pipe Segment Reference		
Quick Maint. Rating	3223	R48-03730-R48-06585		
Quick Overall Rating	3524	Upstream MH	Downstream MH	
		R48-03730	R48-06585	
Length surveyed	Material	Shape	Height	Width
209.9	Vitrified Clay Pipe	Circular	18	18
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	3	6	2	4	8
	3	3	9	3	2	6	3	5	15
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	4		Subtotals	5		Subtotals	9	
SUMMARY	Pipe Rating		11	Pipe Rating		12	Overall Pipe Rating		23
	Structural Index		2.8	O&M Index		2.4	Overall Index		2.6
	Str. Quick Rating		3321	O&M Quick Rating		3223	Ovrl. Quick Rating		3524

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03730	R48-03720	R48-03730-R48-03720	9/25/2017	Tower rd	Reinforced Concrete Pipe	24	213.4	213.4

Pipe Size: 24 Total Ln.: 213.4 Inspected Ln.: 213.4

Project Total Ln.: 213.4 Project Inspected Ln.: 213.4

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

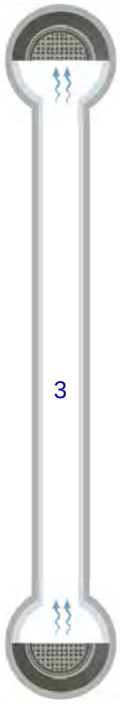
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3100	R48-03730-R48-03720		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R48-03730	R48-03720	
Length surveyed	Material	Shape	Height	Width
213.4	Reinforced Concrete...	Circular	24	24
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R48-03720

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-03720					
0.0 ft.	Water Level		0 - 0		5	
154.1 ft.	Infiltration Stain		7 - 5		5	
154.1 ft.	Infiltration Dripper		12 - 5		5	
201.5 ft.	Infiltration Stain		12 - 5		5	
213.4 ft.	Manhole		0 - 0		5	
	R48-03730					

R48-03730

Ted Berry Company
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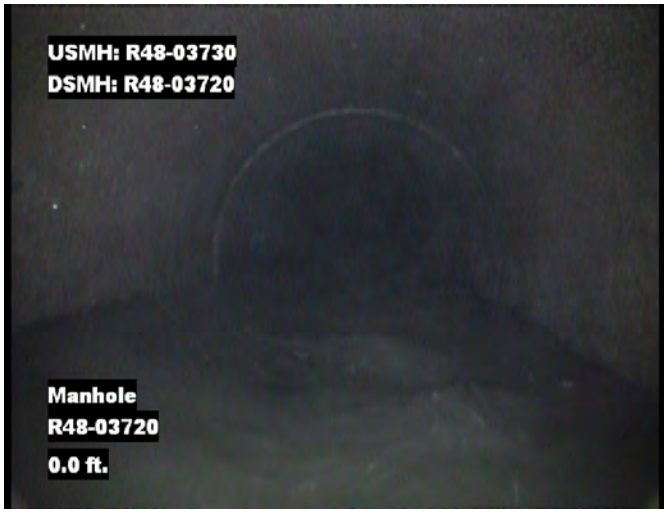
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-03720

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 154.1 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A

Distance: 154.1 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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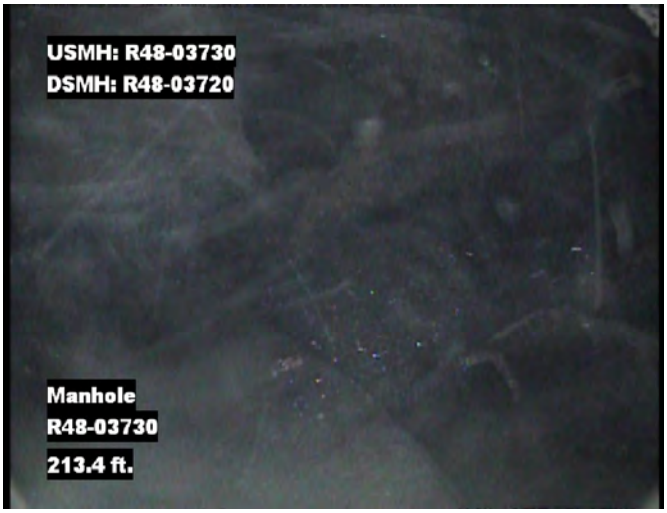
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 201.5 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A



Distance: 213.4 ft. Grade: 0
Condition: Manhole
Remarks: R48-03730

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3100	R48-03730-R48-03720		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R48-03730	R48-03720	

Length surveyed	Material	Shape	Height	Width
213.4	Reinforced Concrete...	Circular	24	24

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		3	Overall Pipe Rating		3
	Structural Index		0	O&M Index		3.0	Overall Index		3.0
	Str. Quick Rating		0000	O&M Quick Rating		3100	Ovrl. Quick Rating		3100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03770	R48-03765	R48-03770-R48-03765	9/26/2017	Bear hill rd	Asbestos Cement	21	167.1	167.1

Pipe Size: 21 Total Ln.: 167.1 Inspected Ln.: 167.1

Project Total Ln.: 167.1 Project Inspected Ln.: 167.1

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Bear hill rd	20170926	09:16
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	N/A	R48-03770-R48-03765		
Quick Overall Rating	N/A	Upstream MH	Downstream MH	
		R48-03770	R48-03765	
Length surveyed	Material	Shape	Height	Width
167.1	Asbestos Cement	Circular	21	21
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				

R48-03765

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-03765					
0.0 ft.	Water Level		0 - 0		5	
167.1 ft.	Manhole		0 - 0		0	
	R48-03770					

R48-03770

Ted Berry Company
521 Federal Rd
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	09:16

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-03765

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 167.1 ft. Grade: 0
Condition: Manhole
Remarks: R48-03770

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	09:16

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R48-03770-R48-03765	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R48-03770	R48-03765

Length surveyed	Material	Shape	Height	Width
167.1	Asbestos Cement	Circular	21	21

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	0		Subtotals	0	
SUMMARY	Pipe Rating		0	Pipe Rating		0	Overall Pipe Rating		0
	Structural Index		0	O&M Index		0	Overall Index		0
	Str. Quick Rating		0000	O&M Quick Rating		0000	Ovrl. Quick Rating		0000

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03780	R48-03775	R48-03780-R48-03775	10/4/2017	Bear hill rd xc	Vitrified Clay Pipe	21	0	11.8

Pipe Size: 21 Total Ln.: 0 Inspected Ln.: 11.8

Project Total Ln.: 0.0 Project Inspected Ln.: 11.8

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

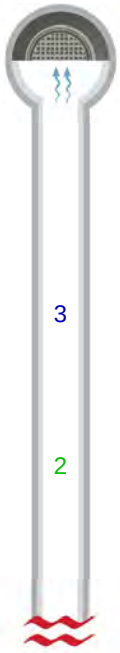
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd xc	20171004	13:23

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3121	R48-03780-R48-03775		
Quick Overall Rating	3121	Upstream MH	Downstream MH	
		R48-03780	R48-03775	
Length surveyed	Material	Shape	Height	Width
11.8	Vitrified Clay Pipe	Circular	21	21
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R48-03775

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-03775					
0.0 ft.	Water Level		0 - 0		40	
0.3 ft.	Infiltration Dripper		1 - 12		5	
3						
8.5 ft.	Material Change		0 - 0		5	
	pvc					
10.6 ft.	Deposits Settled Fine		5 - 7		5	
2						
11.8 ft.	Survey Abandoned		0 - 0		5	
	needs cleaning					

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd xc	20171004	13:23

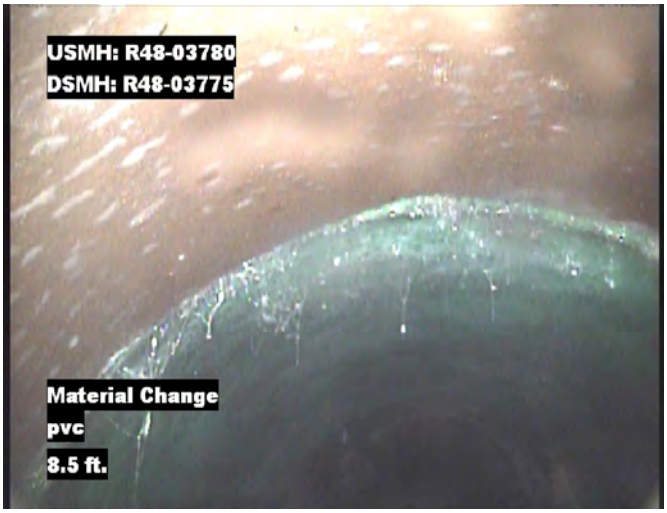
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-03775

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.3 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A



Distance: 8.5 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

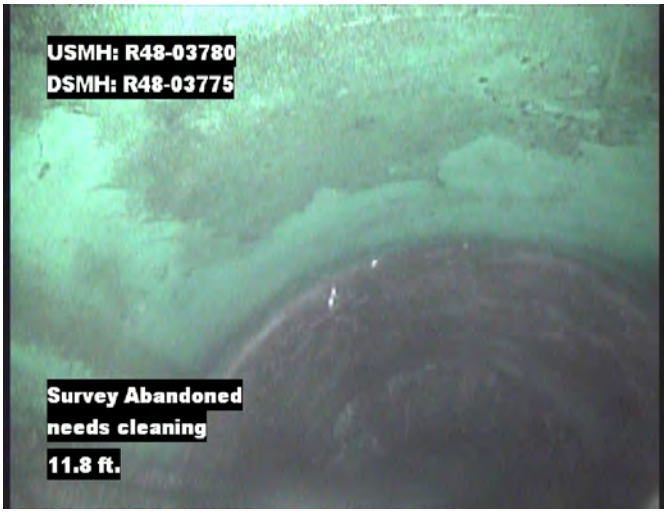
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd xc	20171004	13:23

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Distance: 10.6 ft. Grade: 2
Condition: Deposits Settled Fine
Remarks: N/A



Distance: 11.8 ft. Grade: 0
Condition: Survey Abandoned
Remarks: needs cleaning

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd xc	20171004	13:23

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3121	R48-03780-R48-03775		
Quick Overall Rating	3121	Upstream MH	Downstream MH	
		R48-03780	R48-03775	

Length surveyed	Material	Shape	Height	Width
11.8	Vitrified Clay Pipe	Circular	21	21

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	1	2	2	1	2
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0

Continuous Defects

Code	ID	Length

	Subtotals	0		Subtotals	2		Subtotals	2	
SUMMARY	Pipe Rating		0	Pipe Rating		5	Overall Pipe Rating		5
	Structural Index		0	O&M Index		2.5	Overall Index		2.5
	Str. Quick Rating		0000	O&M Quick Rating		3121	Ovrl. Quick Rating		3121

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03815	R47-03810	R48-03815-R47-03810	10/5/2017	Second ave	Vitrified Clay Pipe	24	0	111.4

Pipe Size: 24 Total Ln.: 0 Inspected Ln.: 111.4

Project Total Ln.: 0.0 Project Inspected Ln.: 111.4

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Second ave	20171005	08:30
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill valley and west end		

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R48-03815-R47-03810		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R48-03815	R47-03810	
Length surveyed	Material	Shape	Height	Width
111.4	Vitrified Clay Pipe	Circular	24	24
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				

R47-03810

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R47-03810					
0.0 ft.	Water Level		0 - 0		10	
104.9 ft.	Water Level		0 - 0		65	
111.4 ft.	Roots Ball Joint		12 - 0		85	
111.4 ft.	Survey Abandoned		0 - 0		0	
	cant navigate due to root ball					

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Second ave	20171005	08:30

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R47-03810

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 104.9 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 111.4 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

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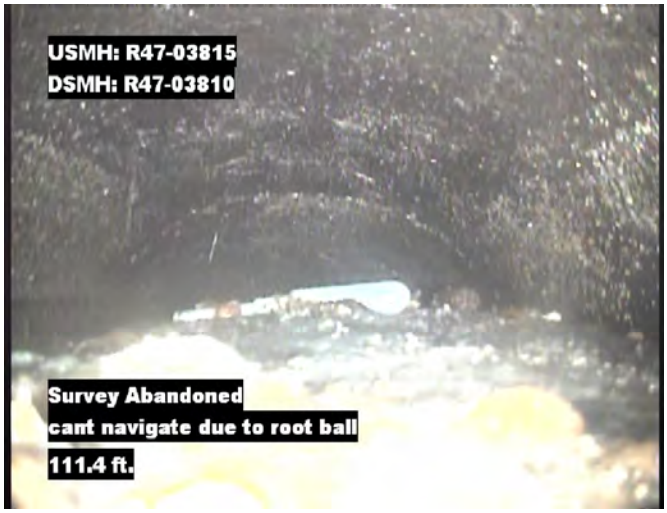
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Second ave	20171005	08:30

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end



Distance: 111.4 ft. Grade: 0
Condition: Survey Abandoned
Remarks: cant navigate due to root ball

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Second ave	20171005	08:30

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R48-03815-R47-03810		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R48-03815	R47-03810	

Length surveyed	Material	Shape	Height	Width
111.4	Vitrified Clay Pipe	Circular	24	24

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4100	Ovrl. Quick Rating		4100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03820	R48-03815	R48-03820-R48-03815	9/26/2017	Bear hill rd	Vitrified Clay Pipe	21	0	24.5

Pipe Size: 21 Total Ln.: 0 Inspected Ln.: 24.5

Project Total Ln.: 0.0 Project Inspected Ln.: 24.5

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	10:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A
Quick Maint. Rating	1300
Quick Overall Rating	1300

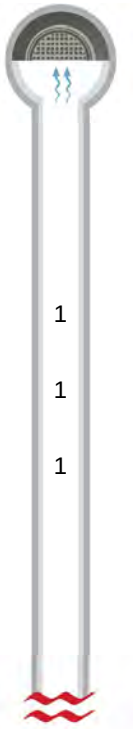
Pipe Segment Reference: R48-03820-R48-03815

Upstream MH	Downstream MH
R48-03820	R48-03815

Length surveyed	Material	Shape	Height	Width
24.5	Vitrified Clay Pipe	Circular	21	21

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R48-03815

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-03815					
0.0 ft.	Water Level		0 - 0		25	
3.0 ft.	Roots Fine Joint		10 - 2		5	
16.6 ft.	Roots Fine Joint		11 - 1		5	
24.5 ft.	Roots Fine Joint		11 - 1		5	
24.5 ft.	Water Level		0 - 0		75	
24.5 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate going to require heavy cleaning					

Ted Berry Company
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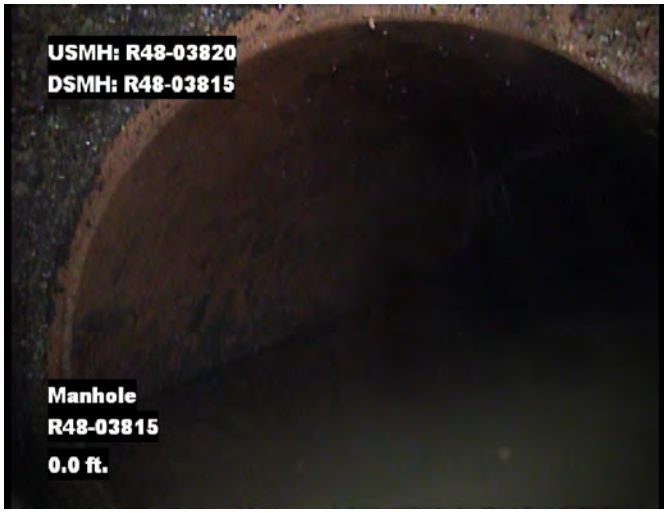
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	10:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-03815

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 3.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 16.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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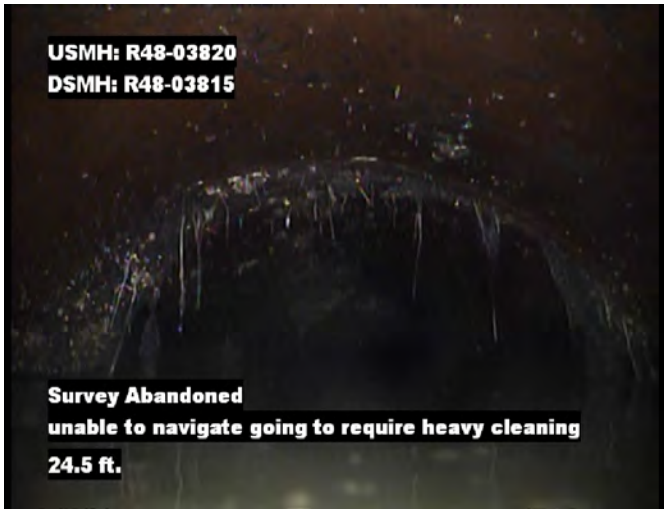
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	10:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance:	24.5 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	24.5 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		



Distance:	24.5 ft.	Grade:	0
Condition:	Survey Abandoned		
Remarks:	unable to navigate going to require heavy cleaning		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	10:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	1300	R48-03820-R48-03815		
Quick Overall Rating	1300	Upstream MH	Downstream MH	
		R48-03820	R48-03815	

Length surveyed	Material	Shape	Height	Width
24.5	Vitrified Clay Pipe	Circular	21	21

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	3	3	1	3	3
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0

Continuous Defects

Code	ID	Length

	Structural Ratings			O & M Ratings			Combined Ratings		
	Subtotals	0		Subtotals	3		Subtotals	3	
SUMMARY	Pipe Rating		0	Pipe Rating		3	Overall Pipe Rating		3
	Structural Index		0	O&M Index		1.0	Overall Index		1.0
	Str. Quick Rating		0000	O&M Quick Rating		1300	Ovrl. Quick Rating		1300

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-03820	R48-03815	R48-03820-R48-03815	9/26/2017	Bear hill rd	Vitrified Clay Pipe	21	0	45.7

Pipe Size: 21 Total Ln.: 0 Inspected Ln.: 45.7

Project Total Ln.: 0.0 Project Inspected Ln.: 45.7

Ted Berry Company
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Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Bear hill rd	20170926	14:59
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R48-03820-R48-03815		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R48-03820	R48-03815	
Length surveyed	Material	Shape	Height	Width
45.7	Vitrified Clay Pipe	Circular	21	21
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	
Remarks				

R48-03820

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-03820					
0.0 ft.	Water Level		0 - 0		60	
45.7 ft.	Roots Ball Joint		12 - 0		75	
45.7 ft.	Survey Abandoned		0 - 0		0	
	due to root ball- warthog wouldnt touch the roots					

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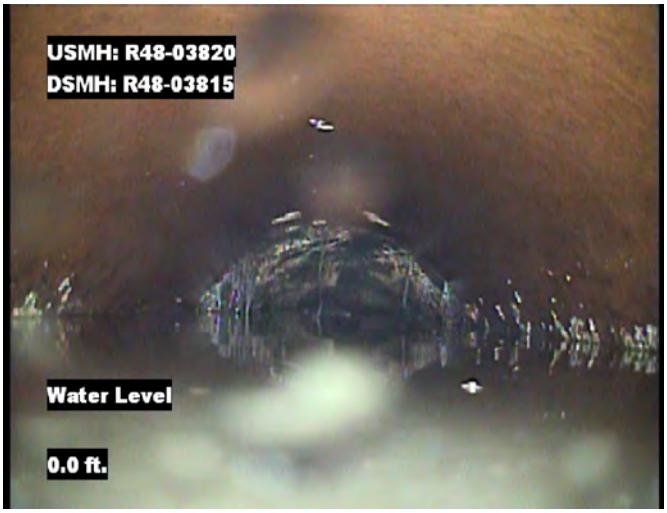
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

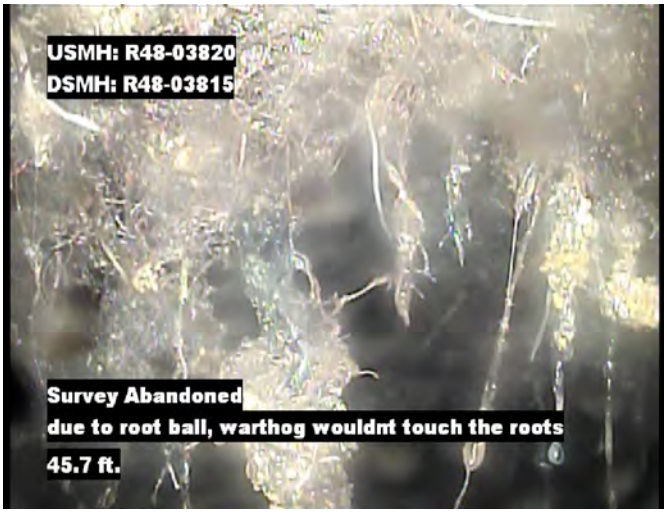
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-03820



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 45.7 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A



Distance: 45.7 ft. Grade: 0
Condition: Survey Abandoned
Remarks: due to root ball- warthog wouldnt touch the roots

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170926	14:59

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A
Quick Maint. Rating	4100
Quick Overall Rating	4100

Pipe Segment Reference: R48-03820-R48-03815

Upstream MH	Downstream MH
R48-03820	R48-03815

Length surveyed	Material	Shape	Height	Width
45.7	Vitrified Clay Pipe	Circular	21	21

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4100	Ovrl. Quick Rating		4100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-06520	R48-06515	R48-06520-R48-06515	9/8/2017	Bear hill rd	Vitrified Clay Pipe	8	135	135

Pipe Size: 8 Total Ln.: 135 Inspected Ln.: 135

Project Total Ln.: 135.0 Project Inspected Ln.: 135.0

Ted Berry Company
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Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Bear hill rd	20170908	10:04
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill valley and west end		

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	N/A	R48-06520-R48-06515		
Quick Overall Rating	5121	Upstream MH	Downstream MH	
		R48-06520	R48-06515	
Length surveyed	Material	Shape	Height	Width
135	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	
Remarks				

R48-06520

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-06520					
0.0 ft.	Water Level		0 - 0		5	
127.1 ft.	Fracture Circumferential		7 - 12		5	
128.6 ft.	Broken Pipe Void Visible		9 - 0		5	
135.0 ft.	Manhole		0 - 0		5	
	R48-06515 drop					

R48-06515

Ted Berry Company
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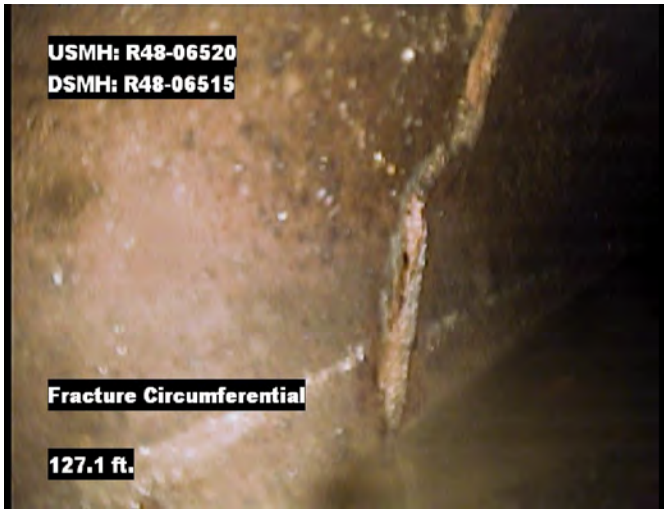
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170908	10:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-06520

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 127.1 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 128.6 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170908	10:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	135.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R48-06515 drop		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170908	10:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	N/A	R48-06520-R48-06515		
Quick Overall Rating	5121	Upstream MH	Downstream MH	
		R48-06520	R48-06515	
Length surveyed	Material	Shape	Height	Width
135	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	0	0	2	1	2
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	0		Subtotals	2	
SUMMARY	Pipe Rating		7	Pipe Rating		0	Overall Pipe Rating		7
	Structural Index		3.5	O&M Index		0	Overall Index		3.5
	Str. Quick Rating		5121	O&M Quick Rating		0000	Ovrl. Quick Rating		5121

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-06560	R48-06555	R48-06560-R48-06555	9/12/2017	Bear hill rd	Vitrified Clay Pipe	8	0	107.2

Pipe Size: 8 Total Ln.: 0 Inspected Ln.: 107.2

Project Total Ln.: 0.0 Project Inspected Ln.: 107.2

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	12:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	N/A	R48-06560-R48-06555		
Quick Overall Rating	N/A	Upstream MH	Downstream MH	
		R48-06560	R48-06555	
Length surveyed	Material	Shape	Height	Width
107.2	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

R48-06555

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-06555					
0.0 ft.	Water Level		0 - 0		5	
46.1 ft.	Tap Break-in Active		9 - 0	4	5	
104.1 ft.	Material Change		0 - 0		5	
	pvc					
107.2 ft.	Tap Factory		3 - 0	4	5	
107.2 ft.	General Observation		0 - 0		5	
	broken piece of pipe needs cleaning					
107.2 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate					

Ted Berry Company
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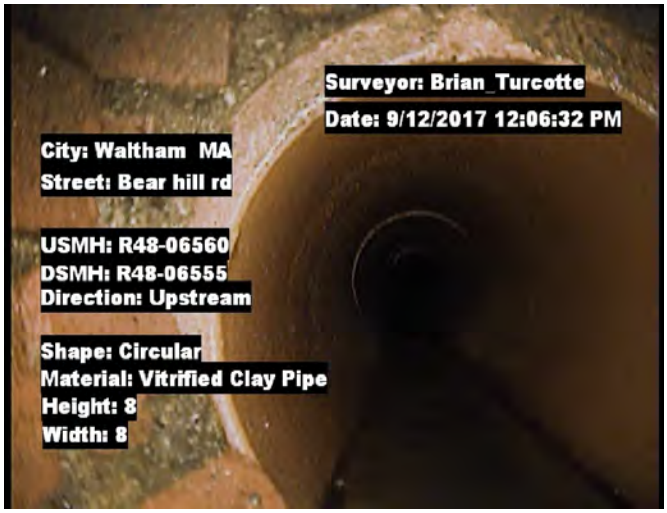
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	12:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R48-06555		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	46.1 ft.	Grade:	0
Condition:	Tap Break-in Active		
Remarks:	N/A		

Distance:	104.1 ft.	Grade:	0
Condition:	Material Change		
Remarks:	pvc		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	12:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 107.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 107.2 ft. Grade: 0
Condition: General Observation
Remarks: broken piece of pipe needs cleaning

Distance: 107.2 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	12:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R48-06560-R48-06555	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R48-06560	R48-06555

Length surveyed	Material	Shape	Height	Width
107.2	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	0		Subtotals	0	
SUMMARY	Pipe Rating		0	Pipe Rating		0	Overall Pipe Rating		0
	Structural Index		0	O&M Index		0	Overall Index		0
	Str. Quick Rating		0000	O&M Quick Rating		0000	Ovrl. Quick Rating		0000

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-06560	R48-06555	R48-06560-R48-06555	9/12/2017	Bear hill rd	Vitrified Clay Pipe	8	0	164.5

Pipe Size: 8 Total Ln.: 0 Inspected Ln.: 164.5

Project Total Ln.: 0.0 Project Inspected Ln.: 164.5

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	13:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R48-06560-R48-06555	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R48-06560	R48-06555

Length surveyed	Material	Shape	Height	Width
164.5	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

R48-06555

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R48-06555					
0.0 ft.	Water Level		0 - 0		5	
46.8 ft.	Tap Break-in		9 - 0	4	5	
103.8 ft.	Material Change		0 - 0		5	
	pvc					
106.4 ft.	Tap Factory		3 - 0	4	5	
110.0 ft.	Material Change		0 - 0		5	
	vc					
164.5 ft.	General Observation		0 - 0		5	
	u/s blockage at MH. Appears to be broken cap					
164.5 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate					

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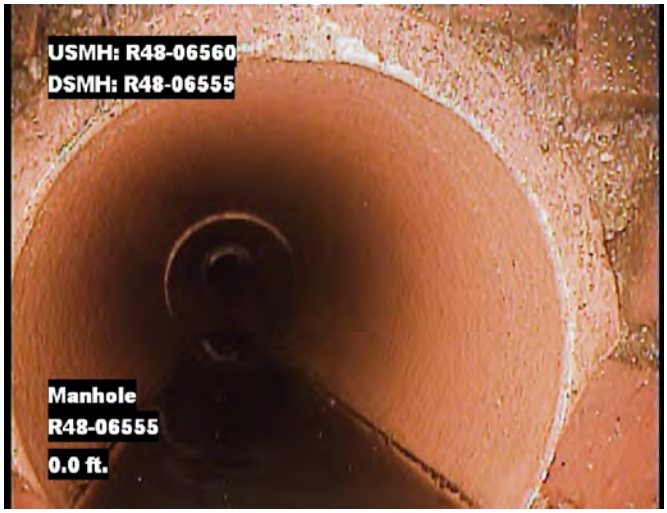
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	13:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

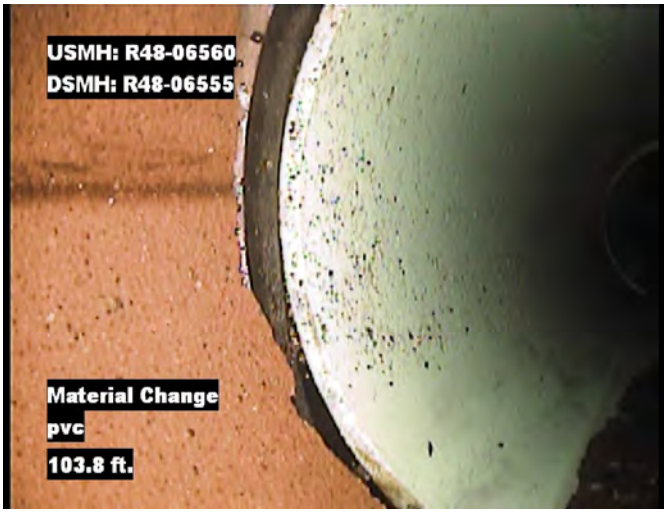
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R48-06555		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	46.8 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		



Distance:	103.8 ft.	Grade:	0
Condition:	Material Change		
Remarks:	pvc		

Ted Berry Company
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Livermore Maine 04253
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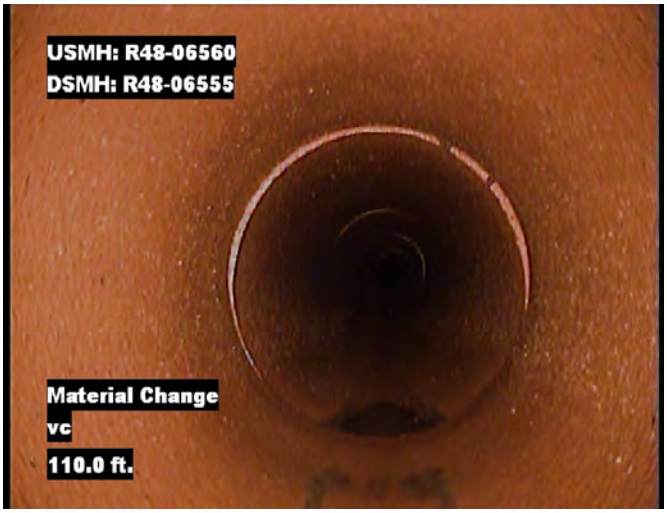
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	13:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

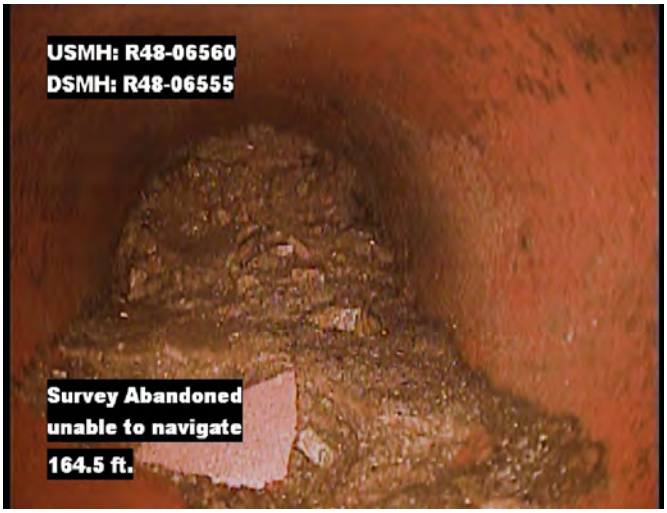
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 106.4 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 110.0 ft. Grade: 0
Condition: Material Change
Remarks: vc

Distance: 164.5 ft. Grade: 0
Condition: General Observation
Remarks: u/s blockage at MH. Appears to be broken cap



Distance: 164.5 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Bear hill rd	20170912	13:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R48-06560-R48-06555	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R48-06560	R48-06555

Length surveyed	Material	Shape	Height	Width
164.5	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	0		Subtotals	0	
SUMMARY	Pipe Rating		0	Pipe Rating		0	Overall Pipe Rating		0
	Structural Index		0	O&M Index		0	Overall Index		0
	Str. Quick Rating		0000	O&M Quick Rating		0000	Ovrl. Quick Rating		0000

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R48-06585	R48-06580	R48-06585-R48-06580	9/25/2017	Tower rd	Vitrified Clay Pipe	18	0	217.6

Pipe Size: 18 Total Ln.: 0 Inspected Ln.: 217.6

Project Total Ln.: 0.0 Project Inspected Ln.: 217.6

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

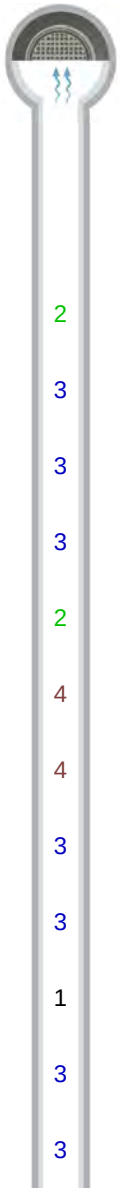
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	433D	R48-06585-R48-06580	
Quick Maint. Rating	4135	Upstream MH	Downstream MH
Quick Overall Rating	443E	R48-06585	R48-06580

Length surveyed	Material	Shape	Height	Width
217.6	Vitrified Clay Pipe	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R48-06580

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R48-06580		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
2 17.9 ft.	Crack Longitudinal		12 - 0		5	
3 22.2 ft.	Fracture Longitudinal		11 - 0		5	
3 28.3 ft.	Fracture Longitudinal		12 - 0		5	
3 37.3 ft.	Fracture Longitudinal	Start S01	12 - 0		5	
2 48.8 ft.	Crack Longitudinal		12 - 0		5	
4 68.1 ft.	Fracture Multiple		11 - 1		5	
4 78.6 ft.	Fracture Multiple		11 - 1		5	
3 78.6 ft.	Fracture Longitudinal	End F01	12 - 0		5	
3 84.8 ft.	Fracture Longitudinal	Start S02	12 - 0		5	
1 91.0 ft.	Roots Fine Joint		11 - 1		5	
3 128.4 ft.	Fracture Longitudinal	End F02	12 - 0		5	
3 146.9 ft.	Infiltration Dripper		1 - 1		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	433D	R48-06585-R48-06580	
Quick Maint. Rating	4135	Upstream MH	Downstream MH
Quick Overall Rating	443E	R48-06585	R48-06580

Length surveyed	Material	Shape	Height	Width
217.6	Vitrified Clay Pipe	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

3	153.1 ft.	Infiltration Dripper		1 - 1		5
4	168.9 ft.	Fracture Multiple		11 - 1		5
3	174.3 ft.	Fracture Longitudinal	Start S03	12 - 0		5
3	188.5 ft.	Infiltration Dripper		12 - 0		5
3	190.8 ft.	Infiltration Dripper		11 - 1		5
3	196.8 ft.	Infiltration Dripper		1 - 3		5
3	203.0 ft.	Fracture Longitudinal	End F03	12 - 0		5
4	203.0 ft.	Infiltration Runner		12 - 3		5
	217.6 ft.	Manhole R48-06585		0 - 0		5

R48-06585

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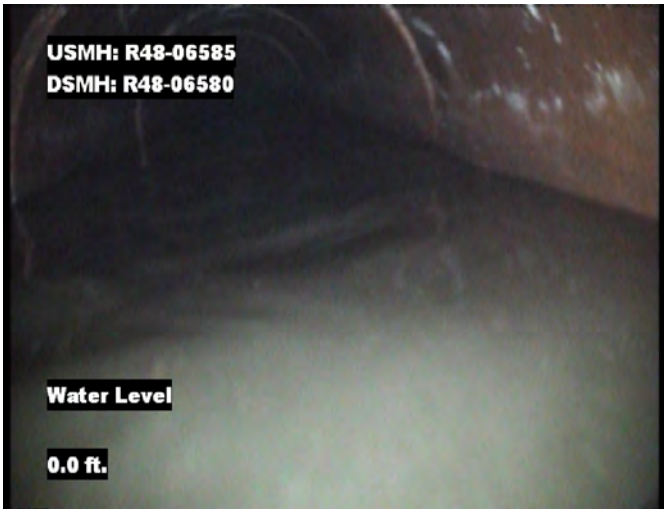
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R48-06580



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 17.9 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 22.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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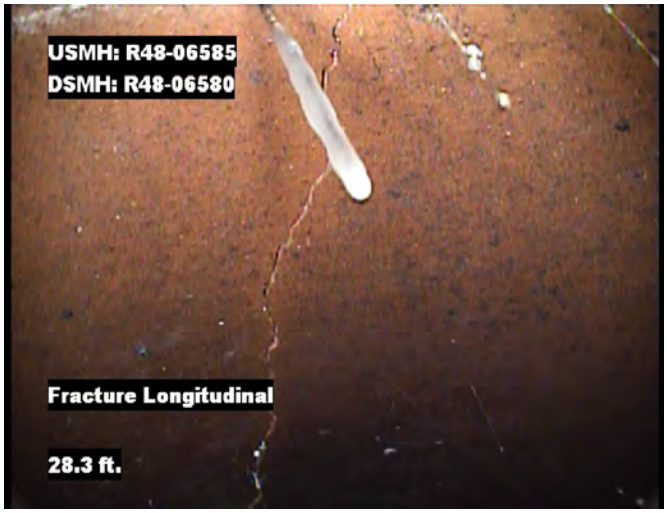
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 28.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 37.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 48.8 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 68.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

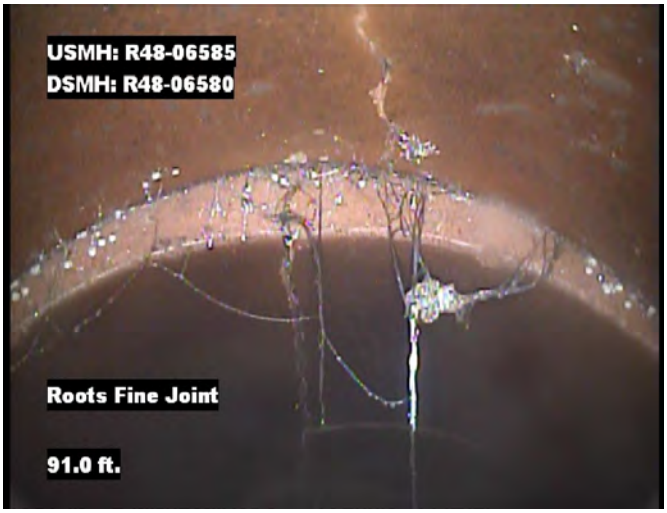
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 78.6 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 78.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 84.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 91.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 128.4 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 146.9 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 153.1 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 168.9 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Tower rd	20170925	14:45
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Distance: 174.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 188.5 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 190.8 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 196.8 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

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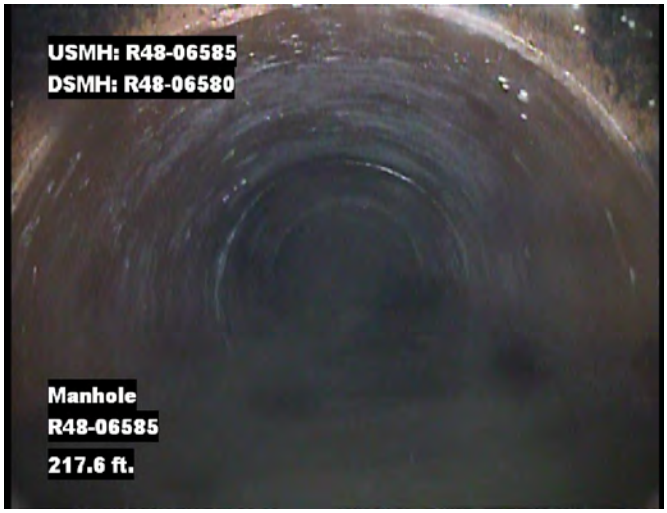
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 203.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 203.0 ft. Grade: 4
Condition: Infiltration Runner
Remarks: N/A



Distance: 217.6 ft. Grade: 0
Condition: Manhole
Remarks: R48-06585

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Tower rd	20170925	14:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	433D	Pipe Segment Reference	R48-06585-R48-06580
Quick Maint. Rating	4135	Upstream MH	Downstream MH
Quick Overall Rating	443E	R48-06585	R48-06580

Length surveyed	Material	Shape	Height	Width
217.6	Vitrified Clay Pipe	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	2	4	2	0	0	2	2	4
	3	2	6	3	5	15	3	7	21
	4	3	12	4	1	4	4	4	16
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code ID Length									
FL F01 41.3	3	8	24	0	0	0	3	8	24
FL F02 43.6	3	9	27	0	0	0	3	9	27
FL F03 28.7	3	6	18	0	0	0	3	6	18
	Subtotals	30		Subtotals	7		Subtotals	37	
SUMMARY	Pipe Rating		91	Pipe Rating		20	Overall Pipe Rating		111
	Structural Index		3.0	O&M Index		2.9	Overall Index		3.0
	Str. Quick Rating		433D	O&M Quick Rating		4135	Ovrl. Quick Rating		443E

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R57-07975	R57-07970	R57-07975-R57-07970	9/21/2017	Edge hill rd	Vitrified Clay Pipe	27	169.7	169.7

Pipe Size: 27 Total Ln.: 169.7 Inspected Ln.: 169.7

Project Total Ln.: 169.7 Project Inspected Ln.: 169.7

Ted Berry Company
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Defect Listing Plot Left

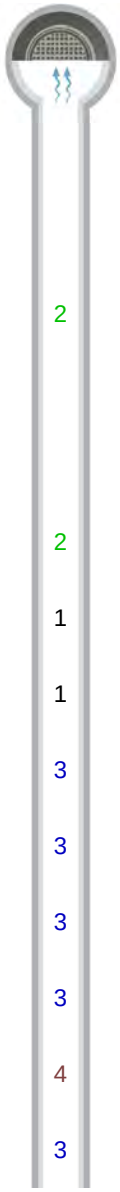
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	4134	Pipe Segment Reference		
Quick Maint. Rating	413C	R57-07975-R57-07970		
Quick Overall Rating	423D	Upstream MH: R57-07975	Downstream MH: R57-07970	
Length surveyed: 169.7	Material: Vitrified Clay Pipe	Shape: Circular	Height: 27	Width: 27
Direction: Upstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: No Pre-Cleaning	Lining Method

Remarks



R57-07970

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R57-07970		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
2 17.6 ft.	Deposits Attached Encrustation		5 - 12		0	
23.2 ft.	Infiltration Stain	Start S01	5 - 12		5	
35.4 ft.	Infiltration Stain	End F01	5 - 12		5	
2 35.4 ft.	Deposits Attached Encrustation	Start S02	5 - 12		5	
1 40.1 ft.	Roots Fine Joint		7 - 5		5	
1 48.5 ft.	Roots Fine Joint	Start S03	7 - 5		5	
3 50.2 ft.	Infiltration Dripper		12 - 5		5	
3 62.1 ft.	Infiltration Dripper		1 - 5		5	
3 65.8 ft.	Infiltration Dripper		1 - 5		5	
3 76.3 ft.	Infiltration Dripper		12 - 5		5	
4 80.3 ft.	Infiltration Runner		11 - 5		5	
3 83.7 ft.	Infiltration Dripper	Start S04	12 - 5		5	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	4134
Quick Maint. Rating	413C
Quick Overall Rating	423D

Pipe Segment Reference: R57-07975-R57-07970

Upstream MH	Downstream MH
R57-07975	R57-07970

Length surveyed	Material	Shape	Height	Width
169.7	Vitrified Clay Pipe	Circular	27	27

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

4	112.1 ft.	Fracture Multiple		11 - 1		5
3	126.6 ft.	Fracture Longitudinal		12 - 0		5
1	136.1 ft.	Roots Fine Joint	End F03	7 - 5		5
2	136.1 ft.	Deposits Attached Encrustation	End F02	5 - 12		5
3	140.7 ft.	Fracture Longitudinal		12 - 0		5
3	145.6 ft.	Fracture Longitudinal		12 - 0		5
3	151.5 ft.	Fracture Longitudinal		12 - 0		5
3	169.7 ft.	Infiltration Dripper	End F04	12 - 5		5
	169.7 ft.	Manhole R57-07975		0 - 0		5

R57-07975

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R57-07970

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 17.6 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Distance: 23.2 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 35.4 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A

Distance: 35.4 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Distance: 40.1 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 48.5 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 50.2 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 62.1 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 65.8 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 76.3 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 80.3 ft. Grade: 4
Condition: Infiltration Runner
Remarks: N/A

Distance: 83.7 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 112.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 126.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

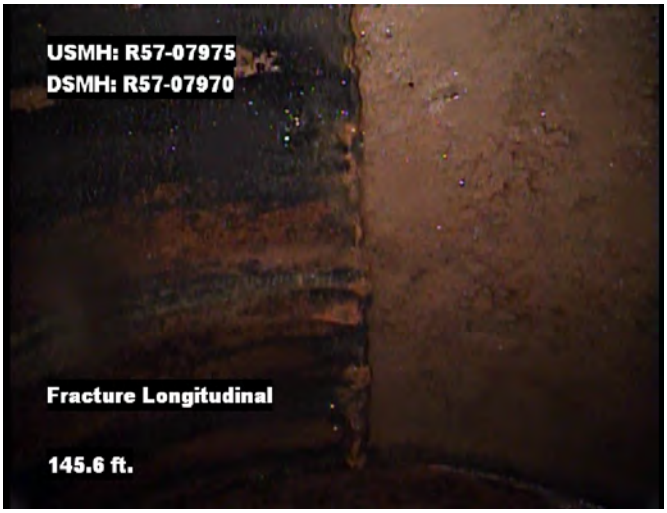
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 136.1 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 136.1 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

Distance: 140.7 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 145.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 151.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 169.7 ft. Grade: 3
Condition: Infiltration Dripper
Remarks: N/A

Distance: 169.7 ft. Grade: 0
Condition: Manhole
Remarks: R57-07975

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Edge hill rd	20170921	08:02

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	4134	Pipe Segment Reference	R57-07975-R57-07970
Quick Maint. Rating	413C	Upstream MH	Downstream MH
Quick Overall Rating	423D	R57-07975	R57-07970

Length surveyed	Material	Shape	Height	Width
169.7	Vitrified Clay Pipe	Circular	27	27

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	0	0	2	1	2	2	1	2
	3	4	12	3	4	12	3	8	24
	4	1	4	4	1	4	4	2	8
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
IS F01 12.2	0	0	0	0	2	0	0	2	0
DAE F02 100.7	0	0	0	2	20	40	2	20	40
RFJ F03 87.6	0	0	0	1	18	18	1	18	18
ID F04 86.0	0	0	0	3	17	51	3	17	51
	Subtotals	5		Subtotals	62		Subtotals	67	
SUMMARY	Pipe Rating		16	Pipe Rating		128	Overall Pipe Rating		144
	Structural Index		3.2	O&M Index		2.1	Overall Index		2.1
	Str. Quick Rating		4134	O&M Quick Rating		413C	Ovrl. Quick Rating		423D

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-03025	R58-03020	R58-03025-R58-03020	9/19/2017	Vernon st	Transite Pipe	24	244.1	244.1

Pipe Size: 24 Total Ln.: 244.1 Inspected Ln.: 244.1

Project Total Ln.: 244.1 Project Inspected Ln.: 244.1

Ted Berry Company
521 Federal Rd
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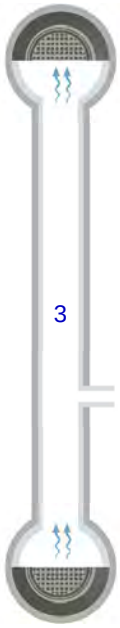
Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Vernon st	20170919	14:40
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B bear hill and west end		

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-03025-R58-03020		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R58-03025	R58-03020	
Length surveyed	Material	Shape	Height	Width
244.1	Transite Pipe	Circular	24	24
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				



R58-03020

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-03025		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
128.5 ft.	Fracture Longitudinal		12 - 0		5	
202.0 ft.	Tap Break-in		12 - 0	4	5	
244.1 ft.	Manhole R58-03025		0 - 0		5	

R58-03025

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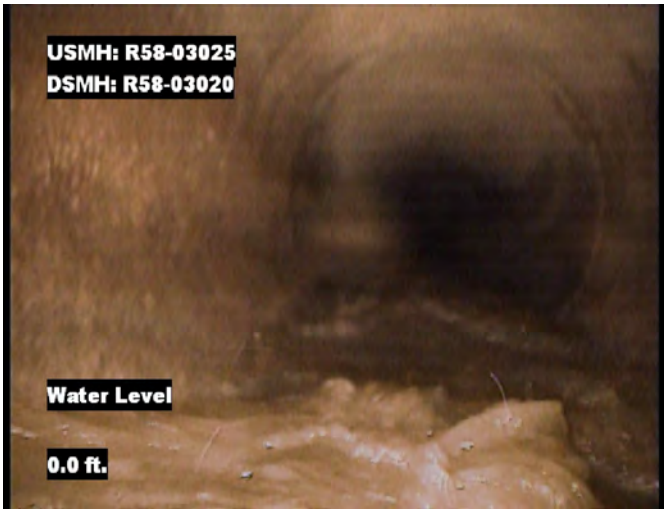
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	14:40

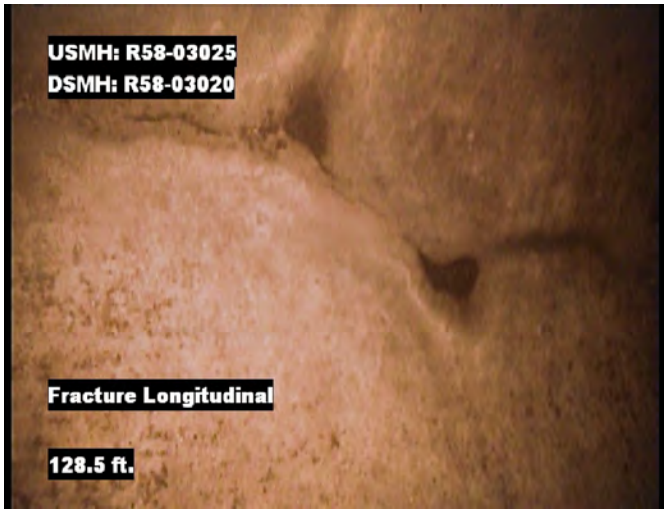
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03025



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 128.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 202.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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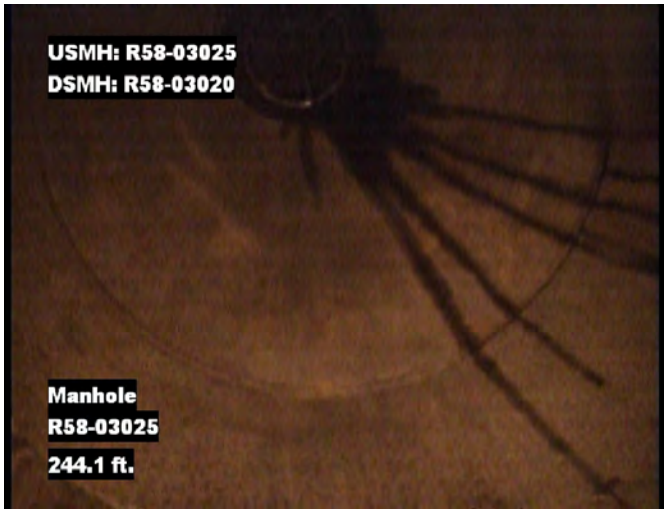
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	14:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance:	244.1 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-03025		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	14:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-03025-R58-03020		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R58-03025	R58-03020	

Length surveyed	Material	Shape	Height	Width
244.1	Transite Pipe	Circular	24	24

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		3	Pipe Rating		0	Overall Pipe Rating		3
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		3100	O&M Quick Rating		0000	Ovrl. Quick Rating		3100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-03030	R58-03025	R58-03030-R58-03025	9/19/2017	Vernon st	Transite Pipe	24	197.6	197.6

Pipe Size: 24 Total Ln.: 197.6 Inspected Ln.: 197.6

Project Total Ln.: 197.6 Project Inspected Ln.: 197.6

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	15:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	3100
Quick Maint. Rating	N/A
Quick Overall Rating	3100

Pipe Segment Reference: R58-03030-R58-03025

Upstream MH	Downstream MH
R58-03030	R58-03025

Length surveyed	Material	Shape	Height	Width
197.6	Transite Pipe	Circular	24	24

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-03025

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-03025		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
54.2 ft.	Tap Break-in		12 - 0	4	5	
121.5 ft.	Crack Multiple		2 - 4		5	
197.6 ft.	Manhole R58-03030		0 - 0		5	

R58-03030

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	15:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-03025		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	54.2 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	121.5 ft.	Grade:	3
Condition:	Crack Multiple		
Remarks:	N/A		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	15:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance:	197.6 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-03030		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Vernon st	20170919	15:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-03030-R58-03025		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R58-03030	R58-03025	

Length surveyed	Material	Shape	Height	Width
197.6	Transite Pipe	Circular	24	24

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		3	Pipe Rating		0	Overall Pipe Rating		3
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		3100	O&M Quick Rating		0000	Ovrl. Quick Rating		3100

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-03070	R58-03065	R58-03070-R58-03065	9/14/2017	Main st	Asbestos Cement	8	0	157.2

Pipe Size: 8 Total Ln.: 0 Inspected Ln.: 157.2

Project Total Ln.: 0.0 Project Inspected Ln.: 157.2

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5242	R58-03070-R58-03065	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5242	R58-03070	R58-03065

Length surveyed	Material	Shape	Height	Width
157.2	Asbestos Cement	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-03065

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-03065		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
5.0 ft.	Material Change vcp		0 - 0		0	
62.8 ft.	Tap Break-in		12 - 0	4	5	
97.8 ft.	Tap Break-in		12 - 0	4	5	
4 101.7 ft.	Fracture Multiple		10 - 2		5	
102.1 ft.	Tap Break-in		12 - 0	4	5	
3 102.5 ft.	Fracture Longitudinal		12 - 0		5	
3 132.8 ft.	Fracture Longitudinal		12 - 0		5	
4 138.9 ft.	Fracture Multiple		11 - 2		5	
144.2 ft.	Material Change dip		0 - 0		5	
154.4 ft.	Tap Break-in		12 - 0	4	5	
5 157.2 ft.	Broken Pipe Void Visible		10 - 2		5	
5 157.2 ft.	Broken Pipe Void Visible		6 - 0		5	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5242	R58-03070-R58-03065	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5242	R58-03070	R58-03065

Length surveyed	Material	Shape	Height	Width
157.2	Asbestos Cement	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

157.2 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate through broken pipe					

Ted Berry Company
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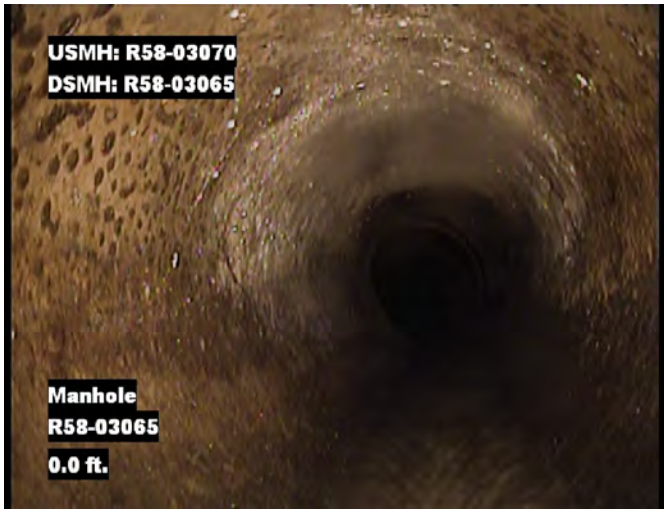
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

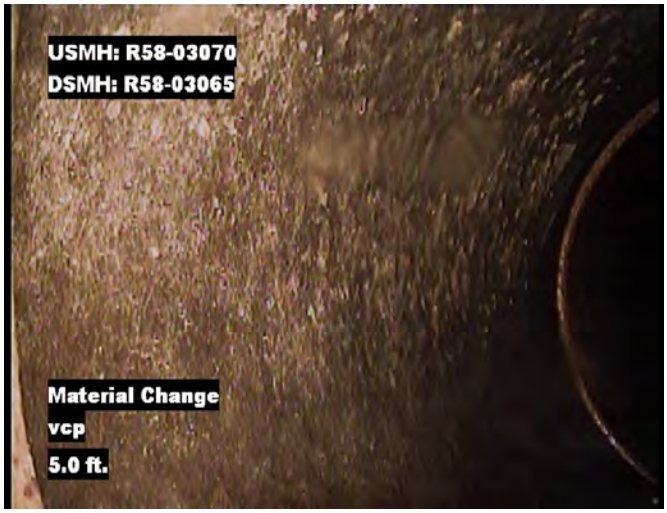
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03065

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 5.0 ft. Grade: 0
Condition: Material Change
Remarks: vcp

Distance: 62.8 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 97.8 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 101.7 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 102.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 102.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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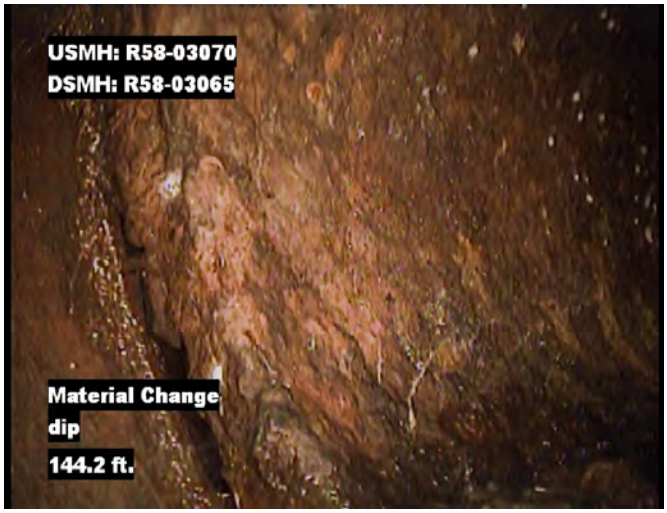
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 132.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 138.9 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A



Distance: 144.2 ft. Grade: 0
Condition: Material Change
Remarks: dip

Distance: 154.4 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 157.2 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 157.2 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 157.2 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate through broken pipe

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	09:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5242	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-03070-R58-03065		
Quick Overall Rating	5242	Upstream MH	Downstream MH	
		R58-03070	R58-03065	
Length surveyed	Material	Shape	Height	Width
157.2	Asbestos Cement	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	2	6	3	0	0	3	2	6
	4	2	8	4	0	0	4	2	8
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	0		Subtotals	6	
SUMMARY	Pipe Rating		24	Pipe Rating		0	Overall Pipe Rating		24
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		5242	O&M Quick Rating		0000	Ovrl. Quick Rating		5242

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-03075	R58-03070	R58-03075-R58-03070	9/14/2017	Main st	Vitrified Clay Pipe	8	125.2	125.2

Pipe Size: 8 Total Ln.: 125.2 Inspected Ln.: 125.2

Project Total Ln.: 125.2 Project Inspected Ln.: 125.2

Ted Berry Company
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Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	08:10

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	5100	R58-03075-R58-03070		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-03075	R58-03070	
Length surveyed	Material	Shape	Height	Width
125.2	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-03075

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-03075		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
21.7 ft.	Tap Break-in		12 - 0	4	5	
45.0 ft.	Tap Break-in		3 - 0	4	5	
80.2 ft.	Tap Break-in		12 - 0	4	5	
85.6 ft.	Tap Break-in Active		3 - 0	4	5	
85.6 ft.	Infiltration Gusher around lateral		3 - 0		5	
116.2 ft.	Fracture Multiple		10 - 2		5	
125.2 ft.	Manhole R58-03070		0 - 0		5	

R58-03070

Ted Berry Company
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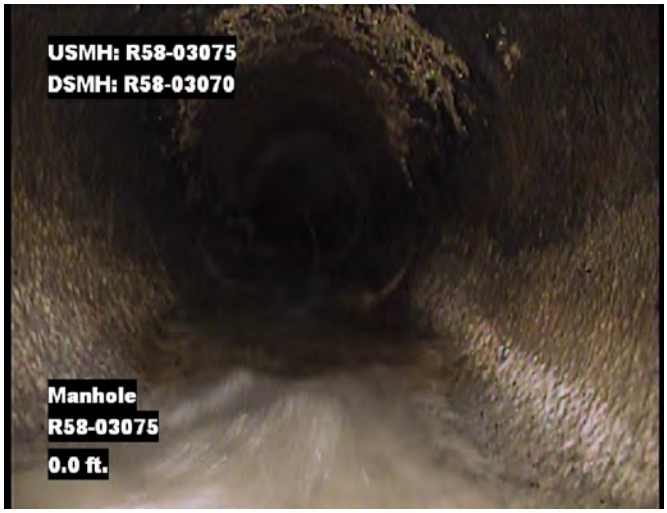
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	08:10

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03075

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 21.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 45.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	08:10

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 80.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 85.6 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 85.6 ft. Grade: 5
Condition: Infiltration Gusher
Remarks: around lateral

Distance: 116.2 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	08:10

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance:	125.2 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-03070		

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	08:10

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	5100	R58-03075-R58-03070		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-03075	R58-03070	

Length surveyed	Material	Shape	Height	Width
125.2	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	0	0	5	1	5	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	1		Subtotals	2	
SUMMARY	Pipe Rating		4	Pipe Rating		5	Overall Pipe Rating		9
	Structural Index		4.0	O&M Index		5.0	Overall Index		4.5
	Str. Quick Rating		4100	O&M Quick Rating		5100	Ovrl. Quick Rating		5141

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-03645	R58-03640	R58-03645-R58-03640	9/13/2017	Overland rd	Asbestos Cement	18	122	122

Pipe Size: 18 Total Ln.: 122 Inspected Ln.: 122

Project Total Ln.: 122.0 Project Inspected Ln.: 122.0

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170913	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	2100	Pipe Segment Reference		
Quick Maint. Rating	4400	R58-03645-R58-03640		
Quick Overall Rating	4421	Upstream MH	Downstream MH	
		R58-03645	R58-03640	
Length surveyed	Material	Shape	Height	Width
122	Asbestos Cement	Circular	18	18
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R58-03645

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-03645		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
78.5 ft.	Water Level		0 - 0		15	
86.5 ft.	Tap Break-in		12 - 0	4	5	
100.1 ft.	Camera Underwater	Start S01	0 - 0		5	
100.1 ft.	Water Level Sag		0 - 0		5	
118.7 ft.	Camera Underwater	End F01	0 - 0		5	
122.0 ft.	Manhole R58-03640 drop		0 - 0		5	

R58-03640

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170913	10:40

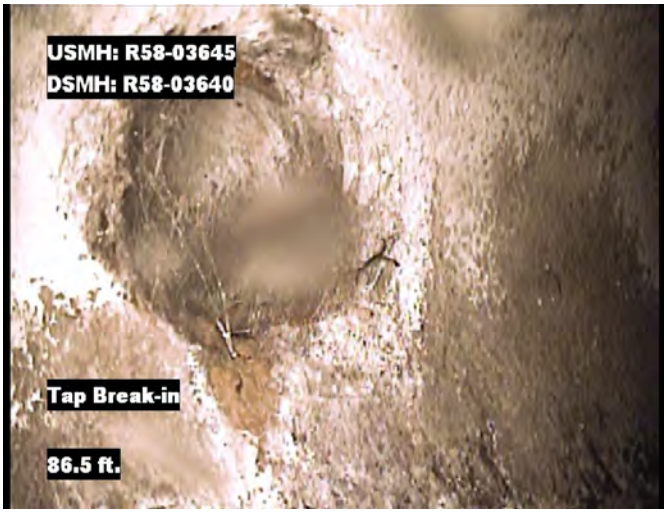
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03645

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 78.5 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 86.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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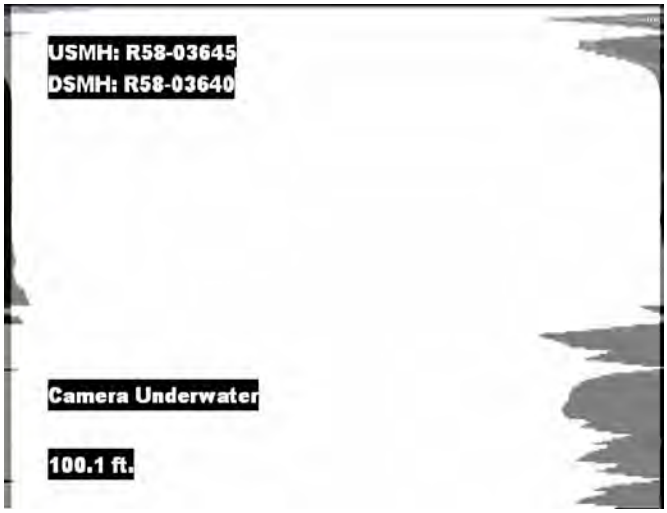
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170913	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

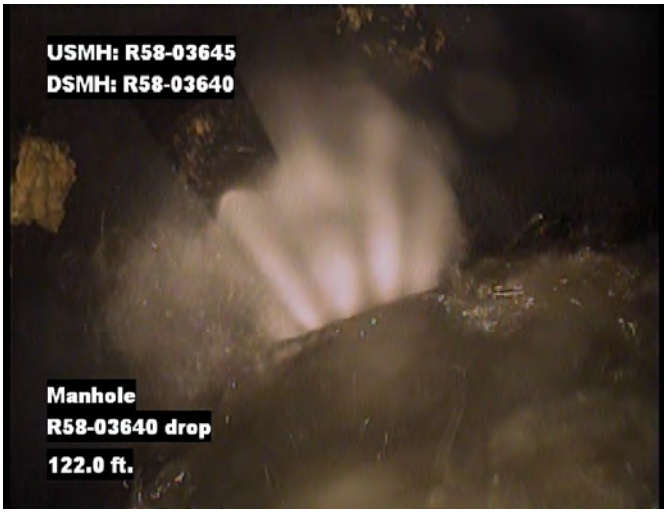
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 100.1 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A

Distance: 100.1 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 118.7 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A



Distance: 122.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03640 drop

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170913	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	2100	Pipe Segment Reference	
Quick Maint. Rating	4400	R58-03645-R58-03640	
Quick Overall Rating	4421	Upstream MH: R58-03645	Downstream MH: R58-03640

Length surveyed	Material	Shape	Height	Width
122	Asbestos Cement	Circular	18	18

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	1	2	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code ID Length									
MCU F01 18.6	0	0	0	4	4	16	4	4	16
	Subtotals	1		Subtotals	5		Subtotals	6	
SUMMARY	Pipe Rating		2	Pipe Rating		18	Overall Pipe Rating		20
	Structural Index		2.0	O&M Index		3.6	Overall Index		3.3
	Str. Quick Rating		2100	O&M Quick Rating		4421	Ovrl. Quick Rating		4422

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-06590	R58-03620	R58-06590-R58-03620	9/8/2017	Lunda st	Vitrified Clay Pipe	10	0	12.4

Pipe Size: 10 Total Ln.: 0 Inspected Ln.: 12.4

Project Total Ln.: 0.0 Project Inspected Ln.: 12.4

Ted Berry Company
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Defect Listing Plot Left

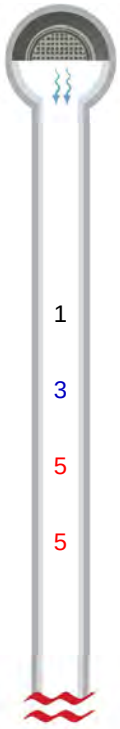
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170908	08:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5200	Pipe Segment Reference		
Quick Maint. Rating	3111	R58-06590-R58-03620		
Quick Overall Rating	5231	Upstream MH	Downstream MH	
		R58-06590	R58-03620	
Length surveyed	Material	Shape	Height	Width
12.4	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-06590

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-06595					
0.0 ft.	Water Level		0 - 0		5	
1.0 ft.	Roots Fine Joint		12 - 12		5	
2.0 ft.	Roots Medium Joint		12 - 5		5	
12.4 ft.	Broken Pipe Soil Visible		7 - 5		5	
12.4 ft.	Hole Soil Visible		7 - 1		5	
12.4 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate through broken pipe					

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170908	08:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-06595

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 1.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 2.0 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170908	08:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 12.4 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A

Distance: 12.4 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Distance: 12.4 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate through broken pipe

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170908	08:27

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5200	R58-06590-R58-03620	
Quick Maint. Rating	3111	Upstream MH	Downstream MH
Quick Overall Rating	5231	R58-06590	R58-03620

Length surveyed	Material	Shape	Height	Width
12.4	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	0	0	2	0	0	2	0	0
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	2		Subtotals	4	
SUMMARY	Pipe Rating		10	Pipe Rating		4	Overall Pipe Rating		14
	Structural Index		5.0	O&M Index		2.0	Overall Index		3.5
	Str. Quick Rating		5200	O&M Quick Rating		3111	Ovrl. Quick Rating		5231

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-06590	R58-03620	R58-06590-R58-03620	9/15/2017	Lunda st	Vitrified Clay Pipe	10	0	36.3

Pipe Size: 10 Total Ln.: 0 Inspected Ln.: 36.3

Project Total Ln.: 0.0 Project Inspected Ln.: 36.3

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170915	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

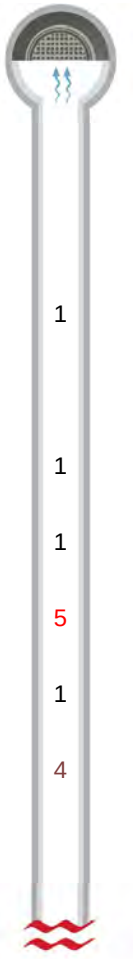
Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Quick Struct. Rating	5111	Pipe Segment Reference		
Quick Maint. Rating	4113	R58-06590-R58-03620		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-06590	R58-03620	

Length surveyed	Material	Shape	Height	Width
36.3	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-03620

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-03620					
0.0 ft.	Water Level		0 - 0		5	
1 5.0 ft.	Joint Offset Medium		0 - 0		5	
5.0 ft.	Material Change		0 - 0		5	
	vcp					
1 18.4 ft.	Roots Fine Joint		9 - 12		5	
1 23.0 ft.	Roots Fine Joint		3 - 0		5	
5 26.5 ft.	Broken Pipe Soil Visible		8 - 12		5	
1 32.9 ft.	Roots Fine Joint		4 - 12		5	
4 36.3 ft.	Roots Ball Joint		4 - 12		70	
36.3 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate past roots					

Ted Berry Company
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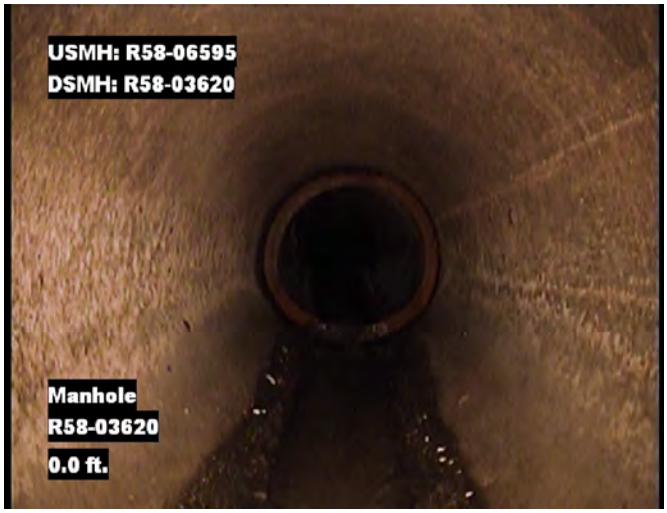
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170915	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

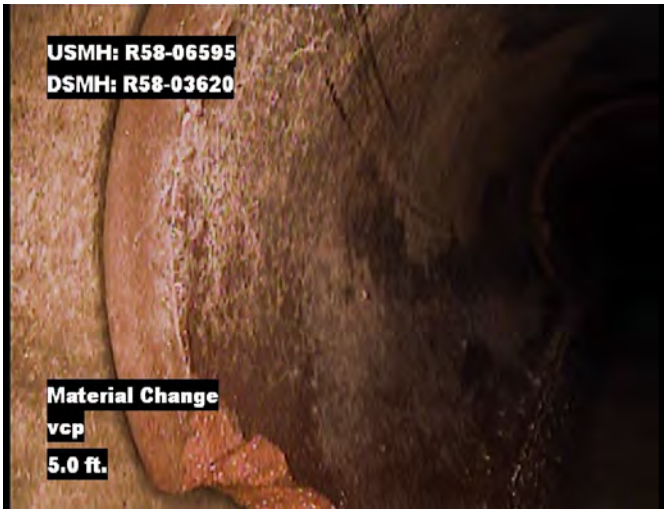
Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-03620

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 5.0 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 5.0 ft. Grade: 0
Condition: Material Change
Remarks: vcp

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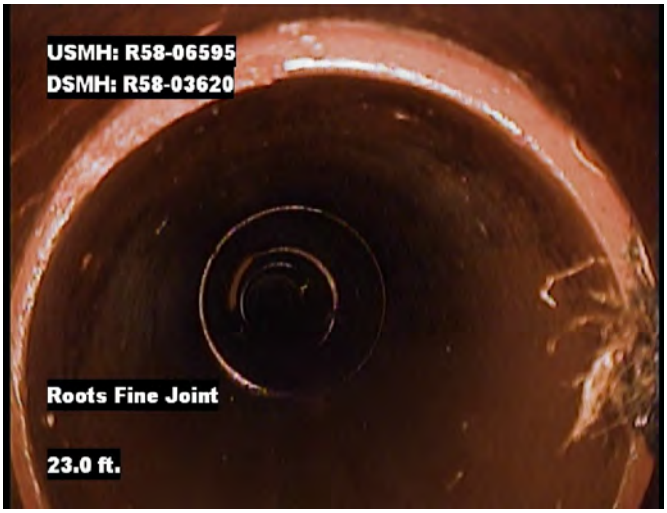
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170915	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Distance: 18.4 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 23.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 26.5 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A

Distance: 32.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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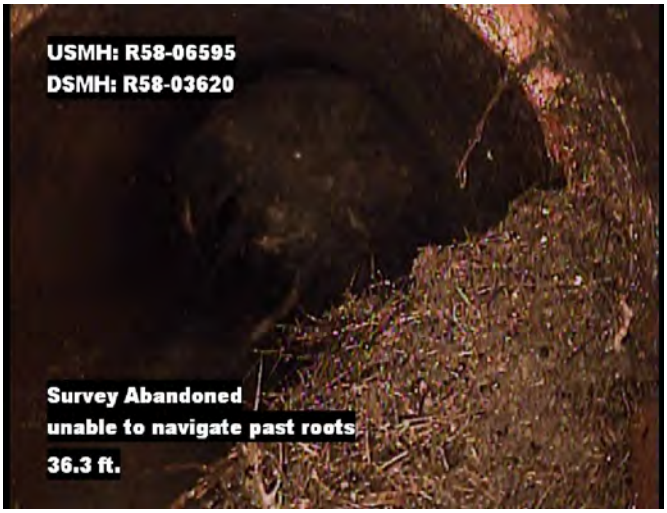
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170915	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Distance: 36.3 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A



Distance: 36.3 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate past roots

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170915	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Quick Struct. Rating	5111	Pipe Segment Reference		
Quick Maint. Rating	4113	R58-06590-R58-03620		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-06590	R58-03620	

Length surveyed	Material	Shape	Height	Width
36.3	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	1	1	1	3	3	1	4	4
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	4		Subtotals	6	
SUMMARY	Pipe Rating		6	Pipe Rating		7	Overall Pipe Rating		13
	Structural Index		3.0	O&M Index		1.8	Overall Index		2.2
	Str. Quick Rating		5111	O&M Quick Rating		4113	Ovrl. Quick Rating		5141

Ted Berry Company
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207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-06600	R58-06595	R58-06600-R58-06595	9/7/2017	Lunda st	Ductile Iron Pipe	8	44.9	11.3

Pipe Size: 8 Total Ln.: 44.9 Inspected Ln.: 11.3

Project Total Ln.: 44.9 Project Inspected Ln.: 11.3

Ted Berry Company
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Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

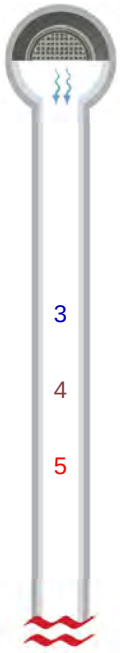
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	14:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5141	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-06600-R58-06595		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-06600	R58-06595	
Length surveyed	Material	Shape	Height	Width
11.3	Ductile Iron Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R58-06600

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-06600					
0.0 ft.	Water Level		0 - 0		5	
0.1 ft.	Fracture Longitudinal		6 - 0		5	
1.1 ft.	Fracture Multiple		12 - 12		5	
10.9 ft.	Hole Soil Visible		5 - 7		5	
11.3 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate past broken pipe					

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	14:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-06600

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 1.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	14:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 10.9 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Distance: 11.3 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate past broken pipe

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	14:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5141	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-06600-R58-06595		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-06600	R58-06595	

Length surveyed	Material	Shape	Height	Width
11.3	Ductile Iron Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	1	4	4	0	0	4	1	4
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	3		Subtotals	0		Subtotals	3	
SUMMARY	Pipe Rating		12	Pipe Rating		0	Overall Pipe Rating		12
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		5141	O&M Quick Rating		0000	Ovrl. Quick Rating		5141

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-06610	R58-06605	R58-06610-R58-06605	9/7/2017	Lunda st	Vitrified Clay Pipe	8	101.2	101.2

Pipe Size: 8 Total Ln.: 101.2 Inspected Ln.: 101.2

Project Total Ln.: 101.2 Project Inspected Ln.: 101.2

Ted Berry Company
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Defect Listing Plot Left

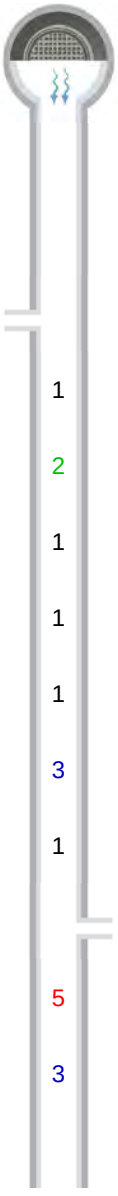
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	3215	R58-06610-R58-06605		
Quick Overall Rating	5132	Upstream MH: R58-06610	Downstream MH: R58-06605	
Length surveyed: 101.2	Material: Vitrified Clay Pipe	Shape: Circular	Height: 8	Width: 8
Direction: Downstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: Jetting	Lining Method

Remarks



R58-06610

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-06610		0 - 0		0	
0.0 ft.	Water Level		0 - 0		0	
31.1 ft.	Tap Break-in		2 - 0	4	5	
1 35.7 ft.	Roots Fine Joint		4 - 0		5	
2 36.1 ft.	Fracture Circumferential		1 - 5		5	
1 37.9 ft.	Roots Fine Joint		2 - 5		5	
1 57.0 ft.	Roots Fine Joint		1 - 2		5	
1 59.0 ft.	Roots Fine Joint		4 - 8		5	
3 61.0 ft.	Roots Medium Joint		2 - 10		5	
1 67.1 ft.	Roots Fine Joint		3 - 5		5	
88.7 ft.	Tap Break-in		12 - 0	4	5	
5 101.2 ft.	Broken Pipe Soil Visible		12 - 12		5	
3 101.2 ft.	Obstacle Intruding Thru Wall rock		9 - 12		15	
101.2 ft.	Survey Abandoned unable to navigate tractor through broken pipe-rock		0 - 0		0	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5121	R58-06610-R58-06605	
Quick Maint. Rating	3215	Upstream MH	Downstream MH
Quick Overall Rating	5132	R58-06610	R58-06605

Length surveyed	Material	Shape	Height	Width
101.2	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-06610

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 31.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 35.7 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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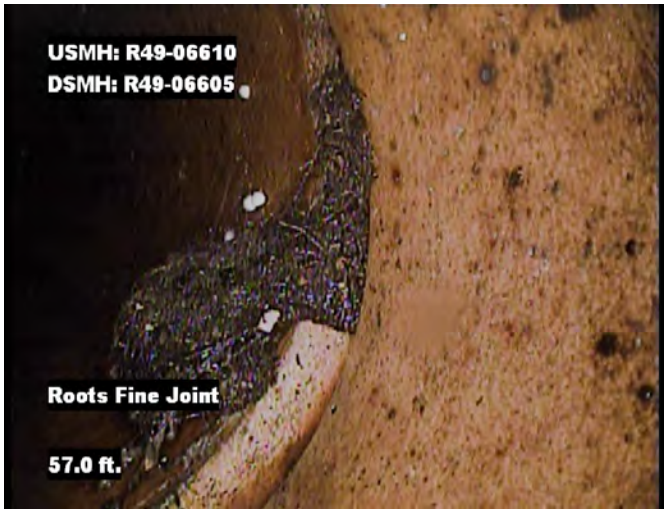
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 36.1 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 37.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 57.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 59.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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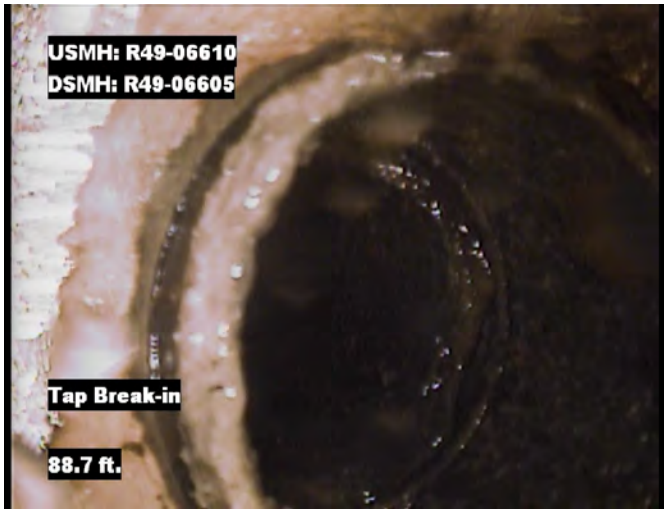
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 61.0 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 67.1 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 88.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 101.2 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A

Ted Berry Company
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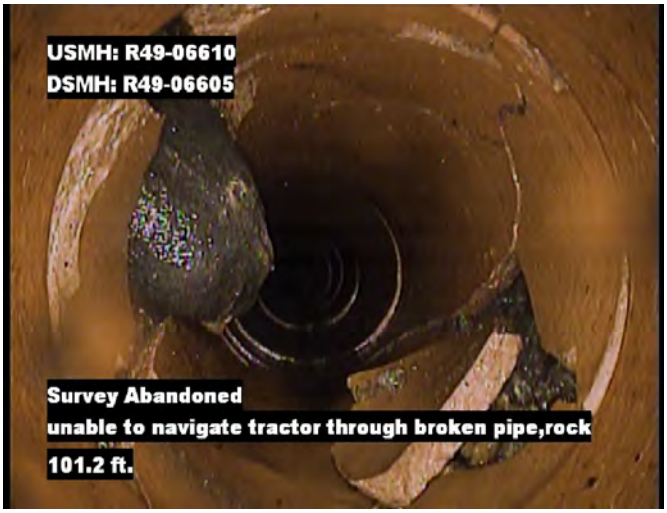
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 101.2 ft. Grade: 3
Condition: Obstacle Intruding Thru Wall
Remarks: rock



Distance: 101.2 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate tractor through broken pipe-rock

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Lunda st	20170907	13:36

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5121	R58-06610-R58-06605	
Quick Maint. Rating	3215	Upstream MH	Downstream MH
Quick Overall Rating	5132	R58-06610	R58-06605

Length surveyed	Material	Shape	Height	Width
101.2	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	5	5	1	5	5
	2	1	2	2	0	0	2	1	2
	3	0	0	3	2	6	3	2	6
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	7		Subtotals	9	
SUMMARY	Pipe Rating		7	Pipe Rating		11	Overall Pipe Rating		18
	Structural Index		3.5	O&M Index		1.6	Overall Index		2.0
	Str. Quick Rating		5121	O&M Quick Rating		3215	Ovrl. Quick Rating		5132

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-07620	R58-07615	R58-07620-R58-07615	10/4/2017	Weston st xc	Vitrified Clay Pipe	10	113.9	113.9

Pipe Size: 10 Total Ln.: 113.9 Inspected Ln.: 113.9

Project Total Ln.: 113.9 Project Inspected Ln.: 113.9

Ted Berry Company
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Defect Listing Plot Left

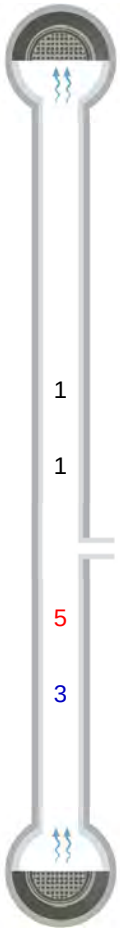
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	5131	Pipe Segment Reference		
Quick Maint. Rating	1200	R58-07620-R58-07615		
Quick Overall Rating	5131	Upstream MH	Downstream MH	
		R58-07620	R58-07615	
Length surveyed	Material	Shape	Height	Width
113.9	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-07615

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-07615		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
2.0 ft.	Material Change vcp		0 - 0		0	
3.0 ft.	Roots Fine Joint		7 - 12		5	
13.3 ft.	Roots Fine Joint		5 - 12		5	
54.6 ft.	Tap Break-in		12 - 0	4	5	
61.2 ft.	Broken Pipe Void Visible		2 - 6		5	
106.0 ft.	Fracture Longitudinal		12 - 0		5	
113.9 ft.	Manhole R58-07620		0 - 0		5	

1
1
5
3

R58-07620

Ted Berry Company
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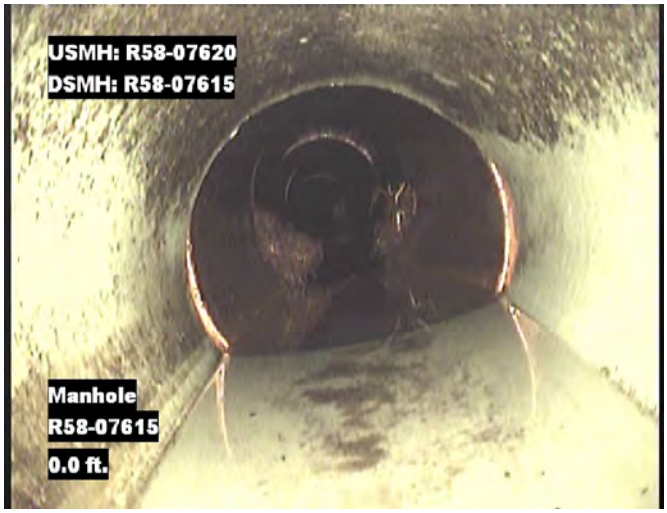
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end



Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-07615		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	2.0 ft.	Grade:	0
Condition:	Material Change		
Remarks:	vcp		

Distance:	3.0 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:45

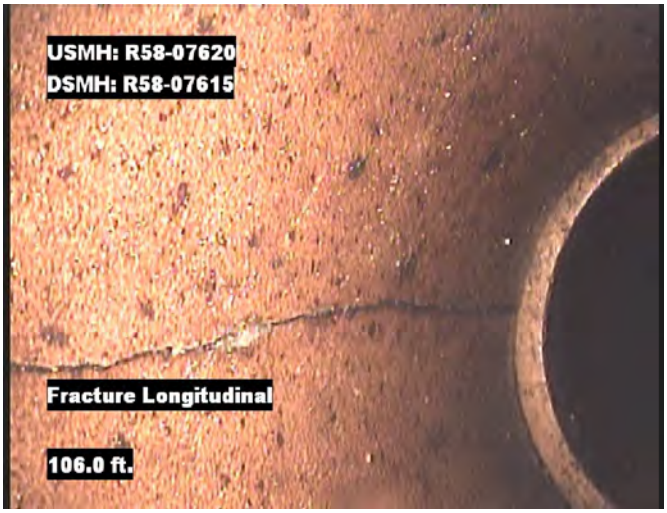
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Distance: 13.3 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 54.6 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 61.2 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A



Distance: 106.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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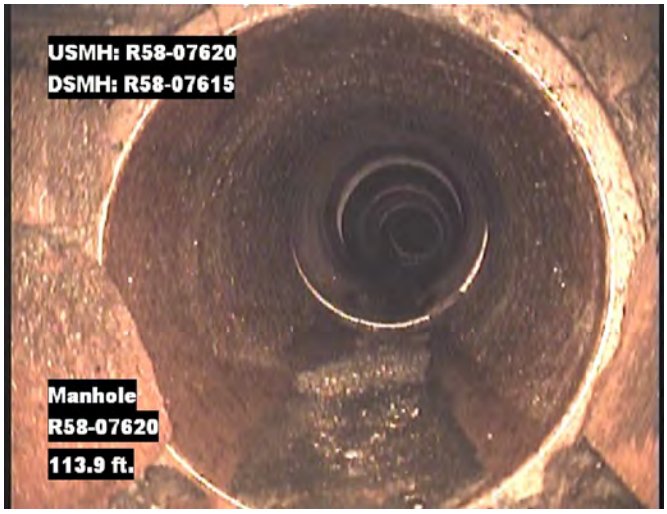
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end



Distance:	113.9 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-07620		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	5131
Quick Maint. Rating	1200
Quick Overall Rating	5131

Pipe Segment Reference: R58-07620-R58-07615

Upstream MH	Downstream MH
R58-07620	R58-07615

Length surveyed	Material	Shape	Height	Width
113.9	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	2	2	1	2	2
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	2		Subtotals	4	
SUMMARY	Pipe Rating		8	Pipe Rating		2	Overall Pipe Rating		10
	Structural Index		4.0	O&M Index		1.0	Overall Index		2.5
	Str. Quick Rating		5131	O&M Quick Rating		1200	Ovrl. Quick Rating		5131

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-07635	R58-07630	R58-07635-R58-07630	9/5/2017	Winthrop st	Vitrified Clay Pipe	6	200.4	200.4

Pipe Size: 6 Total Ln.: 200.4 Inspected Ln.: 200.4

Project Total Ln.: 200.4 Project Inspected Ln.: 200.4

Ted Berry Company
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Livermore Maine 04253
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-07635-R58-07630		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R58-07635	R58-07630	

Length surveyed	Material	Shape	Height	Width
200.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-07635

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-07635		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
45.4 ft.	Tap Factory Capped		9 - 0	4	5	
56.4 ft.	Fracture Longitudinal		12 - 0		5	
69.2 ft.	Tap Break-in		12 - 0	4	5	
71.2 ft.	Tap Factory Capped		3 - 0	4	5	
77.4 ft.	Tap Factory Capped		9 - 0	4	5	
81.2 ft.	Tap Break-in		12 - 0	4	5	
115.0 ft.	Tap Factory		9 - 0	4	5	
125.0 ft.	Tap Factory Capped		3 - 0	4	5	
171.2 ft.	Tap Factory		3 - 0	4	5	
175.1 ft.	Tap Factory Capped		9 - 0	4	5	
193.8 ft.	Tap Factory Active		9 - 0	4	5	
200.4 ft.	Manhole R58-07630		0 - 0		5	

3

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	3100
Quick Maint. Rating	N/A
Quick Overall Rating	3100

Pipe Segment Reference	
R58-07635-R58-07630	
Upstream MH	Downstream MH
R58-07635	R58-07630

Length surveyed	Material	Shape	Height	Width
200.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-07630

Ted Berry Company
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Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

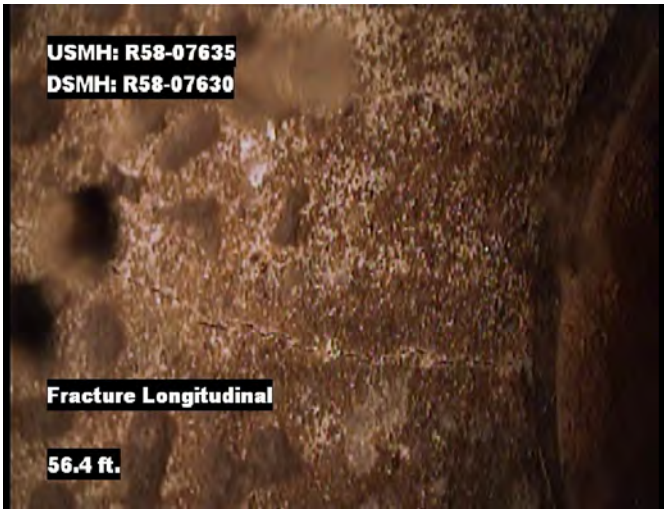
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-07635

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 45.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 56.4 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

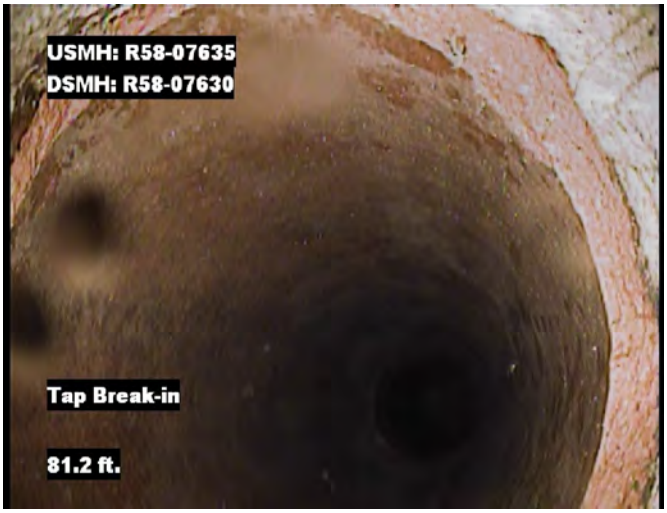
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 69.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 71.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 77.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 81.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 115.0 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 125.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 171.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 175.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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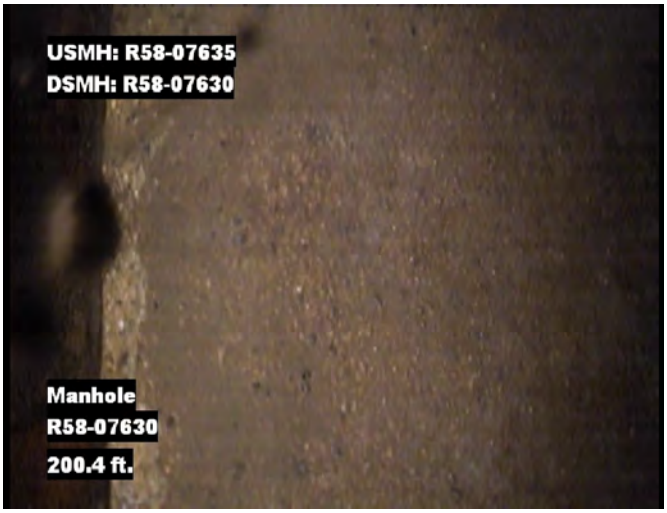
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Winthrop st	20170905	11:33
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill valley and west end		

Distance: 193.8 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A



Distance: 200.4 ft. Grade: 0
Condition: Manhole
Remarks: R58-07630

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Winthrop st	20170905	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-07635-R58-07630		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R58-07635	R58-07630	

Length surveyed	Material	Shape	Height	Width
200.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		3	Pipe Rating		0	Overall Pipe Rating		3
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		3100	O&M Quick Rating		0000	Ovrl. Quick Rating		3100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-07960	R58-07955	R58-07960-R58-07955	9/21/2017	Overland rd	Vitrified Clay Pipe	21	0	2

Pipe Size: 21 Total Ln.: 0 Inspected Ln.: 2

Project Total Ln.: 0.0 Project Inspected Ln.: 2.0

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170921	09:09

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R58-07960-R58-07955		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R58-07960	R58-07955	
Length surveyed	Material	Shape	Height	Width
2	Vitrified Clay Pipe	Circular	21	21
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R58-07960

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-07960					
0.0 ft.	Water Level		0 - 0		5	
2.0 ft.	Roots Ball Joint		8 - 4		65	
2.0 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate needs heavy cleaning					

Ted Berry Company
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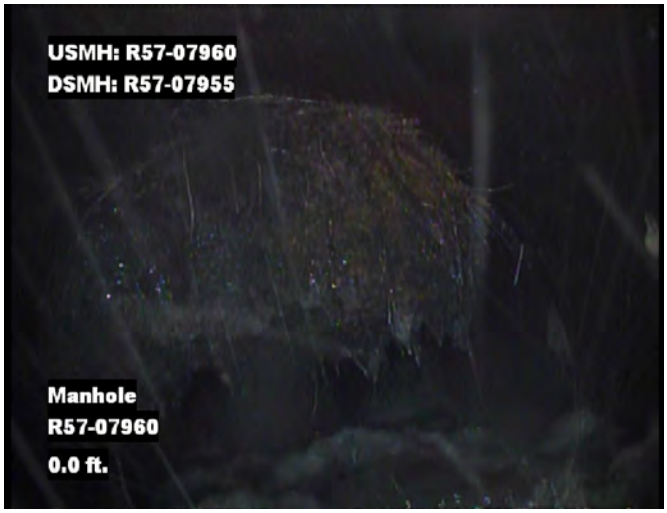
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170921	09:09

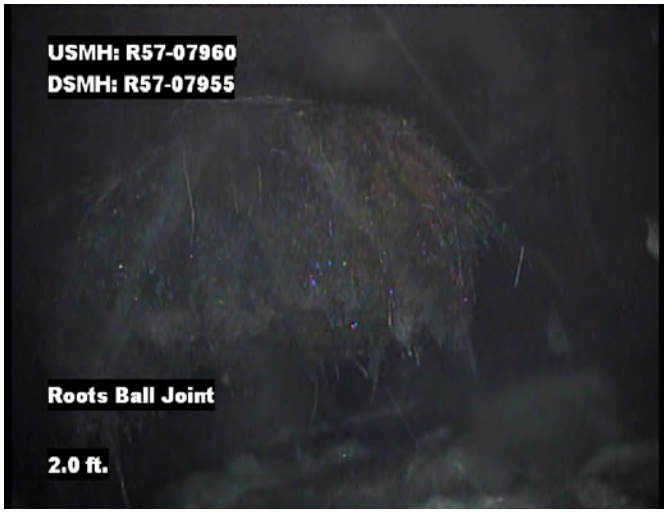
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

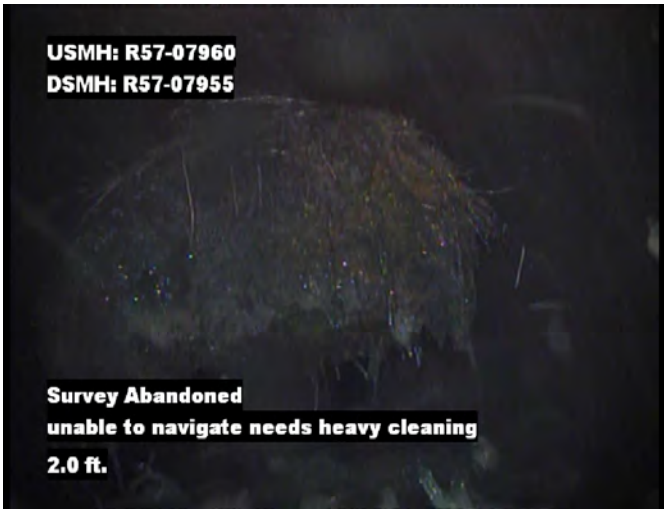


Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-07960

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 2.0 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A



Distance: 2.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate needs heavy cleaning

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Overland rd	20170921	09:09

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R58-07960-R58-07955		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R58-07960	R58-07955	
Length surveyed	Material	Shape	Height	Width
2	Vitrified Clay Pipe	Circular	21	21
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4100	Ovrl. Quick Rating		4100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09955	R58-11600	R58-09955-R58-11600	9/14/2017	Eddy st	Vitrified Clay Pipe	6	0	2

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 2

Project Total Ln.: 0.0 Project Inspected Ln.: 2.0

Ted Berry Company
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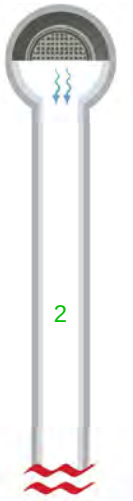
Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Eddy st	20170914	14:22
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09955-R58-11600		
Quick Overall Rating	2100	Upstream MH	Downstream MH	
		R58-09955	R58-11600	
Length surveyed	Material	Shape	Height	Width
2	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	
Remarks				



R58-09955

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09955					
0.0 ft.	Water Level		0 - 0		5	
2.0 ft.	Obstacle Brick		6 - 0		5	
2.0 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate					

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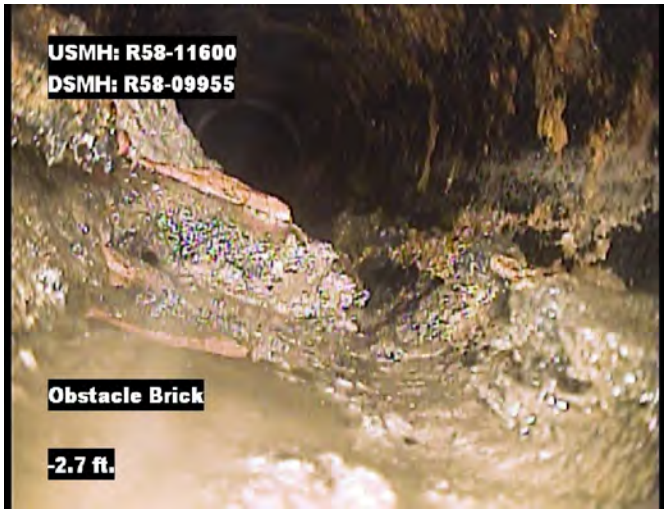
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09955		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		



Distance:	2.0 ft.	Grade:	2
Condition:	Obstacle Brick		
Remarks:	N/A		

Distance:	2.0 ft.	Grade:	0
Condition:	Survey Abandoned		
Remarks:	unable to navigate		

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09955-R58-11600		
Quick Overall Rating	2100	Upstream MH	Downstream MH	
		R58-09955	R58-11600	

Length surveyed	Material	Shape	Height	Width
2	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	1	2	2	1	2
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		2	Overall Pipe Rating		2
	Structural Index		0	O&M Index		2.0	Overall Index		2.0
	Str. Quick Rating		0000	O&M Quick Rating		2100	Ovrl. Quick Rating		2100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09955	R58-11600	R58-09955-R58-11600	9/14/2017	Eddy st	Vitrified Clay Pipe	6	0	114.9

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 114.9

Project Total Ln.: 0.0 Project Inspected Ln.: 114.9

Ted Berry Company
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Defect Listing Plot Left

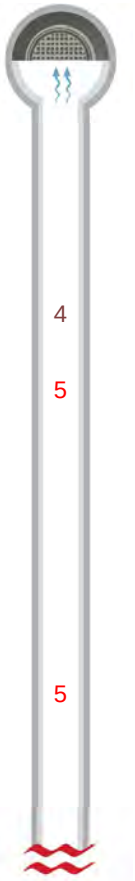
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Quick Struct. Rating	5241	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09955-R58-11600		
Quick Overall Rating	5241	Upstream MH	Downstream MH	
		R58-09955	R58-11600	
Length surveyed	Material	Shape	Height	Width
114.9	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-11600

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-11600					
0.0 ft.	Water Level		0 - 0		5	
4 34.1 ft.	Fracture Multiple		11 - 1		5	
5 35.8 ft.	Hole Soil Visible		11 - 1		5	
41.1 ft.	General Observation		0 - 0		5	
	tar in joints					
42.7 ft.	Water Level		0 - 0		10	
67.6 ft.	Infiltration Stain		4 - 1		5	
5 111.9 ft.	Broken Pipe Soil Visible		12 - 12		5	
114.9 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate past brick and broken pipe					

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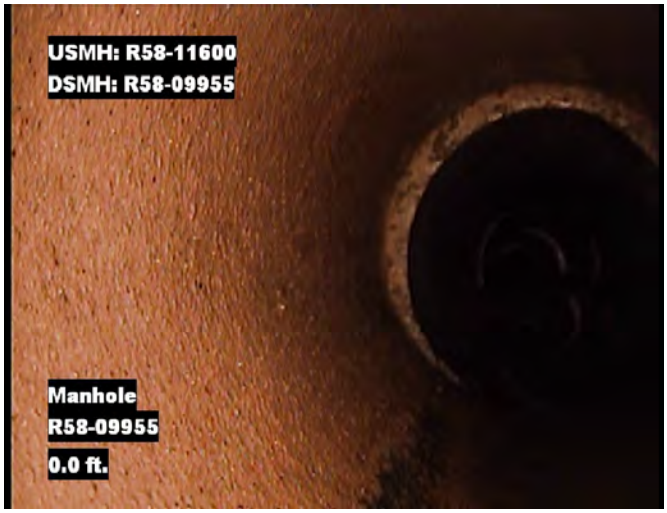
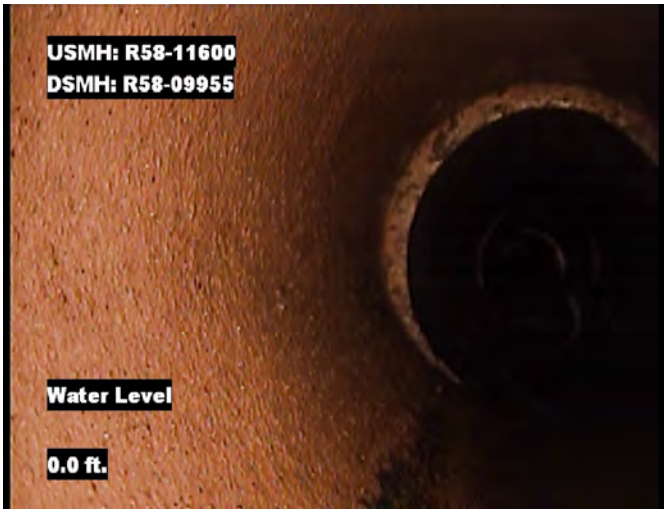
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

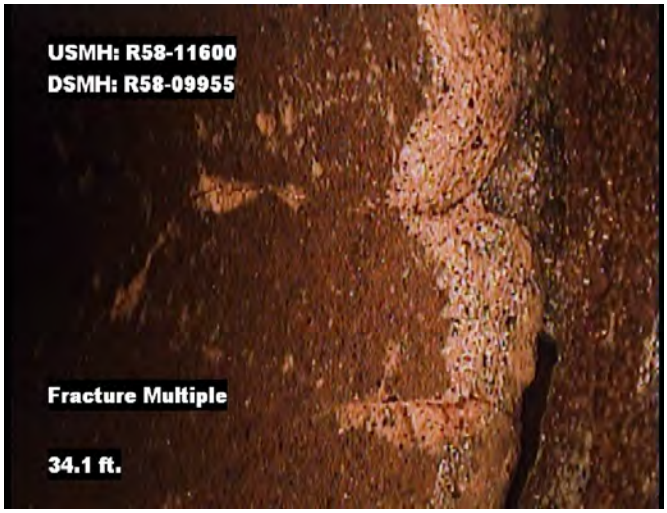
Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11600



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 34.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 35.8 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Ted Berry Company
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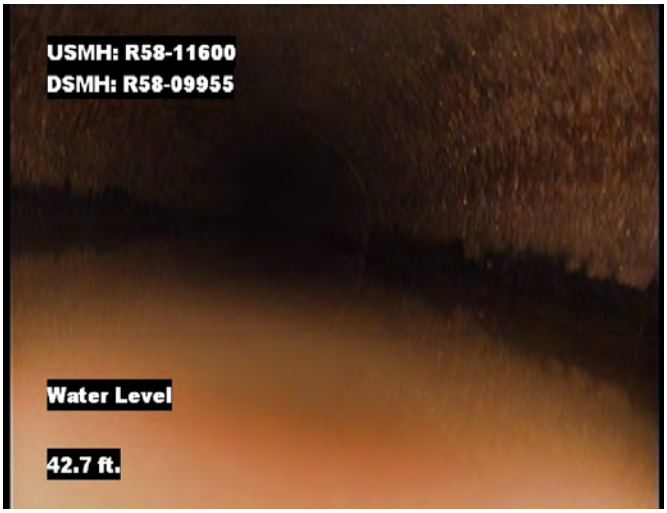
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

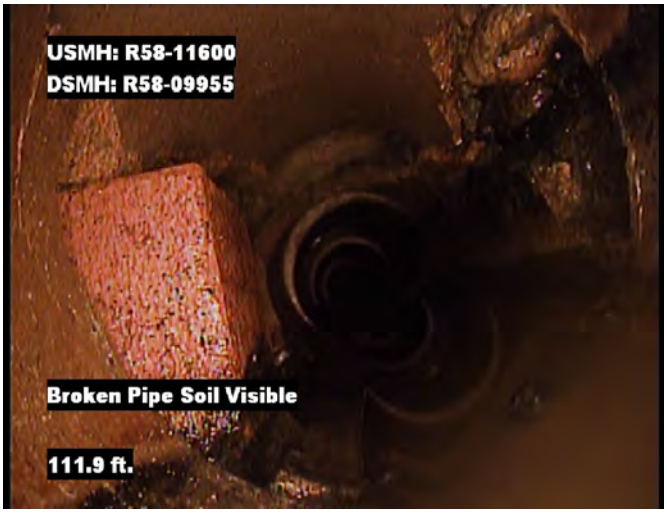
Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Distance: 41.1 ft. Grade: 0
Condition: General Observation
Remarks: tar in joints



Distance: 42.7 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 67.6 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A



Distance: 111.9 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Distance:	114.9 ft.	Grade:	0
Condition:	Survey Abandoned		
Remarks:	unable to navigate past brick and broken pipe		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170914	14:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill Valley and West End

Quick Struct. Rating	5241	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09955-R58-11600		
Quick Overall Rating	5241	Upstream MH	Downstream MH	
		R58-09955	R58-11600	

Length surveyed	Material	Shape	Height	Width
114.9	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	3		Subtotals	0		Subtotals	3	
SUMMARY	Pipe Rating		14	Pipe Rating		0	Overall Pipe Rating		14
	Structural Index		4.7	O&M Index		0	Overall Index		4.7
	Str. Quick Rating		5241	O&M Quick Rating		0000	Ovrl. Quick Rating		5241

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09960	R58-09955	R58-09960-R58-09955	9/14/2017	Main st	Vitrified Clay Pipe	10	213.8	213.8

Pipe Size: 10 Total Ln.: 213.8 Inspected Ln.: 213.8

Project Total Ln.: 213.8 Project Inspected Ln.: 213.8

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

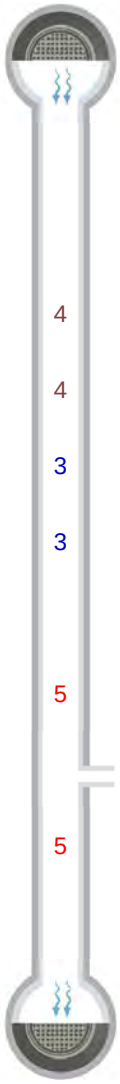
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	12:43

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5242	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09960-R58-09955		
Quick Overall Rating	5242	Upstream MH	Downstream MH	
		R58-09960	R58-09955	
Length surveyed	Material	Shape	Height	Width
213.8	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-09960

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09960		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
0.6 ft.	Fracture Longitudinal Hinge 2		3 - 9		0	
32.4 ft.	Fracture Multiple		11 - 1		0	
36.6 ft.	Fracture Longitudinal		9 - 0		5	
38.8 ft.	Fracture Longitudinal		12 - 0		5	
46.1 ft.	Water Level		0 - 0		10	
64.9 ft.	Broken Pipe Void Visible		12 - 0		0	
65.4 ft.	Tap Break-in		12 - 0	4	5	
164.9 ft.	Hole Soil Visible		10 - 2		5	
213.8 ft.	Manhole R58-09955		0 - 0		5	

R58-09955

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	12:43

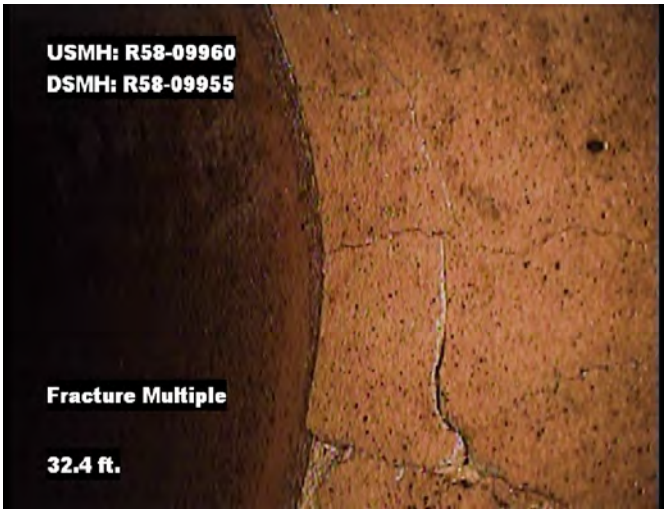
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09960

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.6 ft. Grade: 4
Condition: Fracture Longitudinal Hinge 2
Remarks: N/A



Distance: 32.4 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Ted Berry Company
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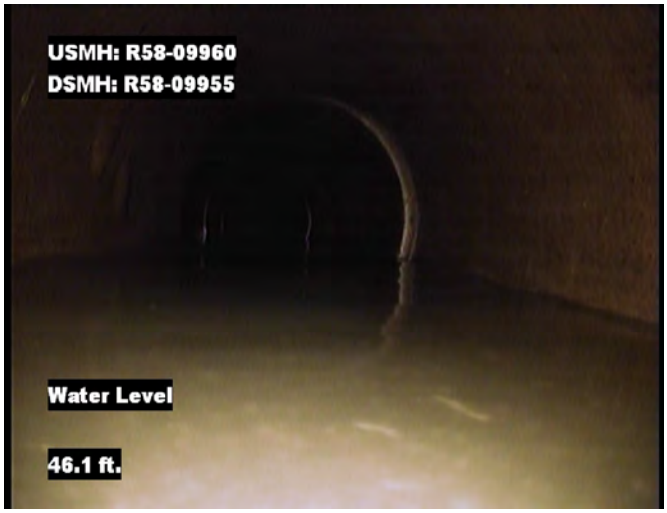
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	12:43

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 36.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 38.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 46.1 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 64.9 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	12:43

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 65.4 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 164.9 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Distance: 213.8 ft. Grade: 0
Condition: Manhole
Remarks: R58-09955

Ted Berry Company
521 Federal Rd
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	12:43

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5242	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09960-R58-09955		
Quick Overall Rating	5242	Upstream MH	Downstream MH	
		R58-09960	R58-09955	
Length surveyed	Material	Shape	Height	Width
213.8	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	2	6	3	0	0	3	2	6
	4	2	8	4	0	0	4	2	8
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	0		Subtotals	6	
SUMMARY	Pipe Rating		24	Pipe Rating		0	Overall Pipe Rating		24
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		5242	O&M Quick Rating		0000	Ovrl. Quick Rating		5242

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09965	R58-09960	R58-09965-R58-09960	9/14/2017	Main st	Vitrified Clay Pipe	10	156.8	156.8

Pipe Size: 10 Total Ln.: 156.8 Inspected Ln.: 156.8

Project Total Ln.: 156.8 Project Inspected Ln.: 156.8

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	11:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5241	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09965-R58-09960		
Quick Overall Rating	5241	Upstream MH	Downstream MH	
		R58-09965	R58-09960	

Length surveyed	Material	Shape	Height	Width
156.8	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09965

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09965		0 - 0		0	
0.0 ft.	Water Level		0 - 0		0	
4.0 ft.	Crack Longitudinal		1 - 0		5	
34.9 ft.	Tap Break-in		12 - 0	4	5	
78.5 ft.	Water Level Sag		0 - 0		5	
91.2 ft.	Fracture Multiple		12 - 1		5	
92.7 ft.	Tap Break-in		12 - 0	4	5	
92.9 ft.	Fracture Longitudinal		12 - 0		5	
94.3 ft.	Fracture Longitudinal		12 - 0		5	
151.6 ft.	Broken Pipe Void Visible		10 - 12		5	
155.9 ft.	Broken Pipe Void Visible		12 - 12		5	
156.8 ft.	Manhole R58-09960		0 - 0		5	

R58-09960

Ted Berry Company
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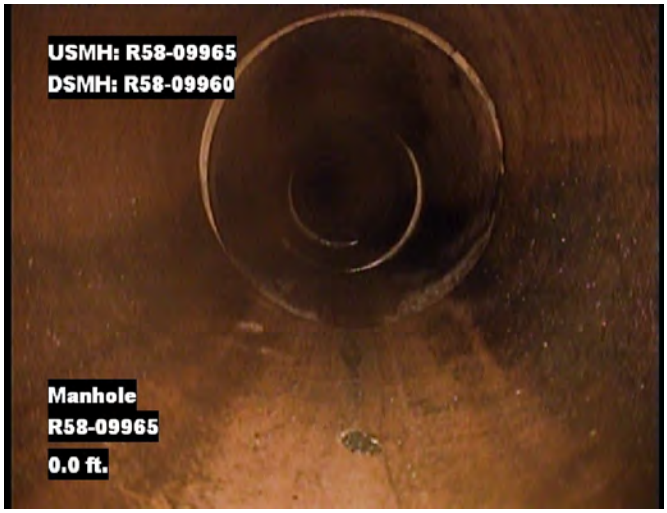
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	11:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09965

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 4.0 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 34.9 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Main st	20170914	11:07
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance: 78.5 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 91.2 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 92.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 92.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	11:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 94.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 151.6 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 155.9 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 156.8 ft. Grade: 0
Condition: Manhole
Remarks: R58-09960

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Main st	20170914	11:07

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5241	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09965-R58-09960		
Quick Overall Rating	5241	Upstream MH	Downstream MH	
		R58-09965	R58-09960	
Length surveyed	Material	Shape	Height	Width
156.8	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	2	4	2	1	2	2	3	6
	3	2	6	3	0	0	3	2	6
	4	1	4	4	0	0	4	1	4
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	7		Subtotals	1		Subtotals	8	
SUMMARY	Pipe Rating		24	Pipe Rating		2	Overall Pipe Rating		26
	Structural Index		3.4	O&M Index		2.0	Overall Index		3.3
	Str. Quick Rating		5241	O&M Quick Rating		2100	Ovrl. Quick Rating		5241

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09975	R58-09960	R58-09975-R58-09960	9/7/2017	Everett st	Vitrified Clay Pipe	6	133.7	133.7

Pipe Size: 6 Total Ln.: 133.7 Inspected Ln.: 133.7

Project Total Ln.: 133.7 Project Inspected Ln.: 133.7

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:58

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	2200	R58-09975-R58-09960	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	2200	R58-09975	R58-09960

Length surveyed	Material	Shape	Height	Width
133.7	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09975

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09975		0 - 0		0	
0.0 ft.	Water Level		0 - 0		60	
29.7 ft.	Material Change pvc		0 - 0		0	
30.9 ft.	Tap Factory		12 - 0	4	5	
47.5 ft.	Tap Factory Active		3 - 0	4	5	
49.7 ft.	Tap Factory Active		9 - 0	4	5	
51.5 ft.	Material Change DIP		0 - 0		5	
106.3 ft.	Water Level Sag		0 - 0		5	
114.7 ft.	Water Level Sag		0 - 0		5	
133.7 ft.	Manhole R58-09960		0 - 0		5	

2

2

R58-09960

Ted Berry Company
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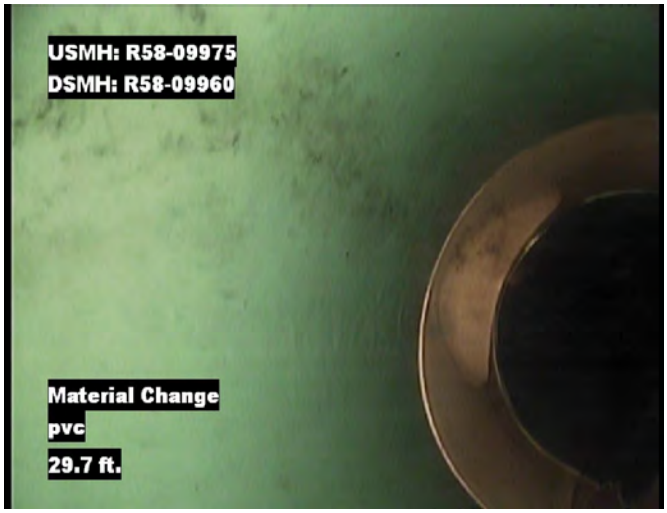
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:58

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09975

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 29.7 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Distance: 30.9 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Ted Berry Company
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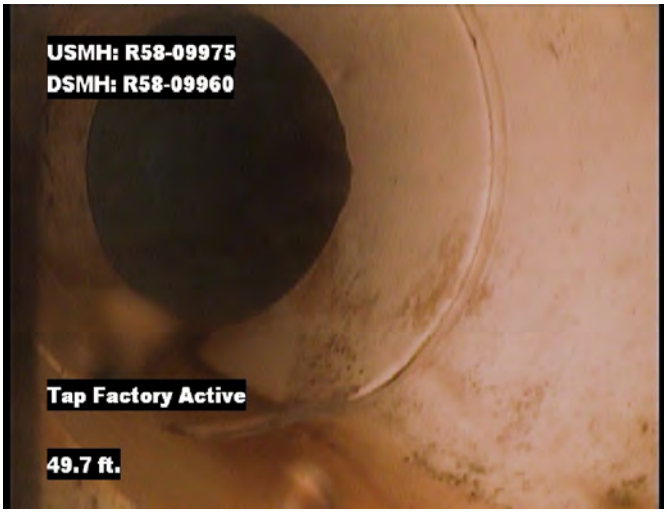
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:58

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 47.5 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A



Distance: 49.7 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 51.5 ft. Grade: 0
Condition: Material Change
Remarks: DIP

Distance: 106.3 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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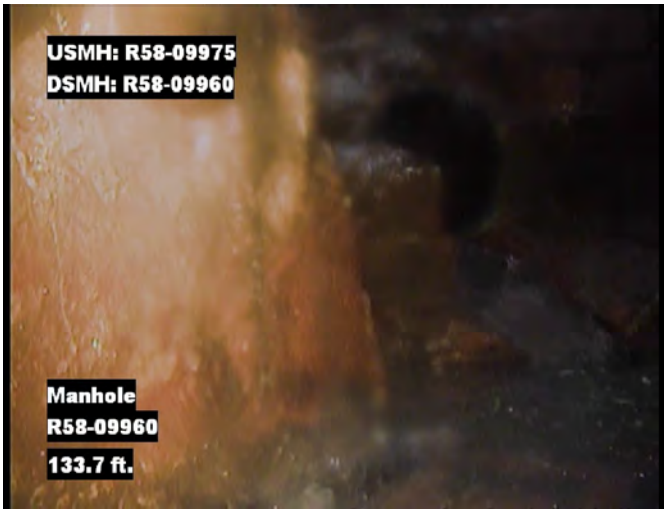
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:58

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 114.7 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A



Distance: 133.7 ft. Grade: 0
Condition: Manhole
Remarks: R58-09960

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:58

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	2200	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09975-R58-09960		
Quick Overall Rating	2200	Upstream MH	Downstream MH	
		R58-09975	R58-09960	
Length surveyed	Material	Shape	Height	Width
133.7	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	2	4	2	2	4	2	4	8
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	2		Subtotals	4	
SUMMARY	Pipe Rating		4	Pipe Rating		4	Overall Pipe Rating		8
	Structural Index		2.0	O&M Index		2.0	Overall Index		2.0
	Str. Quick Rating		2200	O&M Quick Rating		2200	Ovrl. Quick Rating		2400

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09980	R58-09975	R58-09980-R58-09975	9/7/2017	Everett st	Asbestos Cement	6	65.6	65.6

Pipe Size: 6 Total Ln.: 65.6 Inspected Ln.: 65.6

Project Total Ln.: 65.6 Project Inspected Ln.: 65.6

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5322	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09980-R58-09975		
Quick Overall Rating	5322	Upstream MH	Downstream MH	
		R58-09980	R58-09975	
Length surveyed	Material	Shape	Height	Width
65.6	Asbestos Cement	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09980

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09980		0 - 0		0	
0.0 ft.	Water Level		0 - 0		10	
4.0 ft.	Joint Offset Medium		0 - 0		5	
11.9 ft.	Tap Break-in		9 - 0	4	5	
17.5 ft.	Patch Repair brick		10 - 2		5	
20.2 ft.	Patch Repair brick		11 - 1		5	
22.3 ft.	Patch Repair brick		11 - 1		5	
24.4 ft.	Patch Repair brick		11 - 1		5	
24.6 ft.	Crack Longitudinal		12 - 0		5	
25.8 ft.	Patch Repair brick		12 - 0		5	
27.4 ft.	Crack Longitudinal		12 - 0		5	
38.7 ft.	Broken Pipe Void Visible		12 - 5		5	
44.9 ft.	Hole Void Visible		9 - 5		5	
49.1 ft.	Broken Pipe Void Visible		9 - 11		5	

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5322	R58-09980-R58-09975	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5322	R58-09980	R58-09975

Length surveyed	Material	Shape	Height	Width
65.6	Asbestos Cement	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

51.1 ft.	Material Change		0 - 0		5		
	pvc						
57.7 ft.	Material Change		0 - 0		5		
	vcp						
62.3 ft.	Tap Break-in Active		10 - 0	4	5		
65.0 ft.	Tap Break-in Active		2 - 0	4	5		
65.6 ft.	Survey Abandoned		0 - 0		5		
	unable to navigate past lateral						

Ted Berry Company
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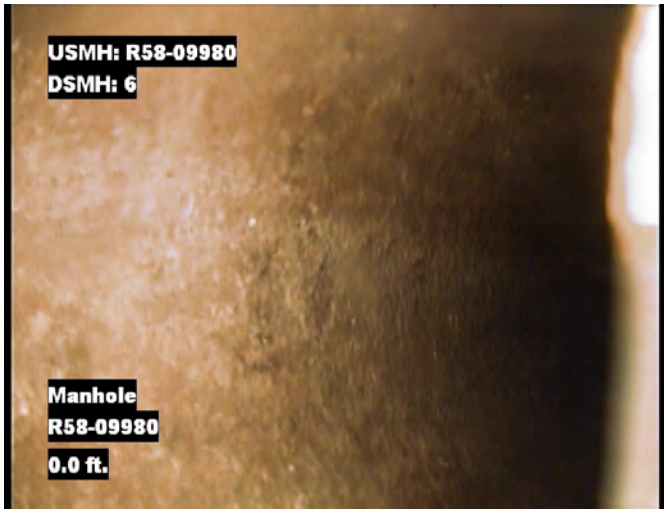
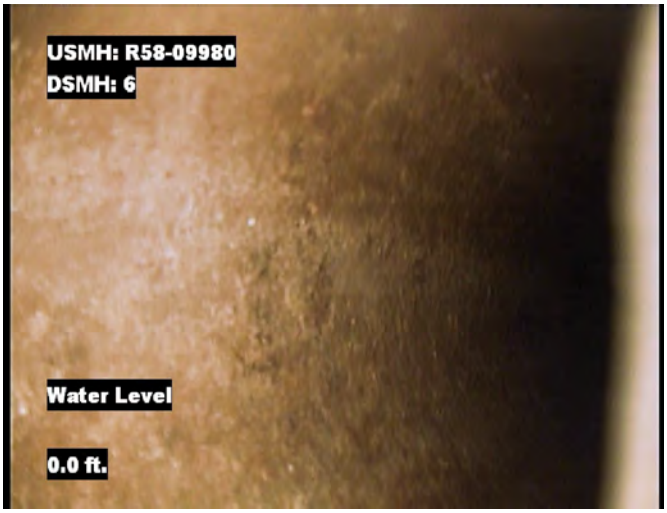
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

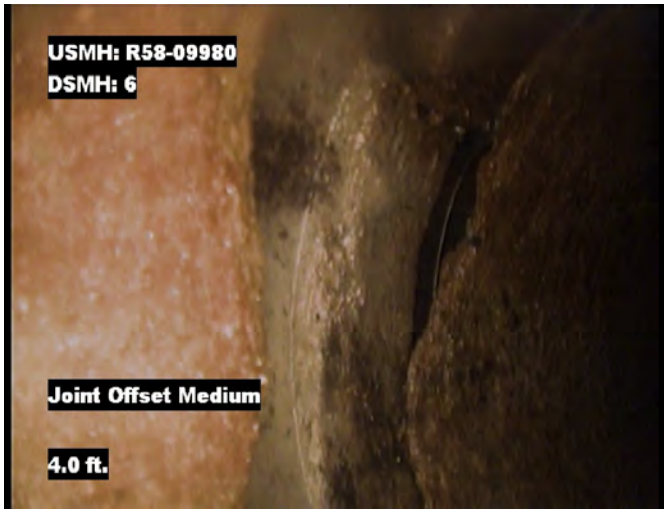
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09980



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 4.0 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 11.9 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 17.5 ft. Grade: 0
Condition: Patch Repair
Remarks: brick

Distance: 20.2 ft. Grade: 0
Condition: Patch Repair
Remarks: brick

Distance: 22.3 ft. Grade: 0
Condition: Patch Repair
Remarks: brick

Distance: 24.4 ft. Grade: 0
Condition: Patch Repair
Remarks: brick

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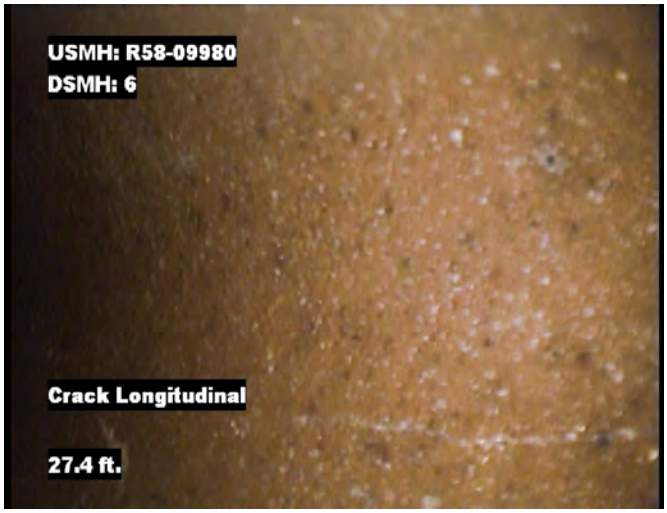
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 24.6 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 25.8 ft. Grade: 0
Condition: Patch Repair
Remarks: brick



Distance: 27.4 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 38.7 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Ted Berry Company
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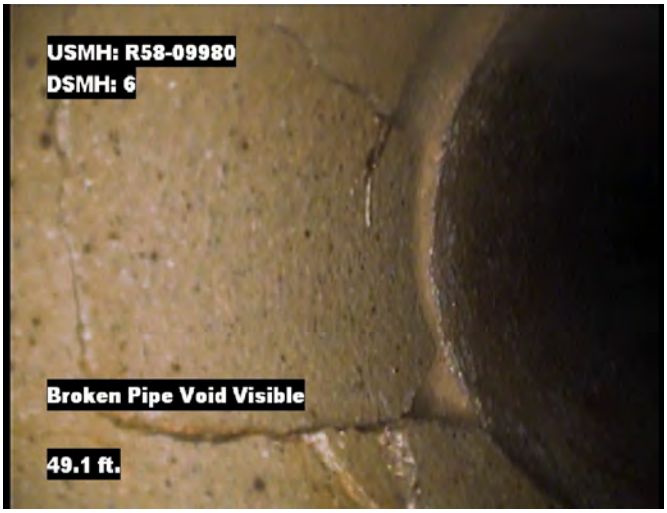
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

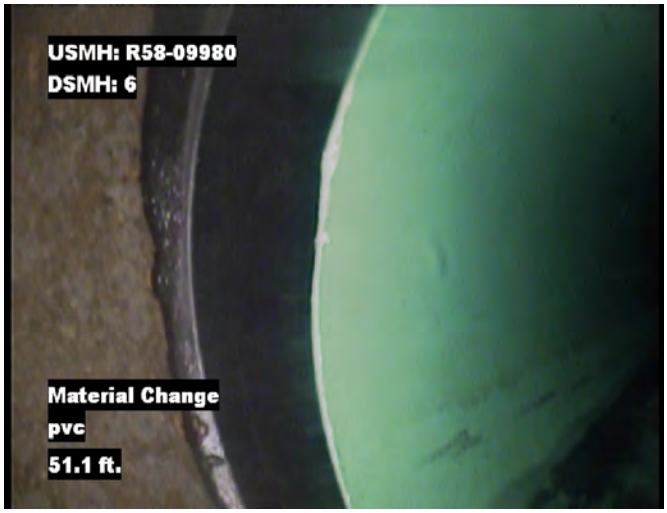
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 44.9 ft. Grade: 5
Condition: Hole Void Visible
Remarks: N/A



Distance: 49.1 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A



Distance: 51.1 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Distance: 57.7 ft. Grade: 0
Condition: Material Change
Remarks: vcp

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 62.3 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 65.0 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 65.6 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate past lateral

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:47

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5322	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09980-R58-09975		
Quick Overall Rating	5322	Upstream MH	Downstream MH	
		R58-09980	R58-09975	

Length surveyed	Material	Shape	Height	Width
65.6	Asbestos Cement	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	1	1	1	0	0	1	1	1
	2	2	4	2	0	0	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	3	15	5	0	0	5	3	15
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	0		Subtotals	6	
SUMMARY	Pipe Rating		20	Pipe Rating		0	Overall Pipe Rating		20
	Structural Index		3.3	O&M Index		0	Overall Index		3.3
	Str. Quick Rating		5322	O&M Quick Rating		0000	Ovrl. Quick Rating		5322

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09980	R58-09975	R58-09980-R58-09975	9/7/2017	Everett st	Asbestos Cement	6	65.6	11.6

Pipe Size: 6 Total Ln.: 65.6 Inspected Ln.: 11.6

Project Total Ln.: 65.6 Project Inspected Ln.: 11.6

Ted Berry Company
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Defect Listing Plot Left

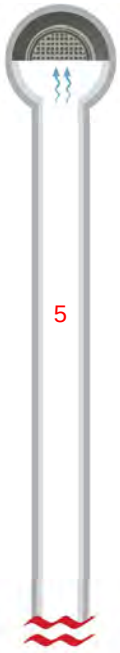
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09980-R58-09975		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R58-09980	R58-09975	
Length surveyed	Material	Shape	Height	Width
11.6	Asbestos Cement	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-09975

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09975					
0.0 ft.	Water Level		0 - 0		5	
5.0 ft.	Broken Pipe		9 - 12		0	
5.0 ft.	Patch Repair		6 - 11		0	
	brick					
10.0 ft.	Material Change		0 - 0		0	
	pvc					
11.6 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate past joint					

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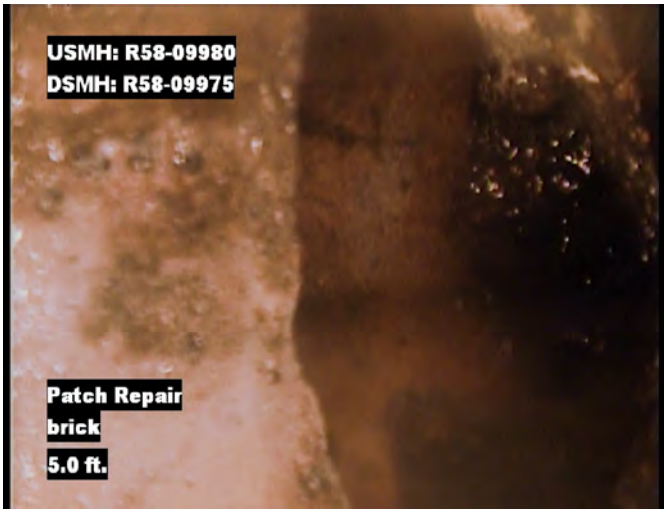
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Everett st	20170907	10:29
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Reversal			1314B Bear Hill valley and west end		

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09975		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	5.0 ft.	Grade:	5
Condition:	Broken Pipe		
Remarks:	N/A		



Distance:	5.0 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	brick		

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance: 10.0 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Distance: 11.6 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate past joint

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	10:29

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09980-R58-09975		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R58-09980	R58-09975	

Length surveyed	Material	Shape	Height	Width
11.6	Asbestos Cement	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5

Continuous Defects

Code	ID	Length

	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		5	Pipe Rating		0	Overall Pipe Rating		5
	Structural Index		5.0	O&M Index		0	Overall Index		5.0
	Str. Quick Rating		5100	O&M Quick Rating		0000	Ovrl. Quick Rating		5100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09985	R58-09980	R58-09985-R58-09980	9/7/2017	Everett st	Asbestos Cement	6	208.7	89.1

Pipe Size: 6 Total Ln.: 208.7 Inspected Ln.: 89.1

Project Total Ln.: 208.7 Project Inspected Ln.: 89.1

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5300	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09985-R58-09980		
Quick Overall Rating	5321	Upstream MH	Downstream MH	
		R58-09985	R58-09980	
Length surveyed	Material	Shape	Height	Width
89.1	Asbestos Cement	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09985

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09985					
0.0 ft.	Water Level		0 - 0		5	
1.0 ft.	Broken Pipe		2 - 12		0	
22.3 ft.	Tap Break-in		2 - 0	4	5	
71.2 ft.	Tap Break-in Active		9 - 0	4	5	
71.2 ft.	Hole Soil Visible		1 - 5		5	
87.5 ft.	Broken Pipe		5 - 12		5	
88.5 ft.	Tap Break-in Intruding		3 - 0	4 / 2	5	
89.1 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate past lateral					

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09985

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 1.0 ft. Grade: 5
Condition: Broken Pipe
Remarks: N/A

Distance: 22.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

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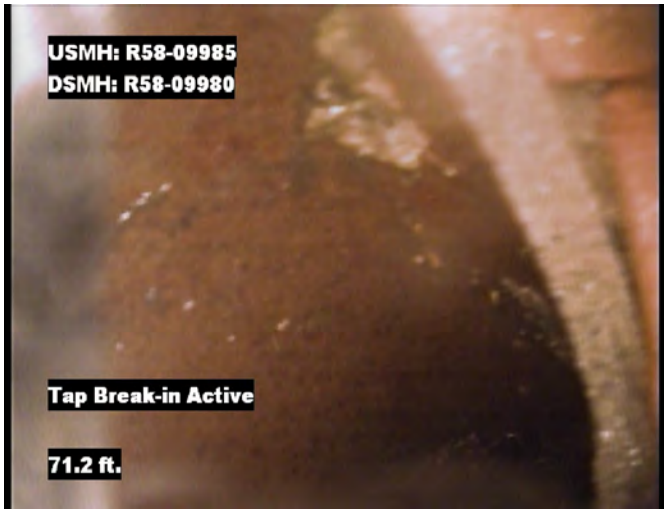
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 71.2 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 71.2 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Distance: 87.5 ft. Grade: 5
Condition: Broken Pipe
Remarks: N/A

Distance: 88.5 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 89.1 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate past lateral

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:22

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5300
Quick Maint. Rating	2100
Quick Overall Rating	5321

Pipe Segment Reference: R58-09985-R58-09980

Upstream MH	Downstream MH
R58-09985	R58-09980

Length surveyed	Material	Shape	Height	Width
89.1	Asbestos Cement	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	1	2	2	1	2
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	3	15	5	0	0	5	3	15
Continuous Defects									
Code / ID / Length									
	Subtotals	3		Subtotals	1		Subtotals	4	
SUMMARY	Pipe Rating		15	Pipe Rating		2	Overall Pipe Rating		17
	Structural Index		5.0	O&M Index		2.0	Overall Index		4.3
	Str. Quick Rating		5300	O&M Quick Rating		2100	Ovrl. Quick Rating		5321

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09985	R58-09980	R58-09985-R58-09980	9/7/2017	Everett st	Asbestos Cement	6	208.7	119.6

Pipe Size: 6 Total Ln.: 208.7 Inspected Ln.: 119.6

Project Total Ln.: 208.7 Project Inspected Ln.: 119.6

Ted Berry Company
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Defect Listing Plot Left

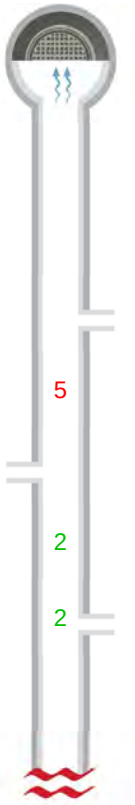
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09985-R58-09980		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R58-09985	R58-09980	
Length surveyed	Material	Shape	Height	Width
119.6	Asbestos Cement	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-09980

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09980					
0.0 ft.	Water Level		0 - 0		5	
49.3 ft.	Tap Break-in Active		9 - 0	4	5	
50.9 ft.	Broken Pipe Soil Visible		12 - 5		5	
50.9 ft.	Tap Break-in Active		3 - 0	4	5	
74.9 ft.	Water Level Sag		0 - 0		5	
119.6 ft.	Tap Break-in Intruding		9 - 0	4 / 2	5	
119.6 ft.	Survey Abandoned		0 - 0		5	
	reversal complete					

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09980

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 49.3 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 50.9 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance: 50.9 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 74.9 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 119.6 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A

Distance: 119.6 ft. Grade: 0
Condition: Survey Abandoned
Remarks: reversal complete

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	09:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09985-R58-09980		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R58-09985	R58-09980	

Length surveyed	Material	Shape	Height	Width
119.6	Asbestos Cement	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	2	4	2	3	6
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	2		Subtotals	4	
SUMMARY	Pipe Rating		7	Pipe Rating		4	Overall Pipe Rating		11
	Structural Index		3.5	O&M Index		2.0	Overall Index		2.8
	Str. Quick Rating		5121	O&M Quick Rating		2200	Ovrl. Quick Rating		5123

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09990	R58-09985	R58-09990-R58-09985	9/6/2017	Nathan rd	Vitrified Clay Pipe	6	249.8	110.5

Pipe Size: 6 Total Ln.: 249.8 Inspected Ln.: 110.5

Project Total Ln.: 249.8 Project Inspected Ln.: 110.5

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

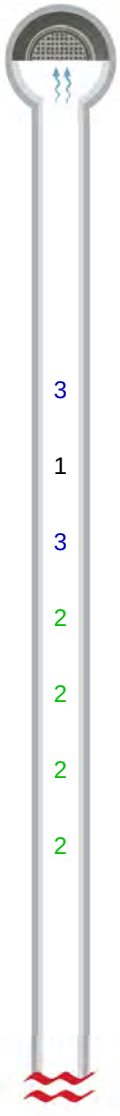
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	3223	R58-09990-R58-09985	
Quick Maint. Rating	2100	Upstream MH	Downstream MH
Quick Overall Rating	3224	R58-09990	R58-09985

Length surveyed	Material	Shape	Height	Width
110.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-09985

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09985					
0.0 ft.	Water Level		0 - 0		0	
3.3 ft.	Patch Repair		2 - 12		0	
	concrete					
10.0 ft.	Crack Multiple		9 - 3		5	
3						
26.6 ft.	Joint Offset Medium		0 - 0		5	
1						
53.3 ft.	Fracture Longitudinal		12 - 0		5	
3						
56.5 ft.	Deposits Attached Grease		12 - 3		5	
2						
57.4 ft.	Water Level Sag		0 - 0		5	
2						
103.6 ft.	Water Level Sag		0 - 0		5	
2						
107.1 ft.	Joint Offset Large		0 - 0		5	
2						
110.0 ft.	Material Change		0 - 0		5	
	pvc					
110.5 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate					

Ted Berry Company
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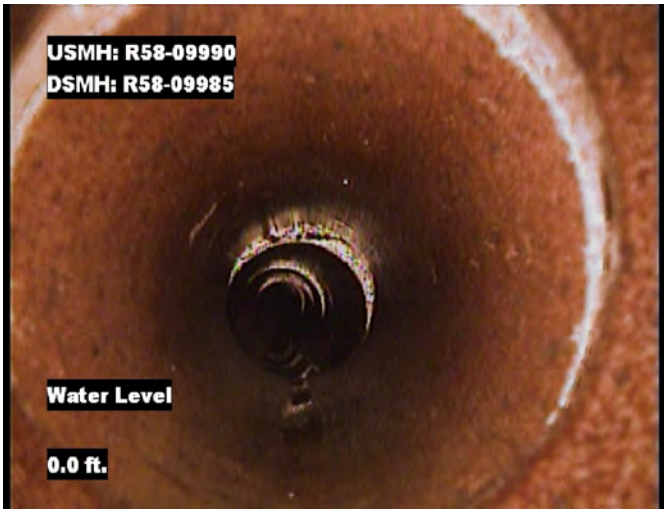
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09985		



Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	3.3 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	concrete		

Distance:	10.0 ft.	Grade:	3
Condition:	Crack Multiple		
Remarks:	N/A		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 26.6 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 53.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 56.5 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 57.4 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

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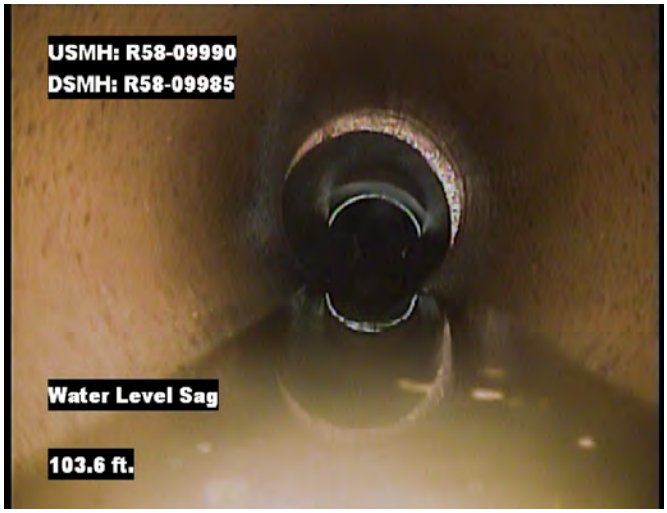
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

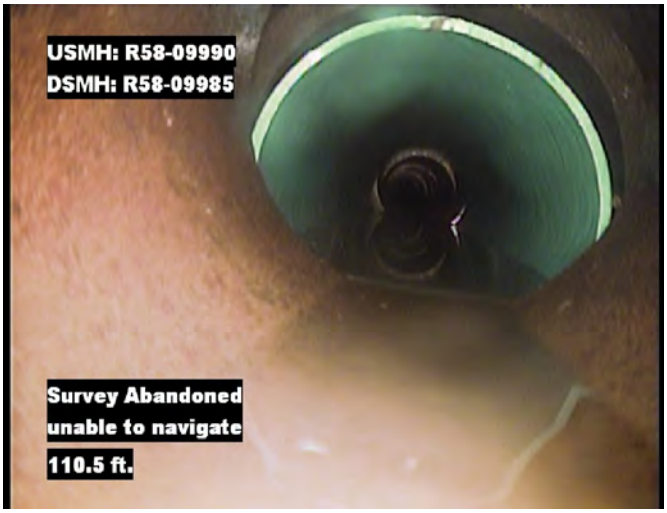
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 103.6 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 107.1 ft. Grade: 2
Condition: Joint Offset Large
Remarks: N/A

Distance: 110.0 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 110.5 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:31

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	3223	R58-09990-R58-09985	
Quick Maint. Rating	2100	Upstream MH	Downstream MH
Quick Overall Rating	3224	R58-09990	R58-09985

Length surveyed	Material	Shape	Height	Width
110.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	1	1	1	0	0	1	1	1
	2	3	6	2	3	6	2	6	12
	3	2	6	3	0	0	3	2	6
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	3		Subtotals	9	
SUMMARY	Pipe Rating		13	Pipe Rating		6	Overall Pipe Rating		19
	Structural Index		2.2	O&M Index		2.0	Overall Index		2.1
	Str. Quick Rating		3223	O&M Quick Rating		2300	Ovrl. Quick Rating		3226

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09990	R58-09985	R58-09990-R58-09985	9/6/2017	Nathan rd	Vitrified Clay Pipe	6	249.8	139.3

Pipe Size: 6 Total Ln.: 249.8 Inspected Ln.: 139.3

Project Total Ln.: 249.8 Project Inspected Ln.: 139.3

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5132	Pipe Segment Reference	R58-09990-R58-09985
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5132	R58-09990	R58-09985

Length surveyed	Material	Shape	Height	Width
139.3	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09990

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09990		0 - 0		0	
0.0 ft.	Water Level		0 - 0		0	
1.5 ft.	Patch Repair brick		10 - 2		0	
5.0 ft.	Patch Repair brick		10 - 2		0	
56.2 ft.	Patch Repair brick		10 - 2		0	
56.5 ft.	Tap Break-in		2 - 0	4	5	
72.5 ft.	Tap Break-in		12 - 0	4	5	
85.9 ft.	Tap Break-in		12 - 0	4	5	
85.9 ft.	Water Level Sag		0 - 0		5	
2						
88.6 ft.	Fracture Longitudinal		12 - 0		5	
3						
101.2 ft.	Hole		12 - 0		5	
5						
123.0 ft.	Fracture Longitudinal		2 - 0		5	
3						
132.2 ft.	Tap Break-in		10 - 0	4	5	
132.2 ft.	Patch Repair brick		10 - 2		5	

Ted Berry Company
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Defect Listing Plot Left

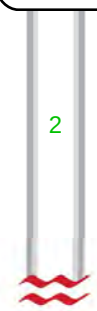
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5132	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09990-R58-09985		
Quick Overall Rating	5132	Upstream MH	Downstream MH	
		R58-09990	R58-09985	
Length surveyed	Material	Shape	Height	Width
139.3	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



136.0 ft.	Material Change		0 - 0		5	
	pvc					
138.9 ft.	Joint Offset Large		0 - 0		5	
139.3 ft.	Survey Abandoned		0 - 0		5	
	reversal complete					

Ted Berry Company
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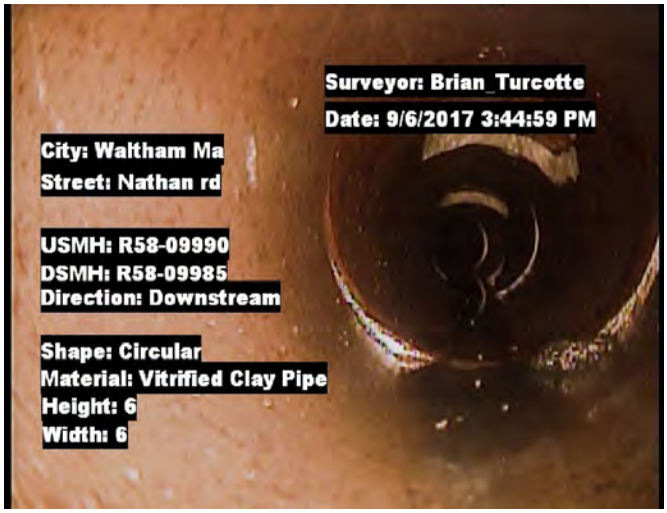
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end



Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09990		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	1.5 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	brick		

Distance:	5.0 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	brick		

Ted Berry Company
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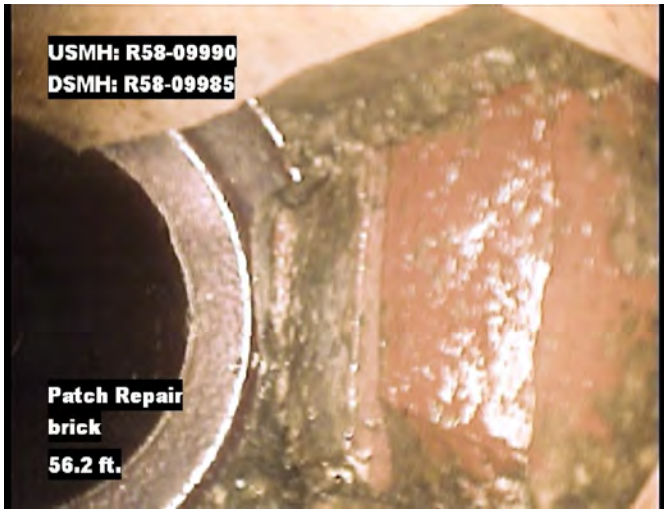
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end



Distance:	56.2 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	brick		

Distance:	56.5 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	72.5 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	85.9 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance: 85.9 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 88.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 101.2 ft. Grade: 5
Condition: Hole
Remarks: N/A

Distance: 123.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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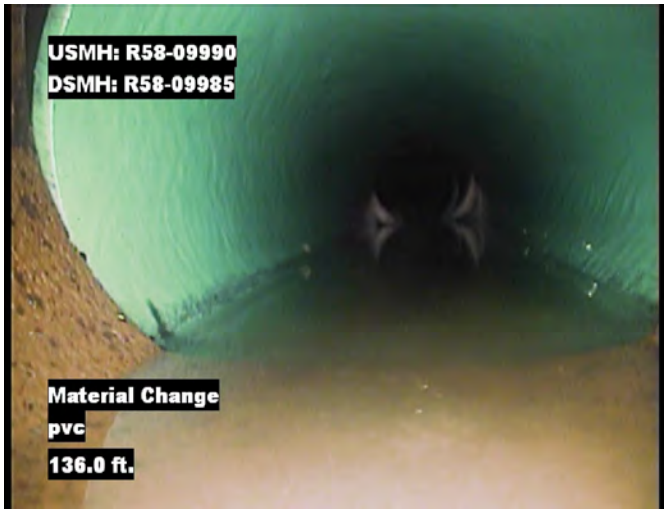
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

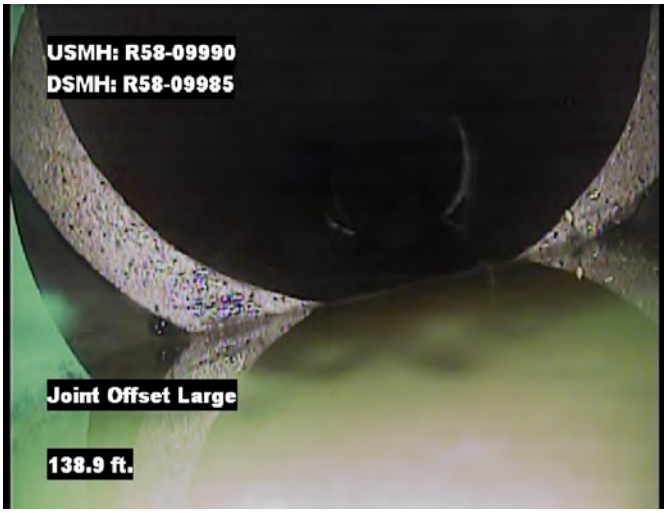
Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance:	132.2 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	132.2 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	brick		



Distance:	136.0 ft.	Grade:	0
Condition:	Material Change		
Remarks:	pvc		



Distance:	138.9 ft.	Grade:	2
Condition:	Joint Offset Large		
Remarks:	N/A		

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Distance: 139.3 ft. Grade: 0
Condition: Survey Abandoned
Remarks: reversal complete

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	15:45

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5132	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-09990-R58-09985		
Quick Overall Rating	5132	Upstream MH	Downstream MH	
		R58-09990	R58-09985	

Length surveyed	Material	Shape	Height	Width
139.3	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	2	4	2	1	2	2	3	6
	3	2	6	3	0	0	3	2	6
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	5		Subtotals	1		Subtotals	6	
SUMMARY	Pipe Rating		15	Pipe Rating		2	Overall Pipe Rating		17
	Structural Index		3.0	O&M Index		2.0	Overall Index		2.8
	Str. Quick Rating		5132	O&M Quick Rating		2100	Ovrl. Quick Rating		5132

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09995	R58-06635	R58-09995-R58-06635	9/7/2017	Everett st	Asbestos Cement	8	82	82

Pipe Size: 8 Total Ln.: 82 Inspected Ln.: 82

Project Total Ln.: 82.0 Project Inspected Ln.: 82.0

Ted Berry Company
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Defect Listing Plot Left

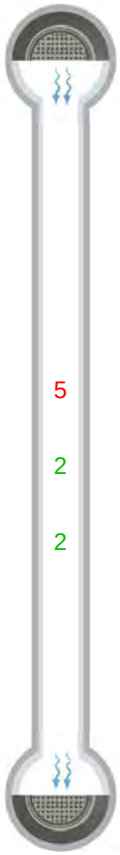
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:39

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09995-R58-06635		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R58-09995	R58-06635	
Length surveyed	Material	Shape	Height	Width
82	Asbestos Cement	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R58-09995

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-09995					
0.0 ft.	Water Level		0 - 0		5	
29.6 ft.	Patch Repair		12 - 4		0	
	unknown					
32.8 ft.	Hole		2 - 4		0	
65.8 ft.	Fracture Circumferential		7 - 11		5	
66.2 ft.	Deposits Settled Other		6 - 4		0	
	sewer debris will jet					
77.3 ft.	Material Change		0 - 0		5	
	pvc					
82.0 ft.	Manhole		0 - 0		5	
	R58-06635 zoomed					

R58-06635

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:39

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09995		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	29.6 ft.	Grade:	0
Condition:	Patch Repair		
Remarks:	unknown		

Distance:	32.8 ft.	Grade:	5
Condition:	Hole		
Remarks:	N/A		

Ted Berry Company
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207-897-3348

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:39

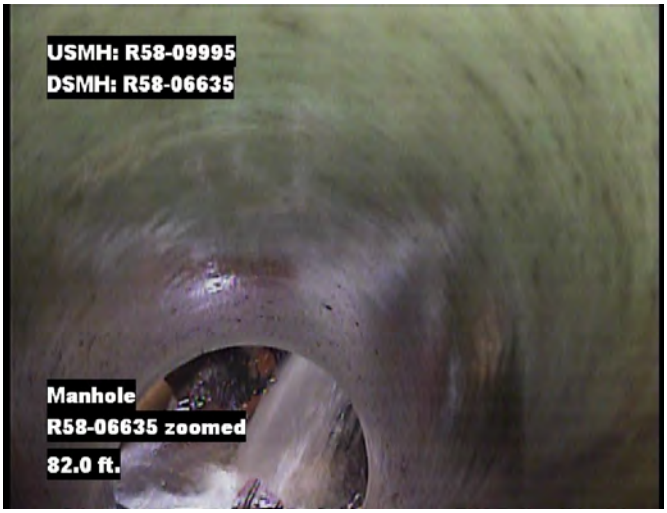
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 65.8 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 66.2 ft. Grade: 2
Condition: Deposits Settled Other
Remarks: sewer debris will jet

Distance: 77.3 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 82.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-06635 zoomed

Ted Berry Company
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Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:39

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R58-09995-R58-06635		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R58-09995	R58-06635	
Length surveyed	Material	Shape	Height	Width
82	Asbestos Cement	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	1	2	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	1		Subtotals	3	
SUMMARY	Pipe Rating		7	Pipe Rating		2	Overall Pipe Rating		9
	Structural Index		3.5	O&M Index		2.0	Overall Index		3.0
	Str. Quick Rating		5121	O&M Quick Rating		2100	Ovrl. Quick Rating		5122

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-09995	R58-09985	R58-09995-R58-09985	9/7/2017	Everett st	PolyVinyl Chloride	6	180.9	180.9

Pipe Size: 6 Total Ln.: 180.9 Inspected Ln.: 180.9

Project Total Ln.: 180.9 Project Inspected Ln.: 180.9

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R58-09995-R58-09985	
Quick Maint. Rating	4300	Upstream MH	Downstream MH
Quick Overall Rating	4300	R58-09995	R58-09985

Length surveyed	Material	Shape	Height	Width
180.9	PolyVinyl Chloride	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-09995

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-09985		0 - 0		0	
0.0 ft.	Water Level		0 - 0		10	
13.0 ft.	Tap Factory		9 - 0	4	5	
13.0 ft.	Water Level		0 - 0		20	
13.0 ft.	Camera Underwater	Start S01	0 - 0		0	
27.5 ft.	Camera Underwater	End F01	0 - 0		0	
27.5 ft.	Water Level		0 - 0		10	
50.1 ft.	Tap Factory		9 - 0	4	5	
59.2 ft.	Tap Factory		3 - 0	4	5	
80.5 ft.	Tap Factory		3 - 0	4	5	
99.9 ft.	Tap Factory		9 - 0	4	5	
160.3 ft.	Tap Factory		3 - 0	4	5	
180.9 ft.	Manhole R58-09985		0 - 0		5	

4

4

R58-09985

Ted Berry Company
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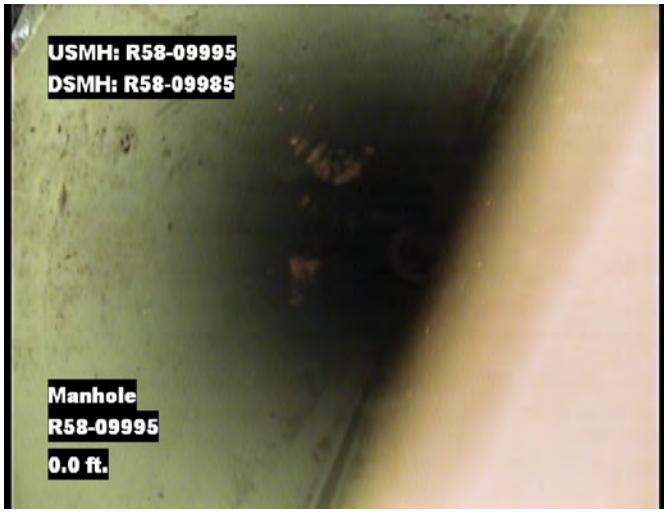
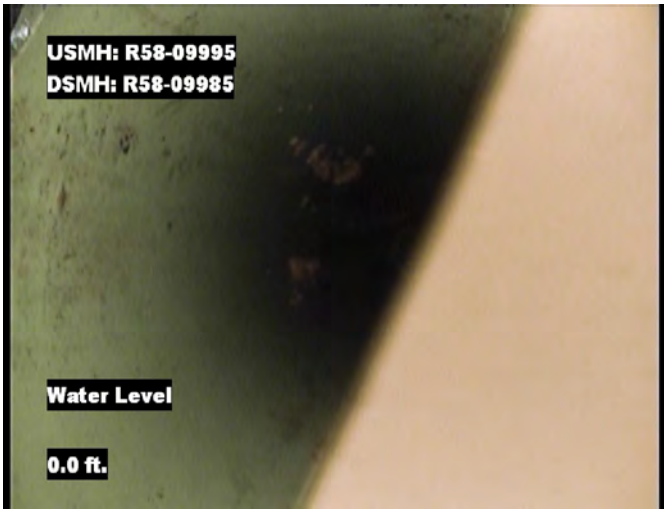
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Everett st	20170907	08:04
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill valley and west end		

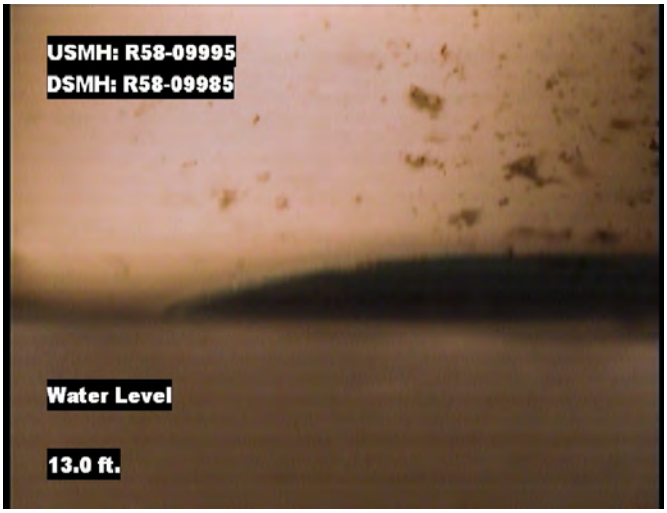


Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-09985



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 13.0 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 13.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Ted Berry Company
521 Federal Rd
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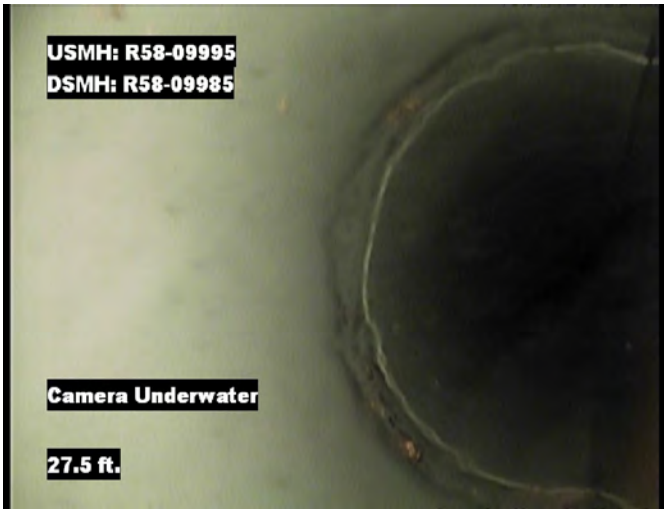
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

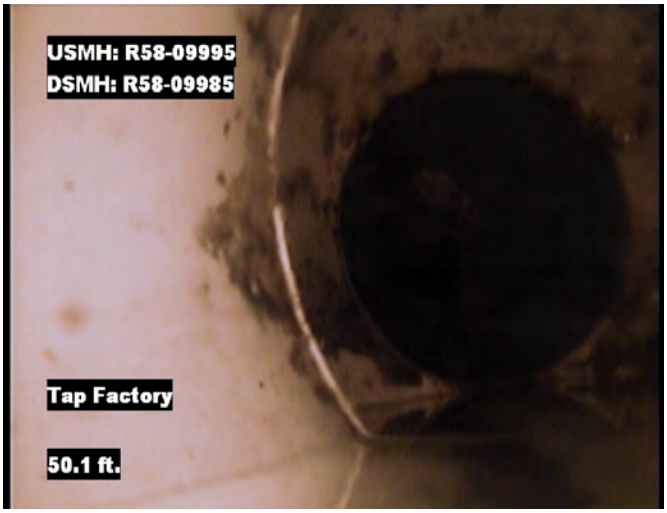
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 13.0 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A



Distance: 27.5 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A

Distance: 27.5 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 50.1 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Ted Berry Company
521 Federal Rd
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 59.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 80.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 99.9 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 160.3 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Ted Berry Company
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Livermore Maine 04253
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	180.9 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-09985		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Everett st	20170907	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4300	R58-09995-R58-09985		
Quick Overall Rating	4300	Upstream MH	Downstream MH	
		R58-09995	R58-09985	

Length surveyed	Material	Shape	Height	Width
180.9	PolyVinyl Chloride	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code ID Length									
MCU F01 14.5	0	0	0	4	3	12	4	3	12
	Subtotals	0		Subtotals	3		Subtotals	3	
SUMMARY	Pipe Rating		0	Pipe Rating		12	Overall Pipe Rating		12
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4300	Ovrl. Quick Rating		4300

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-10010	R58-10005	R58-10010-R58-10005	9/6/2017	Nathan rd	Vitrified Clay Pipe	6	231.8	231.8

Pipe Size: 6 Total Ln.: 231.8 Inspected Ln.: 231.8

Project Total Ln.: 231.8 Project Inspected Ln.: 231.8

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	4233	Pipe Segment Reference		
Quick Maint. Rating	2300	R58-10010-R58-10005		
Quick Overall Rating	4233	Upstream MH	Downstream MH	
		R58-10010	R58-10005	
Length surveyed	Material	Shape	Height	Width
231.8	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R58-10010

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-10010		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
17.8 ft.	Tap Break-in		12 - 0	4	5	
46.2 ft. 4	Fracture Multiple		2 - 5		5	
47.5 ft. 2	Tap Break-in Intruding		2 - 0	4 / 1	5	
67.9 ft.	Tap Break-in		12 - 0	4	5	
104.2 ft. 3	Fracture Longitudinal		12 - 0		5	
114.2 ft. 2	Crack Longitudinal		12 - 0		5	
128.0 ft.	Tap Break-in		12 - 0	4	5	
128.0 ft. 3	Fracture Longitudinal		12 - 0		5	
129.0 ft.	Tap Break-in		12 - 0	4	5	
129.0 ft. 3	Fracture Longitudinal		12 - 0		5	
129.0 ft. 4	Fracture Longitudinal Hinge 2		1 - 6		5	
180.0 ft. 2	Tap Break-in Intruding		12 - 0	4 / 1	5	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	4233	Pipe Segment Reference	R58-10010-R58-10005
Quick Maint. Rating	2300	Upstream MH	Downstream MH
Quick Overall Rating	4233	R58-10010	R58-10005

Length surveyed	Material	Shape	Height	Width
231.8	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

200.4 ft.	Tap Break-in Intruding		2 - 0	4 / 1	5	
	Active					
227.2 ft.	Tap Break-in		12 - 0	4	5	
231.8 ft.	Manhole		0 - 0		5	
	R58-10005					

R58-10005

Ted Berry Company
521 Federal Rd
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-10010

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 17.8 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 46.2 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Ted Berry Company
521 Federal Rd
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 47.5 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A

Distance: 67.9 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 104.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 114.2 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

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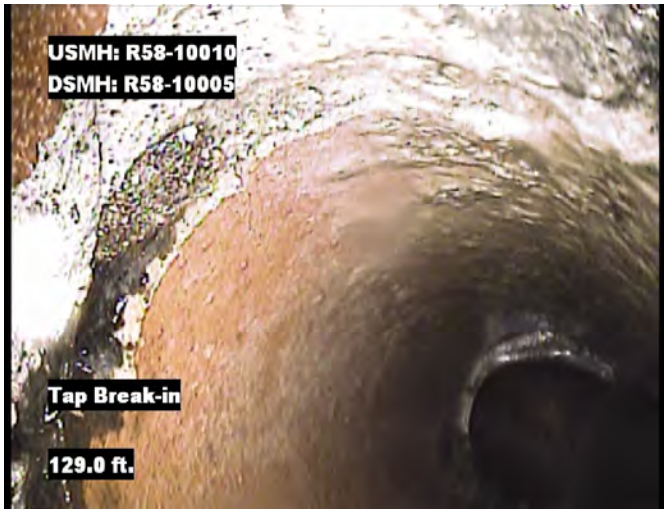
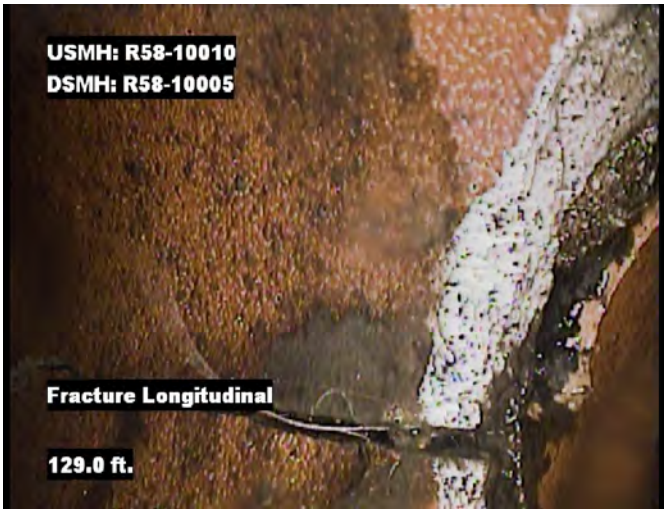
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Nathan rd	20170906	14:24
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill valley and west end		

Distance: 128.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 128.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 129.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 129.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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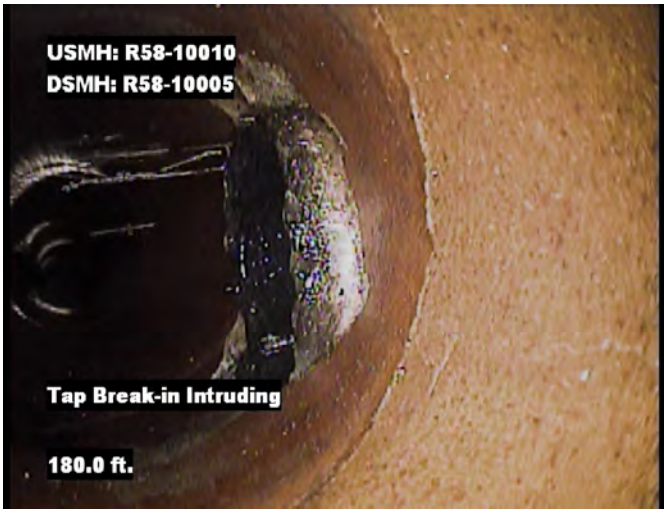
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 129.0 ft. Grade: 4
Condition: Fracture Longitudinal Hinge 2
Remarks: N/A



Distance: 180.0 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A

Distance: 200.4 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: Active

Distance: 227.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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Livermore Maine 04253
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	231.8 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-10005		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Nathan rd	20170906	14:24

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	4233	Pipe Segment Reference		
Quick Maint. Rating	2300	R58-10010-R58-10005		
Quick Overall Rating	4233	Upstream MH	Downstream MH	
		R58-10010	R58-10005	

Length surveyed	Material	Shape	Height	Width
231.8	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	3	6	2	4	8
	3	3	9	3	0	0	3	3	9
	4	2	8	4	0	0	4	2	8
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	3		Subtotals	9	
SUMMARY	Pipe Rating		19	Pipe Rating		6	Overall Pipe Rating		25
	Structural Index		3.2	O&M Index		2.0	Overall Index		2.8
	Str. Quick Rating		4233	O&M Quick Rating		2300	Ovrl. Quick Rating		4233

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11565	R58-11560	R58-11565-R58-11560	9/19/2017	Weston st	Vitrified Clay Pipe	8	239	239

Pipe Size: 8 Total Ln.: 239 Inspected Ln.: 239

Project Total Ln.: 239.0 Project Inspected Ln.: 239.0

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5141	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-11565-R58-11560		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-11565	R58-11560	

Length surveyed	Material	Shape	Height	Width
239	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

R58-11560

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-11560		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
10.3 ft.	Tap Factory Capped		12 - 0	4	5	
27.2 ft.	Tap Break-in		9 - 0	4	5	
40.1 ft.	Tap Factory Capped		12 - 0	4	5	
64.3 ft.	Tap Factory Capped		12 - 0	4	5	
86.6 ft.	Tap Factory Capped		12 - 0	4	5	
104.4 ft.	Tap Break-in		9 - 0	4	5	
106.6 ft.	Fracture Multiple		11 - 1		5	
113.6 ft.	Tap Factory Capped		12 - 0	4	5	
135.9 ft.	Tap Factory Capped		12 - 0	4	5	
160.9 ft.	Tap Factory Capped		2 - 0	4	5	
176.4 ft.	Broken Pipe Void Visible		10 - 2		5	
177.1 ft.	Tap Factory		3 - 0	4	5	

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Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5141	Pipe Segment Reference	R58-11565-R58-11560
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5141	R58-11565	R58-11560

Length surveyed	Material	Shape	Height	Width
239	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

185.4 ft.	Tap Factory Capped		9 - 0	4	5	
194.3 ft.	Tap Break-in Active		12 - 0	4	5	
225.0 ft.	Tap Break-in		9 - 0	4	5	
239.0 ft.	Manhole		0 - 0		5	
	R58-11565					

R58-11565

Ted Berry Company
521 Federal Rd
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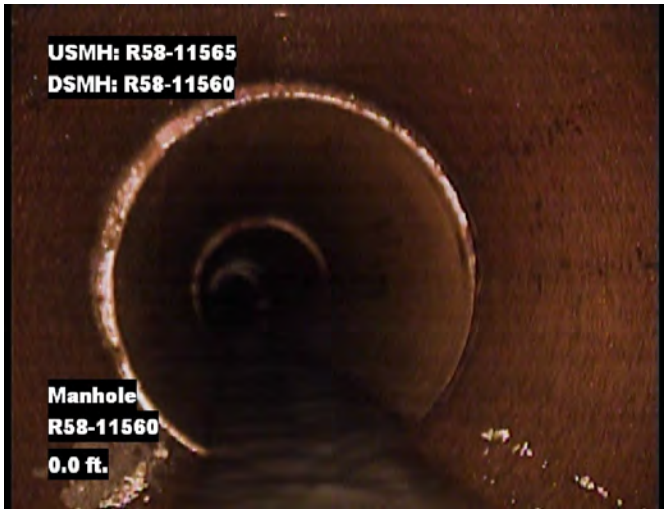
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

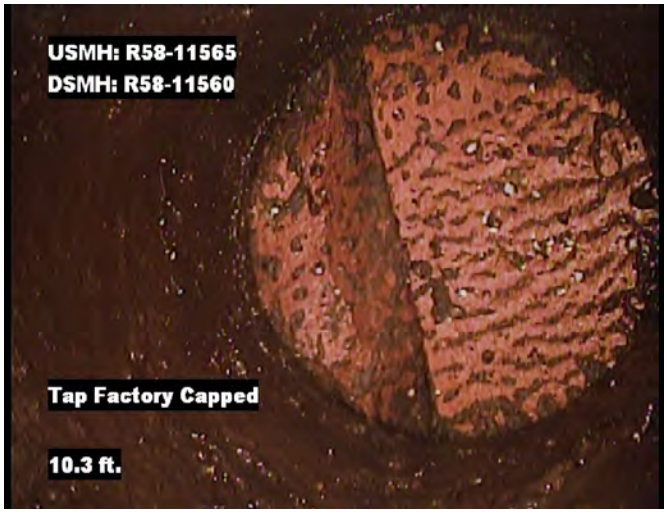
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

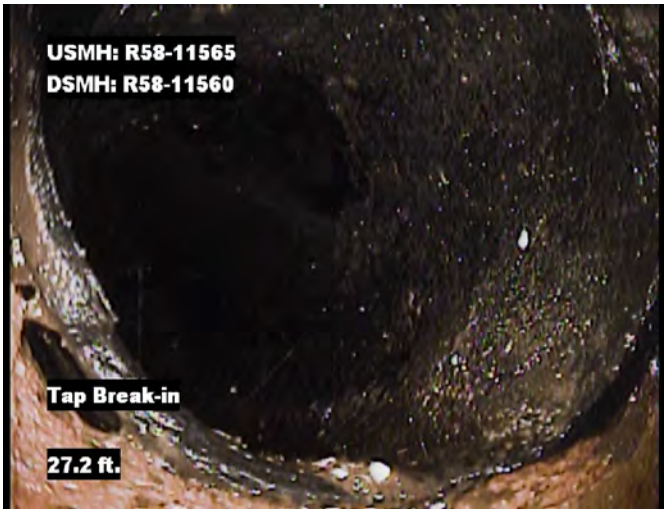


Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11560

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 10.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 27.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

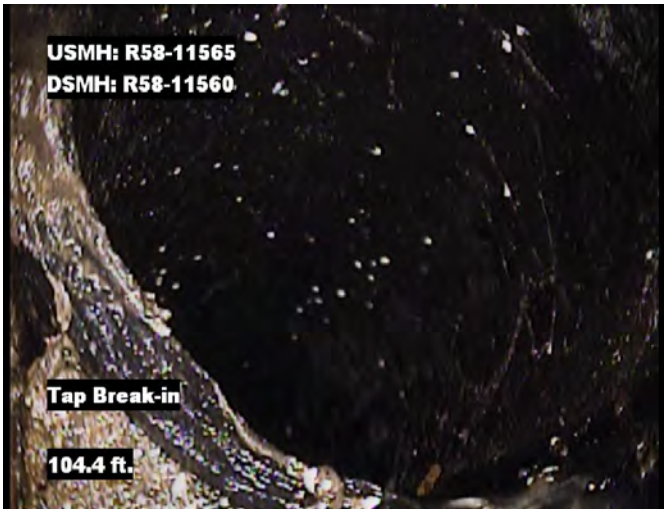
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 40.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 64.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 86.6 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 104.4 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 106.6 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 113.6 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 135.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 160.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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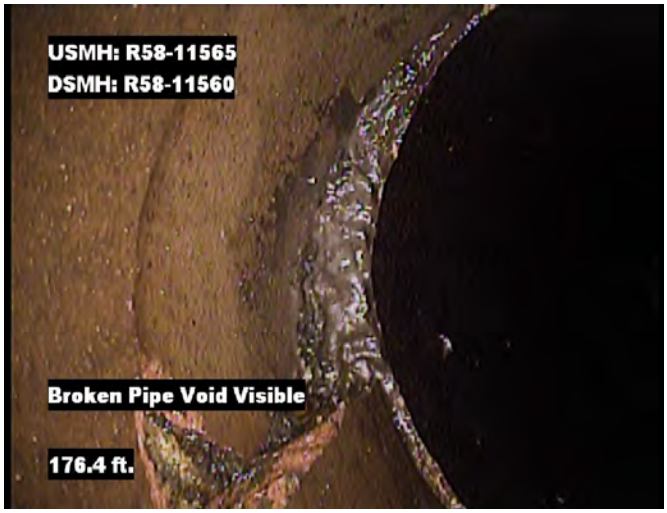
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance: 176.4 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 177.1 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 185.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 194.3 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance:	225.0 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	239.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-11565		

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st	20170919	11:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5141	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-11565-R58-11560		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R58-11565	R58-11560	
Length surveyed	Material	Shape	Height	Width
239	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	0		Subtotals	2	
SUMMARY	Pipe Rating		9	Pipe Rating		0	Overall Pipe Rating		9
	Structural Index		4.5	O&M Index		0	Overall Index		4.5
	Str. Quick Rating		5141	O&M Quick Rating		0000	Ovrl. Quick Rating		5141

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11580	R58-07620	R58-11580-R58-07620	10/4/2017	Weston st xc	Vitrified Clay Pipe	10	54.3	54.3

Pipe Size: 10 Total Ln.: 54.3 Inspected Ln.: 54.3

Project Total Ln.: 54.3 Project Inspected Ln.: 54.3

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	4132	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-11580-R58-07620		
Quick Overall Rating	4132	Upstream MH	Downstream MH	
		R58-11580	R58-07620	
Length surveyed	Material	Shape	Height	Width
54.3	Vitrified Clay Pipe	Circular	10	10
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-07620

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R58-07620					
0.0 ft.	Water Level		0 - 0		0	
3.4 ft.	Fracture Longitudinal		6 - 0		5	
8.9 ft.	Material Change		0 - 0		5	
	pvc					
11.2 ft.	Material Change		0 - 0		5	
	vcp					
37.6 ft.	Fracture Longitudinal		12 - 0		5	
38.7 ft.	Fracture Multiple		12 - 12		5	
43.6 ft.	Water Level Sag		0 - 0		5	
54.3 ft.	Manhole		0 - 0		5	
	R58-11580					

R58-11580

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:55

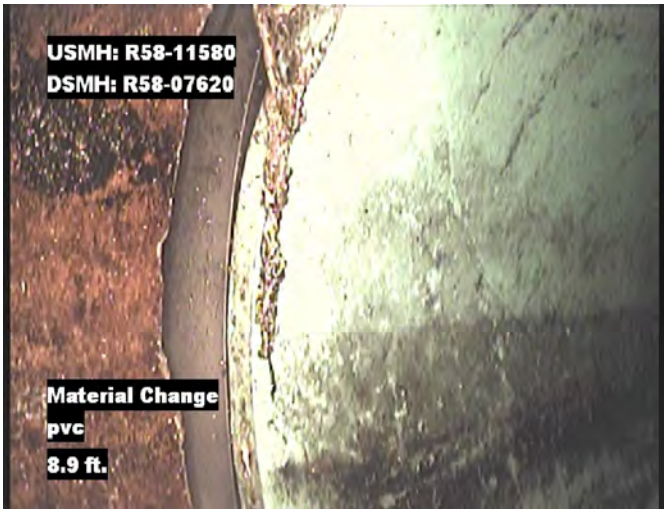
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-07620		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	3.4 ft.	Grade:	3
Condition:	Fracture Longitudinal		
Remarks:	N/A		



Distance:	8.9 ft.	Grade:	0
Condition:	Material Change		
Remarks:	pvc		

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Weston st xc	20171004	07:55
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill valley and west end		

Distance: 11.2 ft. Grade: 0
Condition: Material Change
Remarks: vcp

Distance: 37.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 38.7 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 43.6 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

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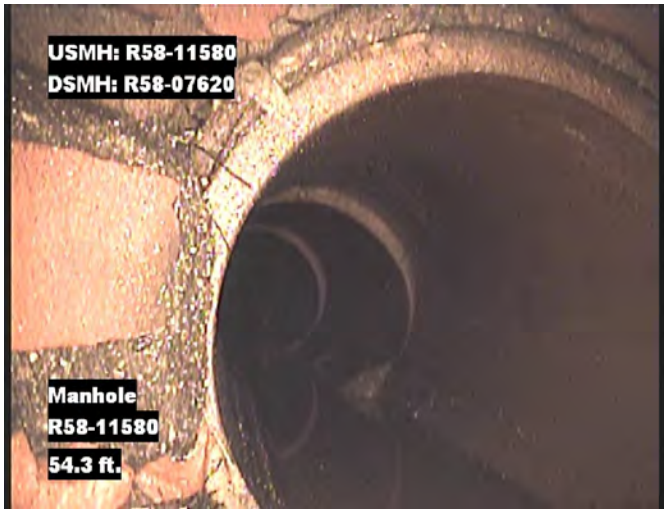
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end



Distance:	54.3 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R58-11580		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Weston st xc	20171004	07:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill valley and west end

Quick Struct. Rating	4132	Pipe Segment Reference		
Quick Maint. Rating	N/A	R58-11580-R58-07620		
Quick Overall Rating	4132	Upstream MH	Downstream MH	
		R58-11580	R58-07620	

Length surveyed	Material	Shape	Height	Width
54.3	Vitrified Clay Pipe	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	1	2	2	2	4
	3	2	6	3	0	0	3	2	6
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	4		Subtotals	1		Subtotals	5	
SUMMARY	Pipe Rating		12	Pipe Rating		2	Overall Pipe Rating		14
	Structural Index		3.0	O&M Index		2.0	Overall Index		2.8
	Str. Quick Rating		4132	O&M Quick Rating		2100	Ovrl. Quick Rating		4132

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11595	R58-11590	R58-11595-R58-11590	9/19/2017	Eddy st	Vitrified Clay Pipe	6	299.5	299.5

Pipe Size: 6 Total Ln.: 299.5 Inspected Ln.: 299.5

Project Total Ln.: 299.5 Project Inspected Ln.: 299.5

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Defect Listing Plot Left

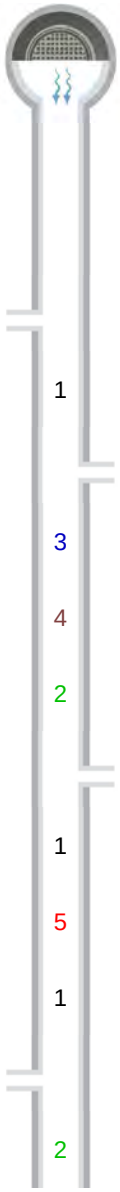
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5242	Pipe Segment Reference		
Quick Maint. Rating	2213	R58-11595-R58-11590		
Quick Overall Rating	5242	Upstream MH: R58-11595	Downstream MH: R58-11590	
Length surveyed: 299.5	Material: Vitrified Clay Pipe	Shape: Circular	Height: 6	Width: 6
Direction: Downstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: Heavy Cleaning	Lining Method

Remarks



R58-11595

		Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
	0.0 ft.	Manhole R58-11595		0 - 0		0	
	0.0 ft.	Water Level		0 - 0		5	
	2.0 ft.	Tap Factory Capped		3 - 0	4	5	
1	2.2 ft.	Roots Fine Joint		10 - 12		5	
	3.5 ft.	Tap Factory Capped		9 - 0	4	5	
3	5.9 ft.	Fracture Longitudinal		9 - 0		5	
4	10.5 ft.	Fracture Multiple		2 - 6		5	
2	22.2 ft.	Fracture Circumferential		11 - 1		5	
	23.4 ft.	Tap Break-in		12 - 0	4	5	
1	23.9 ft.	Roots Fine Joint		11 - 1		5	
5	27.9 ft.	Hole Void Visible		11 - 1		5	
1	46.1 ft.	Roots Fine Joint		8 - 1		5	
	54.7 ft.	Tap Break-in		3 - 0	4	5	
2	67.9 ft.	Deposits Settled Fine		5 - 7		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

		Pipe Segment Reference	
Quick Struct. Rating	5242	R58-11595-R58-11590	
Quick Maint. Rating	2213	Upstream MH	Downstream MH
Quick Overall Rating	5242	R58-11595	R58-11590

Length surveyed	Material	Shape	Height	Width
299.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

	79.9 ft.	Tap Break-in Active		12 - 0	4	5	
	83.3 ft.	Tap Factory Capped		3 - 0	4	5	
	84.5 ft.	Tap Factory Capped		9 - 0	4	5	
2	97.1 ft.	Obstacle Other sewer debris		5 - 7		5	
	124.2 ft.	Tap Break-in		3 - 0	4	5	
	149.8 ft.	Tap Break-in Active		9 - 0	4	5	
	151.0 ft.	Tap Factory Capped		3 - 0	4	5	
	151.9 ft.	Tap Factory Capped		9 - 0	4	5	
	175.7 ft.	Tap Break-in		2 - 0	4	5	
3	185.1 ft.	Fracture Longitudinal		8 - 0		5	
5	218.5 ft.	Hole Soil Visible		3 - 7		5	
	229.0 ft.	Tap Factory Capped		9 - 0	4	5	
	230.1 ft.	Tap Break-in		10 - 0	4	5	
3	239.8 ft.	Fracture Longitudinal		3 - 0		5	
4	267.1 ft.	Fracture Multiple		12 - 12		5	
	299.5 ft.	Manhole R58-11590		0 - 0		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

		Pipe Segment Reference	
Quick Struct. Rating	5242	R58-11595-R58-11590	
Quick Maint. Rating	2213	Upstream MH	Downstream MH
Quick Overall Rating	5242	R58-11595	R58-11590

Length surveyed	Material	Shape	Height	Width
299.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-11590

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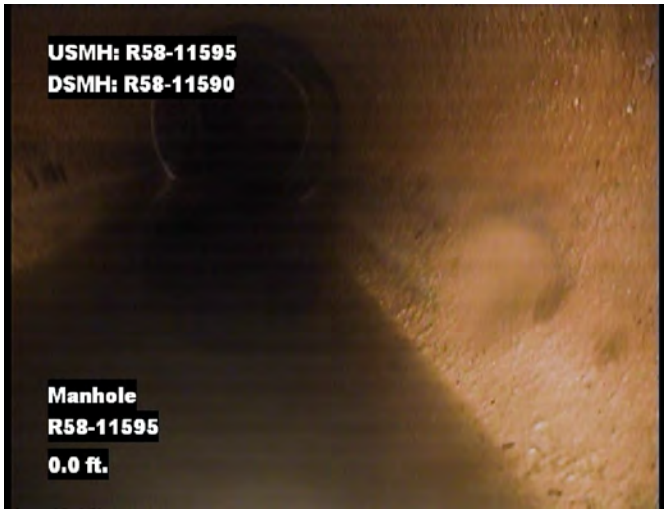
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

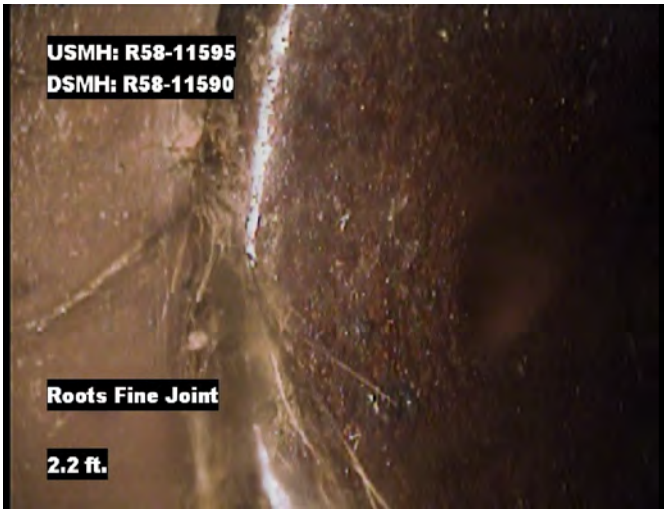
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11595

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 2.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 2.2 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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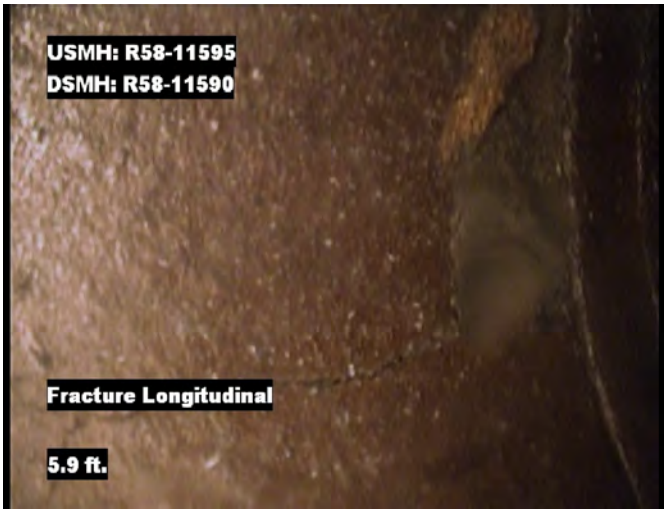
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 3.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 5.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 10.5 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 22.2 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

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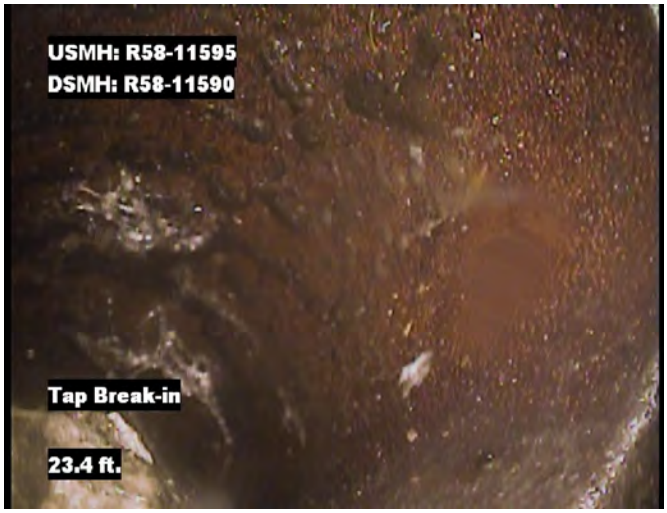
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance:	23.4 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		

Distance:	23.9 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	27.9 ft.	Grade:	5
Condition:	Hole Void Visible		
Remarks:	N/A		

Distance:	46.1 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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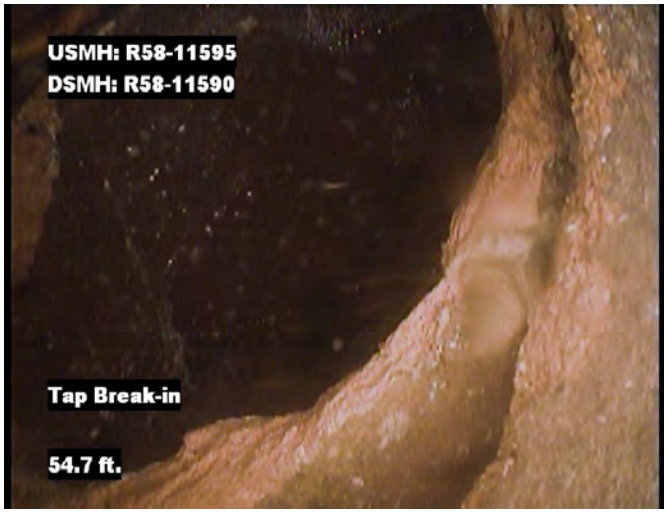
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

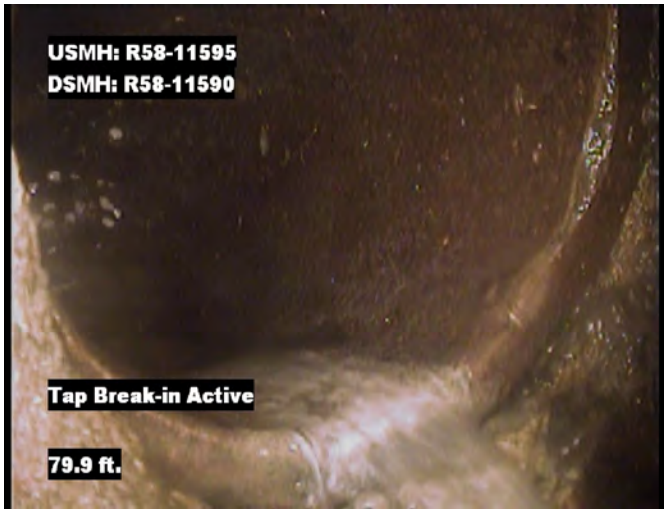
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

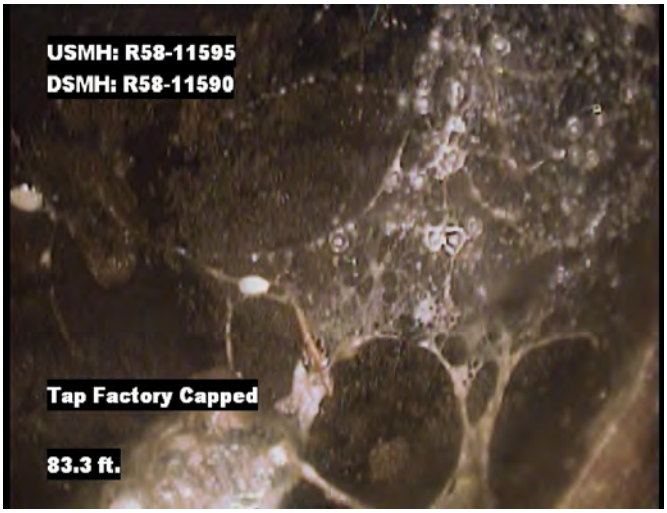


Distance: 54.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 67.9 ft. Grade: 2
Condition: Deposits Settled Fine
Remarks: N/A



Distance: 79.9 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A



Distance: 83.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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Customer	City	Street	Date	Time
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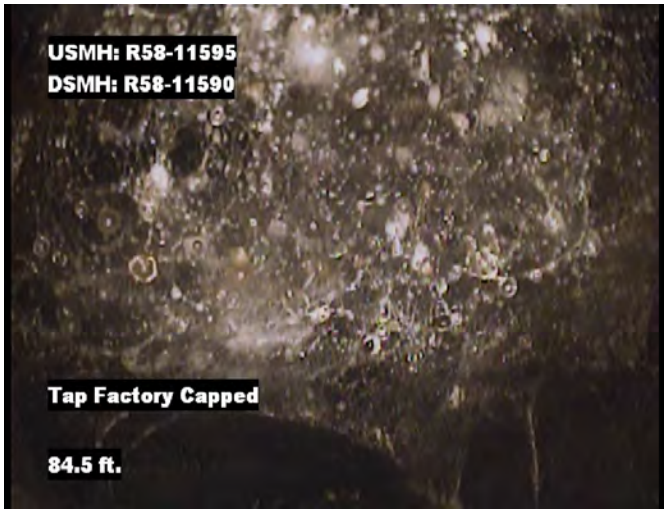
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

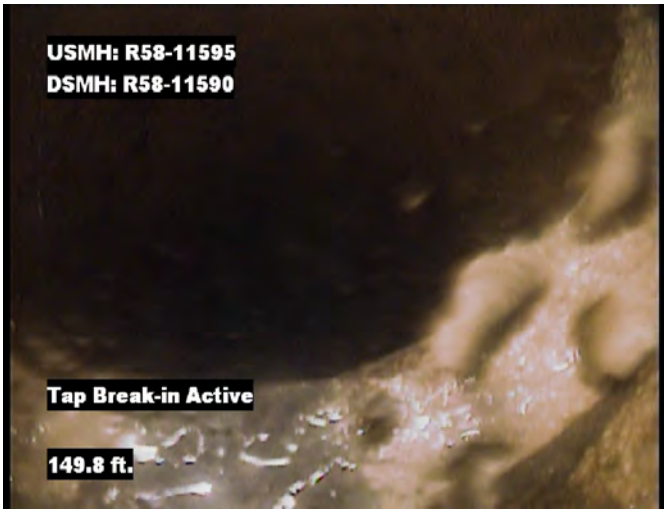
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance: 84.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 97.1 ft. Grade: 2
Condition: Obstacle Other
Remarks: sewer debris

Distance: 124.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 149.8 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

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Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 151.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 151.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 175.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 185.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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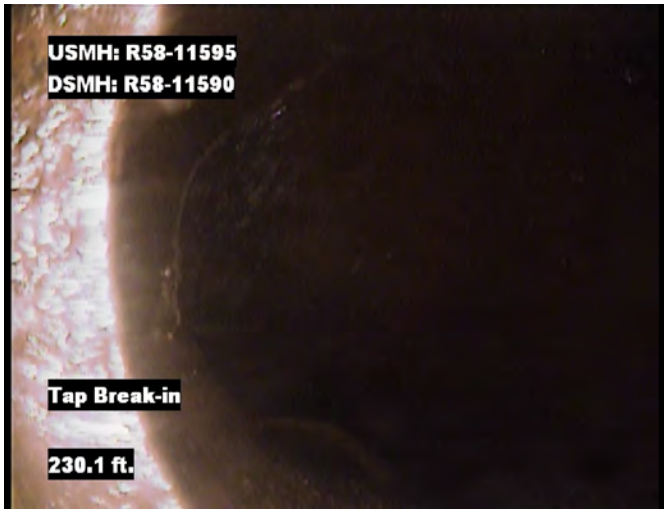
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

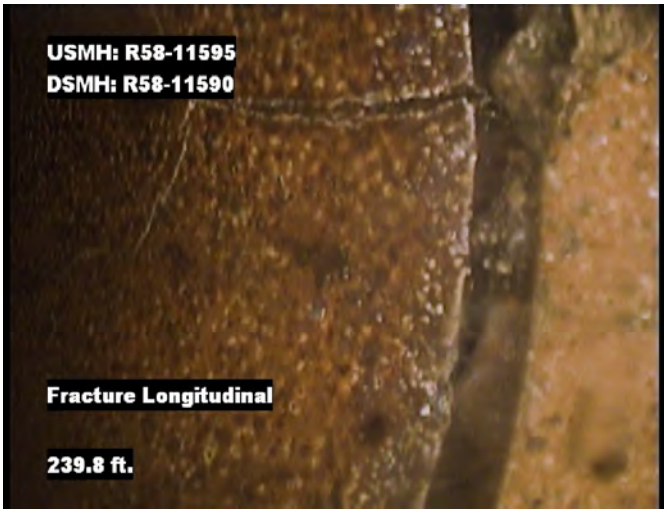
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 218.5 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A

Distance: 229.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 230.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 239.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 267.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 299.5 ft. Grade: 0
Condition: Manhole
Remarks: R58-11590

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	09:13

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5242	Pipe Segment Reference		
Quick Maint. Rating	2213	R58-11595-R58-11590		
Quick Overall Rating	5242	Upstream MH: R58-11595	Downstream MH: R58-11590	
Length surveyed: 299.5	Material: Vitrified Clay Pipe	Shape: Circular	Height: 6	Width: 6
Direction: Downstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: Heavy Cleaning	Lining Method:

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	3	3	1	3	3
	2	1	2	2	2	4	2	3	6
	3	3	9	3	0	0	3	3	9
	4	2	8	4	0	0	4	2	8
	5	2	10	5	0	0	5	2	10
Continuous Defects									
Code / ID / Length									
	Subtotals	8		Subtotals	5		Subtotals	13	
SUMMARY	Pipe Rating		29	Pipe Rating		7	Overall Pipe Rating		36
	Structural Index		3.6	O&M Index		1.4	Overall Index		2.8
	Str. Quick Rating		5242	O&M Quick Rating		2213	Ovrl. Quick Rating		5242

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11600	R58-11595	R58-11600-R58-11595	9/19/2017	Eddy st	Vitrified Clay Pipe	6	222.4	222.4

Pipe Size: 6 Total Ln.: 222.4 Inspected Ln.: 222.4

Project Total Ln.: 222.4 Project Inspected Ln.: 222.4

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5338	Pipe Segment Reference		
Quick Maint. Rating	5121	R58-11600-R58-11595		
Quick Overall Rating	5428	Upstream MH	Downstream MH	
		R58-11600	R58-11595	

Length surveyed	Material	Shape	Height	Width
222.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R58-11595

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-11595		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
3 0.0 ft.	Fracture Longitudinal		4 - 0		5	
1 10.0 ft.	Roots Fine Joint		10 - 0		5	
29.4 ft.	Tap Break-in Active		3 - 0	4	5	
3 46.5 ft.	Fracture Longitudinal		4 - 0		5	
47.3 ft.	Tap Break-in		12 - 0	4	5	
50.9 ft.	Tap Factory Capped		9 - 0	4	5	
51.8 ft.	Tap Factory Capped		3 - 0	4	5	
3 56.6 ft.	Fracture Longitudinal		4 - 0		5	
5 58.4 ft.	Broken Pipe Void Visible		12 - 4		5	
2 68.8 ft.	Crack Longitudinal		9 - 0		5	
5 76.0 ft.	Broken Pipe Void Visible		4 - 8		5	
2 78.6 ft.	Crack Longitudinal		4 - 0		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

		Pipe Segment Reference	
Quick Struct. Rating	5338	R58-11600-R58-11595	
Quick Maint. Rating	5121	Upstream MH	Downstream MH
Quick Overall Rating	5428	R58-11600	R58-11595

Length surveyed	Material	Shape	Height	Width
222.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

2	89.1 ft.	Tap Break-in Intruding		12 - 0	4 / 1	5	
2	90.3 ft.	Fracture Circumferential		3 - 6		5	
3	92.2 ft.	Crack Multiple		11 - 12		5	
3	96.6 ft.	Fracture Longitudinal		12 - 0		5	
	97.8 ft.	Tap Break-in		12 - 0	4	5	
1	100.5 ft.	Roots Fine Joint		11 - 12		5	
2	106.3 ft.	Water Level Sag		0 - 0		5	
	106.3 ft.	Material Change pvc		0 - 0		5	
	107.5 ft.	Tap Factory		3 - 0	4	5	
	109.1 ft.	Material Change vcp		0 - 0		5	
2	110.4 ft.	Fracture Circumferential		10 - 5		5	
5	114.4 ft.	Hole Soil Visible		1 - 6		5	
	119.8 ft.	Material Change pvc		0 - 0		5	
	125.7 ft.	Material Change vcp		0 - 0		5	
3	141.0 ft.	Fracture Longitudinal		3 - 0		5	
3	146.9 ft.	Fracture Longitudinal		3 - 0		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
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Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5338	Pipe Segment Reference		
Quick Maint. Rating	5121	R58-11600-R58-11595		
Quick Overall Rating	5428	Upstream MH	Downstream MH	
		R58-11600	R58-11595	

Length surveyed	Material	Shape	Height	Width
222.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

	148.0 ft.	Tap Break-in		9 - 0	4	5	
2	155.4 ft.	Crack Longitudinal		12 - 0		5	
3	156.9 ft.	Fracture Longitudinal		12 - 0		5	
2	163.0 ft.	Fracture Circumferential		1 - 5		5	
	192.0 ft.	Tap Break-in		3 - 0	4	5	
	199.6 ft.	Tap Factory Capped		3 - 0	4	5	
	216.3 ft.	Tap Break-in		12 - 0	4	5	
5	219.1 ft.	Obstacle Brick		6 - 0		40	
	221.1 ft.	Tap Break-in Active		3 - 0	4	5	
	222.4 ft.	Manhole R58-11600		0 - 0		5	

R58-11600

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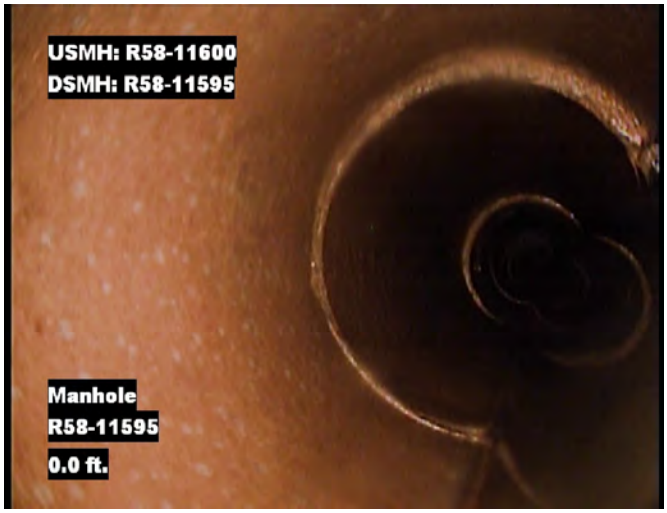
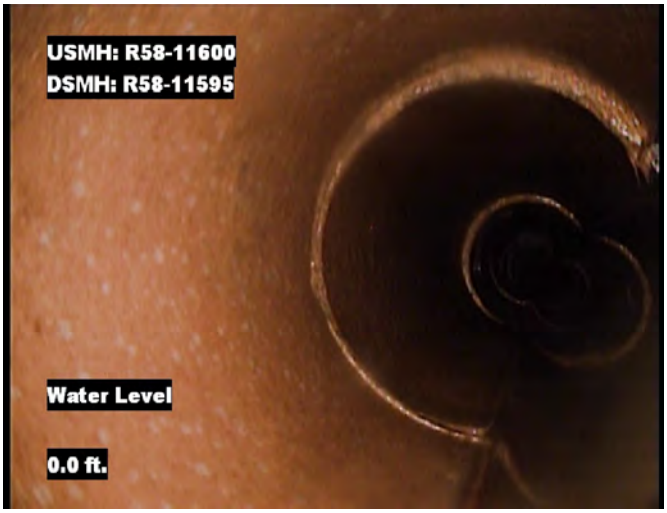
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

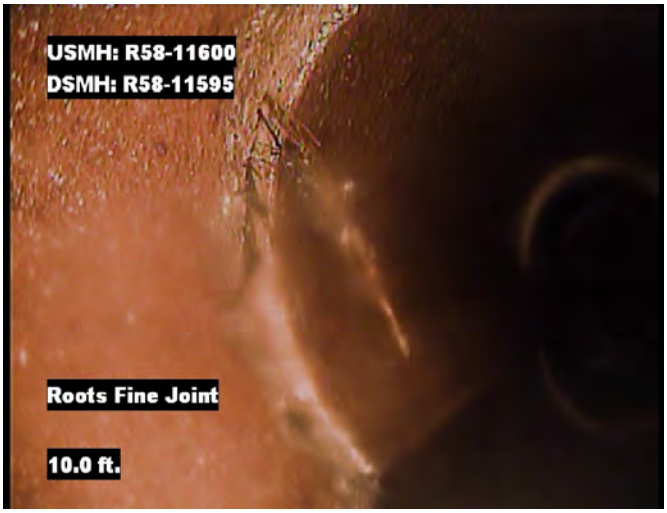


Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11595



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 10.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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Customer	City	Street	Date	Time
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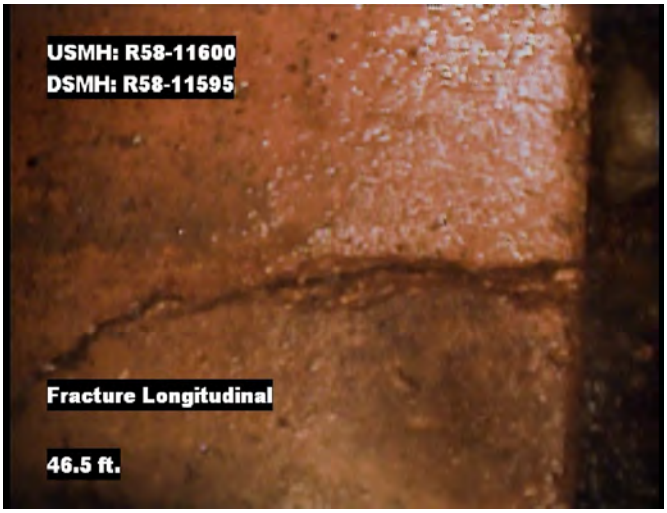
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 29.4 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A



Distance: 46.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 47.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 50.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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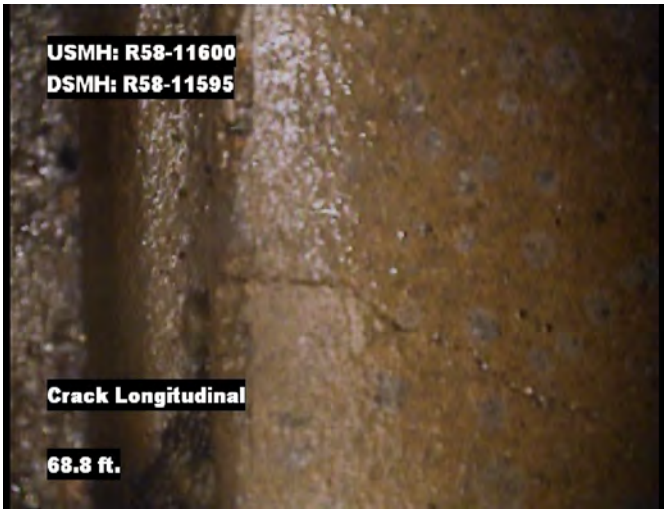
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 51.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 56.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 58.4 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A



Distance: 68.8 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

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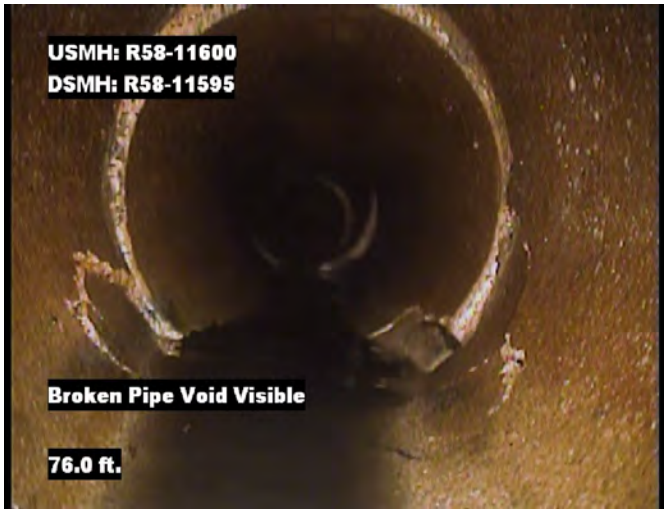
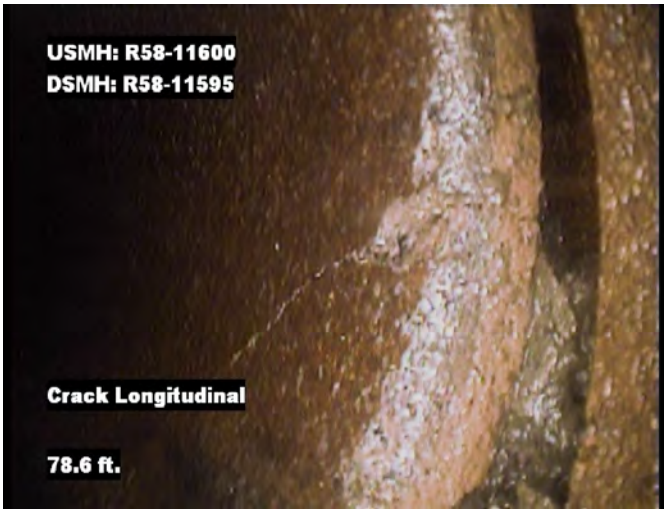
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

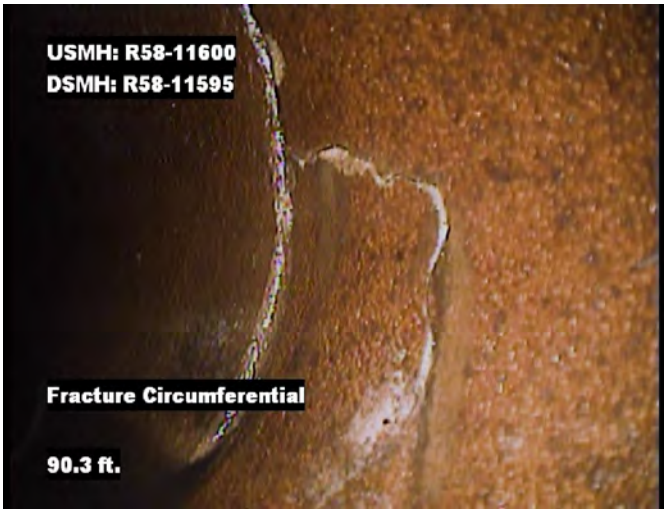


Distance: 76.0 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A



Distance: 78.6 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 89.1 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A



Distance: 90.3 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

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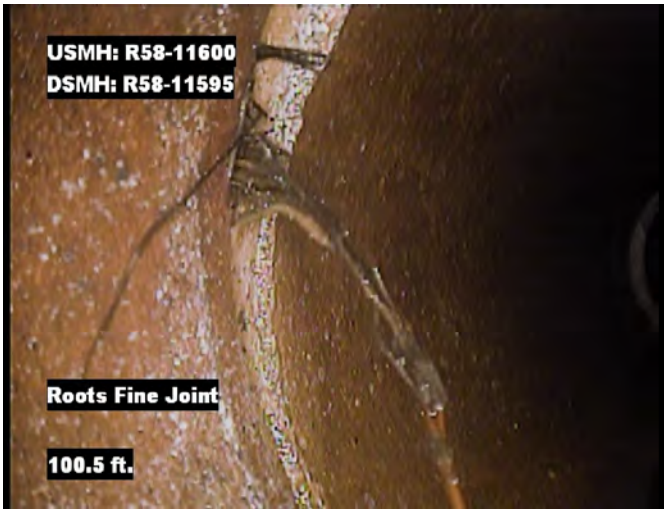
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 92.2 ft. Grade: 3
Condition: Crack Multiple
Remarks: N/A

Distance: 96.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 97.8 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 100.5 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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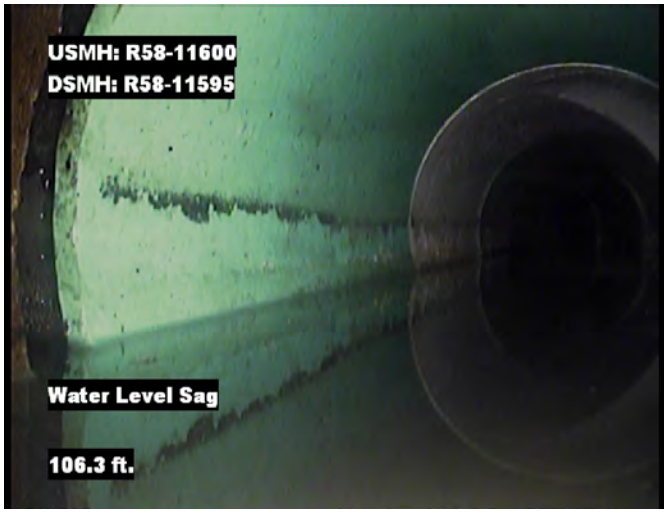
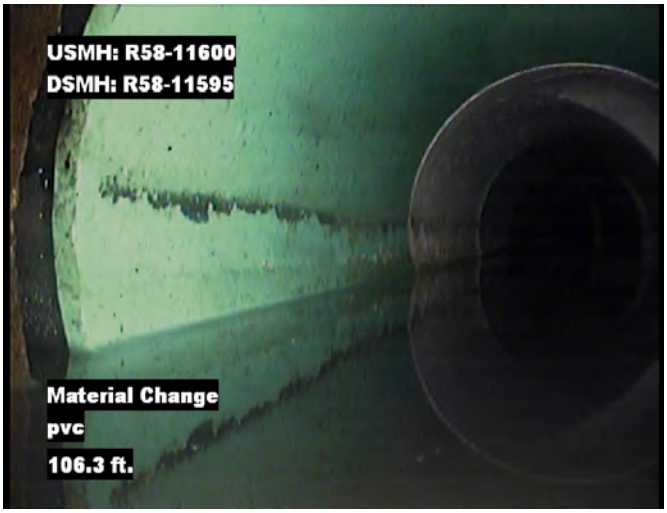
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

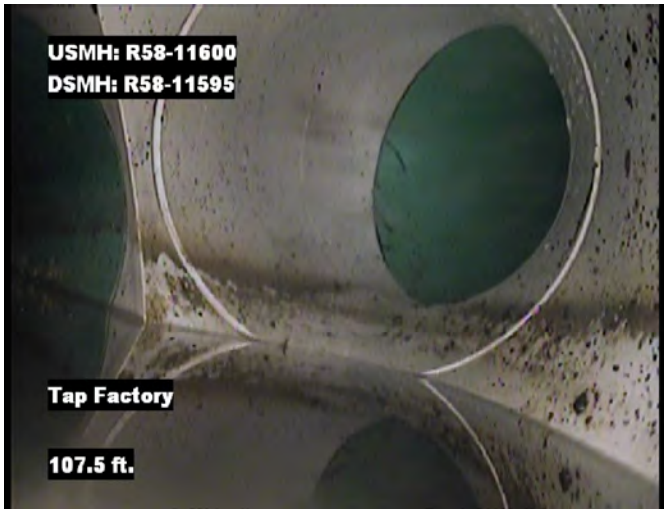
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



Distance: 106.3 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A



Distance: 106.3 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 107.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 109.1 ft. Grade: 0
Condition: Material Change
Remarks: vcp

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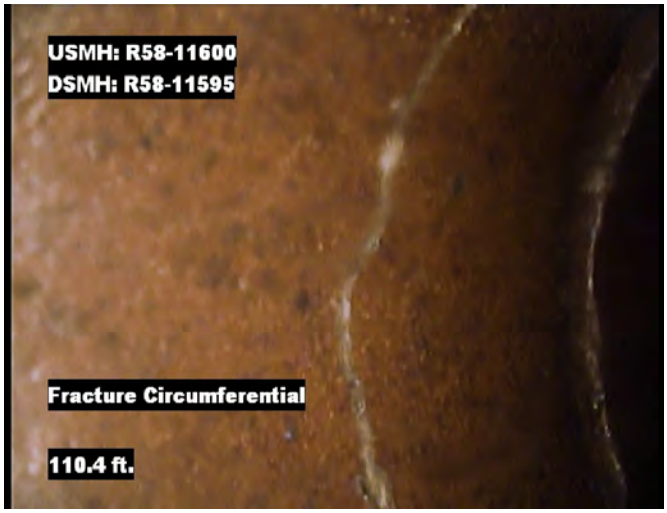
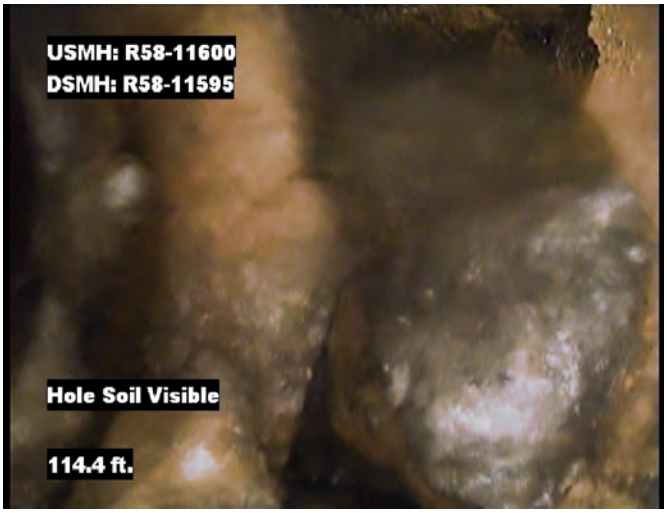
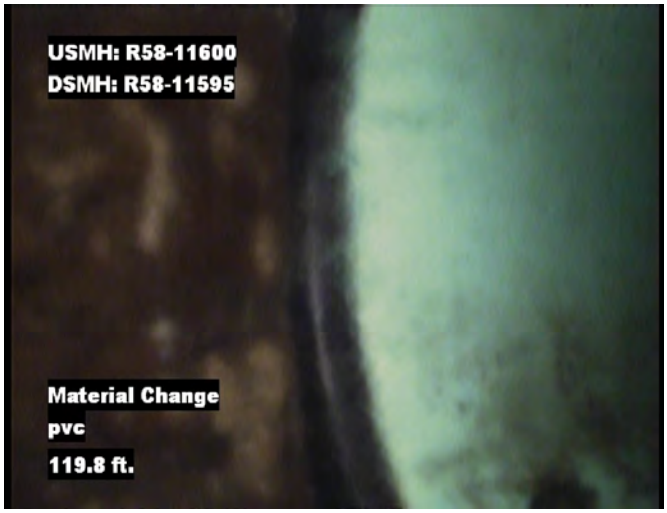
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Eddy st	20170919	08:40
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B bear hill and west end		



Distance: 110.4 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



Distance: 114.4 ft. Grade: 5
Condition: Hole Soil Visible
Remarks: N/A



Distance: 119.8 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Distance: 125.7 ft. Grade: 0
Condition: Material Change
Remarks: vcp

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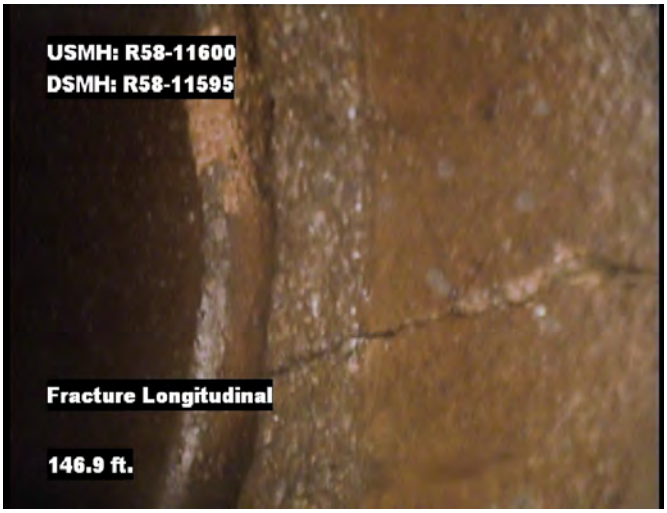
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

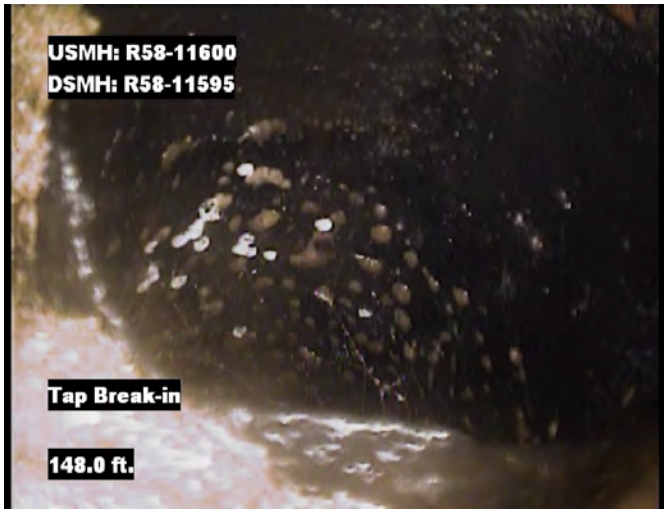
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 141.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 146.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 148.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 155.4 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

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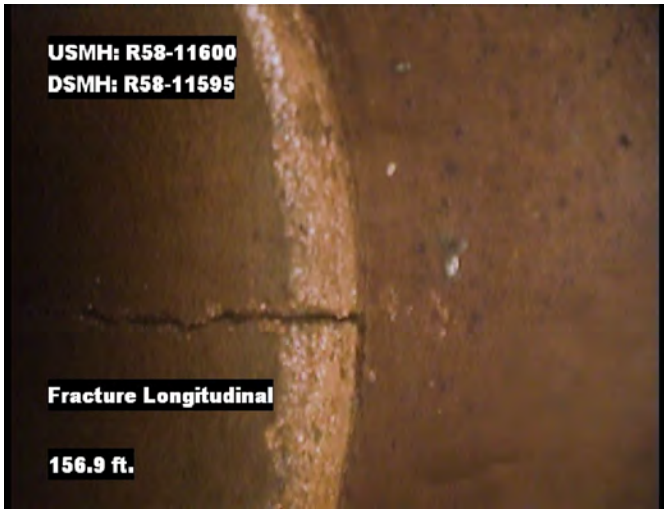
207-897-3348

Image Report 4/Page

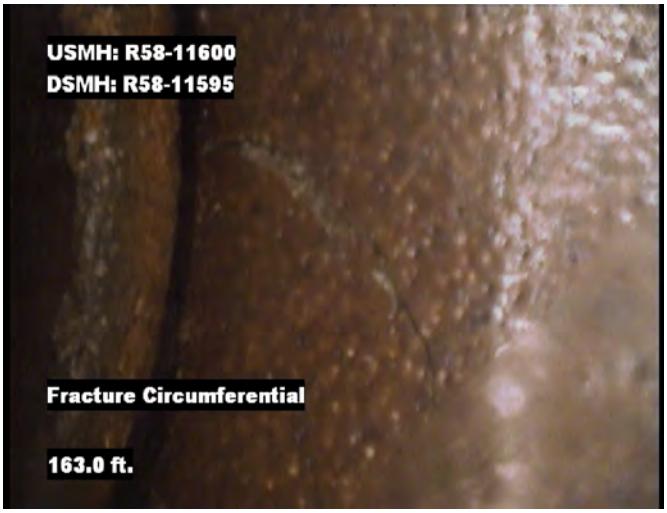
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

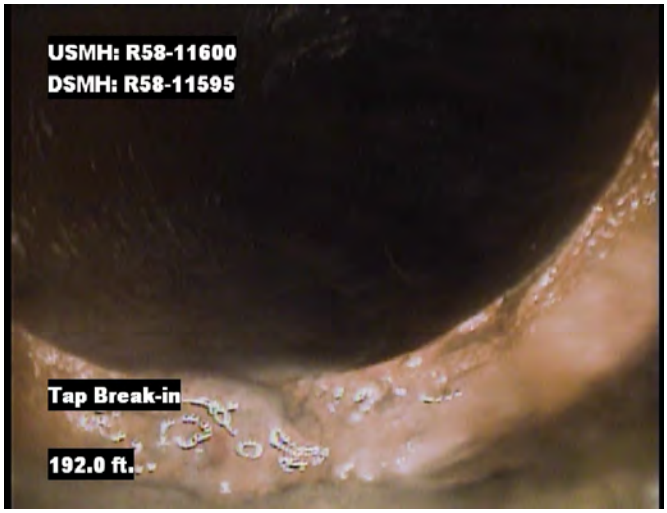
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end



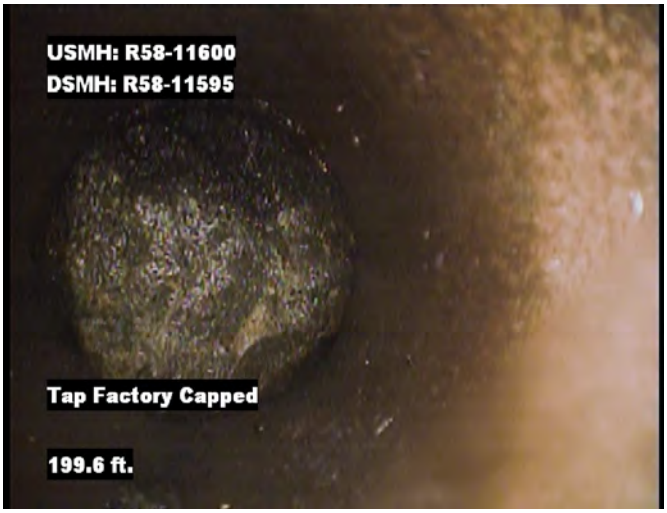
Distance: 156.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 163.0 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



Distance: 192.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 199.6 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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Image Report 4/Page

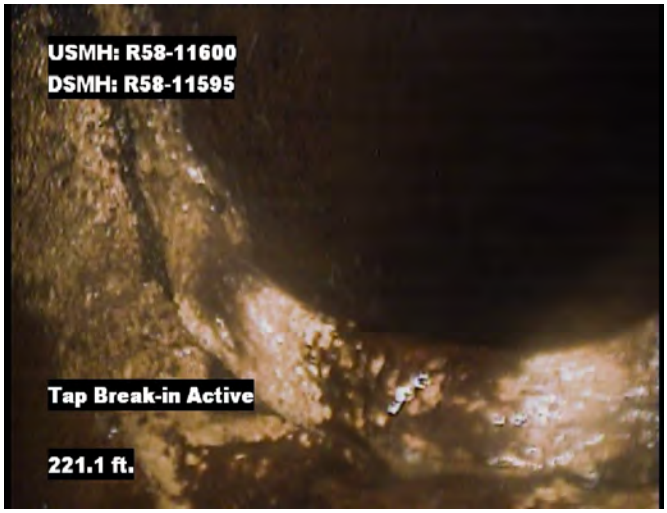
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

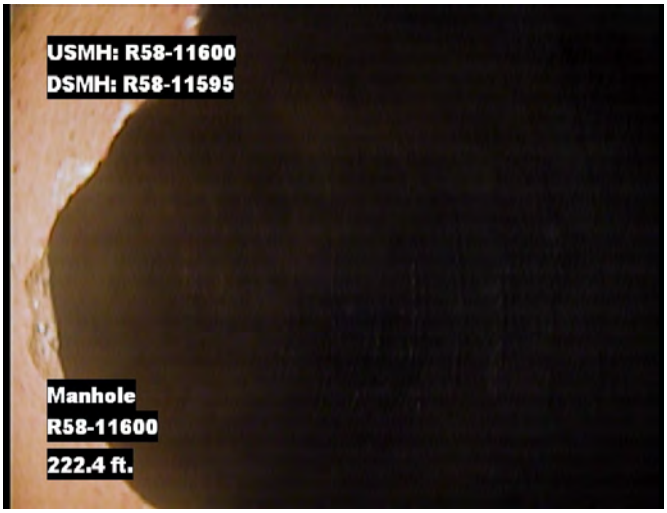
Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Distance: 216.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 219.1 ft. Grade: 5
Condition: Obstacle Brick
Remarks: N/A



Distance: 221.1 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A



Distance: 222.4 ft. Grade: 0
Condition: Manhole
Remarks: R58-11600

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Eddy st	20170919	08:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B bear hill and west end

Quick Struct. Rating	5338
Quick Maint. Rating	5121
Quick Overall Rating	5428

Pipe Segment Reference: R58-11600-R58-11595

Upstream MH	Downstream MH
R58-11600	R58-11595

Length surveyed	Material	Shape	Height	Width
222.4	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	2	2	1	2	2
	2	7	14	2	2	4	2	9	18
	3	8	24	3	0	0	3	8	24
	4	0	0	4	0	0	4	0	0
	5	3	15	5	1	5	5	4	20
Continuous Defects									
Code / ID / Length									
	Subtotals	18		Subtotals	5		Subtotals	23	
SUMMARY	Pipe Rating		53	Pipe Rating		11	Overall Pipe Rating		64
	Structural Index		2.9	O&M Index		2.2	Overall Index		2.8
	Str. Quick Rating		5338	O&M Quick Rating		5122	Ovrl. Quick Rating		5438

GREEN MOUNTAIN Pipeline Services

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

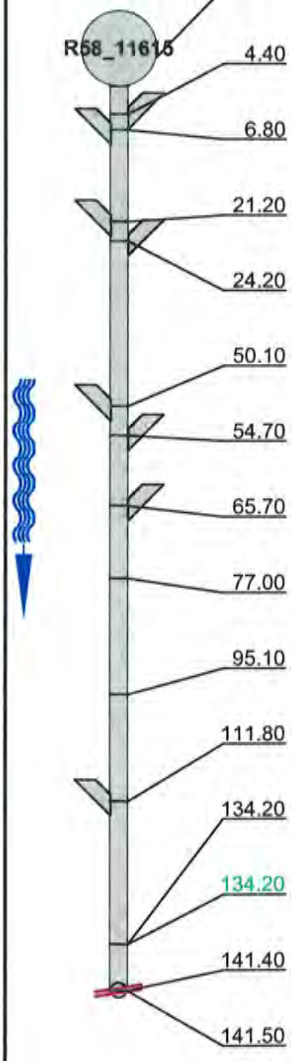
Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
6/30/2011	**Cabot & Boynton**	**Dry**	**DJA**		**3**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**6/30/2011**	**Jetting**	

Street	**Auburn Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11615**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11610**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**141.50 ft**	Section Length	**141.50 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Will Complete Inspection From Opposite Direction.**



1:360 Position	Code	Observation	Photo
0.00	AMH	Upstream Manhole, Survey Begins / MH R58_11615	
4.40	TBA	Tap Break-In Active, at 10 o'clock, 5", within 8 inches of joint: YES	
6.80	TFC	Tap Factory Made Capped, at 02 o'clock, 5", within 8 inches of joint: YES	
21.20	TFA	Tap Factory Made Active, at 02 o'clock, 5", within 8 inches of joint: YES	
24.20	TFC	Tap Factory Made Capped, at 10 o'clock, 5", within 8 inches of joint: YES	
50.10	TFC	Tap Factory Made Capped, at 02 o'clock, 5", within 8 inches of joint: YES	
54.70	TBA	Tap Break-In Active, at 10 o'clock, 5", within 8 inches of joint: YES	
65.70	TBA	Tap Break-In Active, at 11 o'clock, 5", within 8 inches of joint: YES	
77.00	MMC	Material Change, Cast Iron / 76'	
95.10	MMC	Material Change, Vitrified Clay Pipe / 95'	
111.80	TFC	Tap Factory Made Capped, at 02 o'clock, 5", within 8 inches of joint: YES	
134.20	MMC	Material Change, Polyvinyl Chloride (PVC) / 134'	
134.20	JOM	Joint Offset Medium	
141.40	TBA	Tap Break-In Active, at 12 o'clock, 4", within 8 inches of joint: NO	
141.50	MSA	Survey Abandoned / Due To Intruding Tap.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
1100	**0000**	**1**	**0**	**1**	**1**	**0**	**1**

GREEN MOUNTAIN Pipeline Services

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
6/30/2011	**Cabot & Boynton**	**Dry**	**DJA**		**4**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**6/30/2011**	**Jetting**	

Street	**Auburn Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11615**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11610**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**2.00 ft**	Section Length	**2.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Complete's Inspection. Total Length 143.5'.**

1:50	Position	Code	Observation	Photo
R58_11610	0.00	AMH	Downstream Manhole, Survey Begins / MH R58_11610	
	2.00	MSA	Survey Abandoned / Due To Offset Joint. Complete's Inspection.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	**0000**	**0**	**0**	**0**	**0**	**0**	**0**

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
6/30/2011	**Cabot & Boynton**	**Dry**	**DJA**		**8**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**6/30/2011**	**Jetting**	

Street	**Auburn Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11635**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11630**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**213.20 ft**	Section Length	**213.20 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information :

1:540 Position	Code	Observation	Photo
0.00	AMH	Upstream Manhole, Survey Begins / MH R58_11635	
16.20	TFA	Tap Factory Made Active, at 03 o'clock, 5", within 8 inches of joint: YES	
69.80	TFA	Tap Factory Made Active, at 03 o'clock, 5", within 8 inches of joint: YES	
71.80	TFC	Tap Factory Made Capped, at 09 o'clock, 5", within 8 inches of joint: YES	
111.80	TFC	Tap Factory Made Capped, at 03 o'clock, 5", within 8 inches of joint: YES	
115.10	TFA	Tap Factory Made Active, at 09 o'clock, 5", within 8 inches of joint: YES	
117.20	TBA	Tap Break-In Active, at 03 o'clock, 4", within 8 inches of joint: YES	
138.80	FM	Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES	1_1_9_A.JPG
151.10	FM	Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES	1_1_10_A.JPG
159.90	TBA	Tap Break-In Active, at 09 o'clock, 5", within 8 inches of joint: YES	
164.20	TFA	Tap Factory Made Active, at 02 o'clock, 5", within 8 inches of joint: YES	
213.20	AMH	Downstream Manhole, Survey Ends / MH R58_11630	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
4200	**0000**	**8**	**0**	**8**	**4**	**0**	**4**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Auburn Street**	**6/30/2011**		**8**

Photo: 1_1_9_A.JPG, VCR No.: Waltham TV #1
138.8FT, Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES

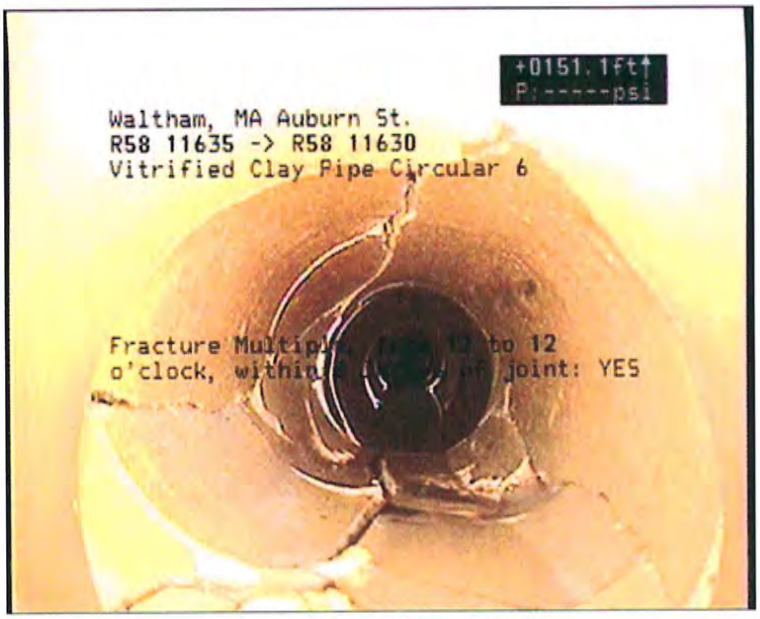

Photo: 1_1_10_A.JPG, VCR No.: Waltham TV #1
151.1FT, Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11650	R58-06625	R58-11650-R58-06625	9/5/2017	Cabot st	Not Known	10	170	170

Pipe Size: 10 Total Ln.: 170 Inspected Ln.: 170

Project Total Ln.: 170.0 Project Inspected Ln.: 170.0

Ted Berry Company
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Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R58-11650-R58-06625	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R58-11650	R58-06625

Length surveyed	Material	Shape	Height	Width
170	Not Known	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R58-11650

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-11650		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
6.4 ft.	Tap Break-in with roots		2 - 0	4	5	
8.4 ft.	General Observation lateral cutout not there		0 - 0		5	
14.2 ft.	Tap Break-in		10 - 0	4	5	
36.2 ft.	Material Change pvc		0 - 0		5	
40.0 ft.	Material Change liner		0 - 0		5	
170.0 ft.	Manhole R58-06625 Drop		0 - 0		5	

R58-06625

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11650

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 6.4 ft. Grade: 0
Condition: Tap Break-in
Remarks: with roots

Distance: 8.4 ft. Grade: 0
Condition: General Observation
Remarks: lateral cutout not there

Ted Berry Company
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Livermore Maine 04253
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Image Report 4/Page

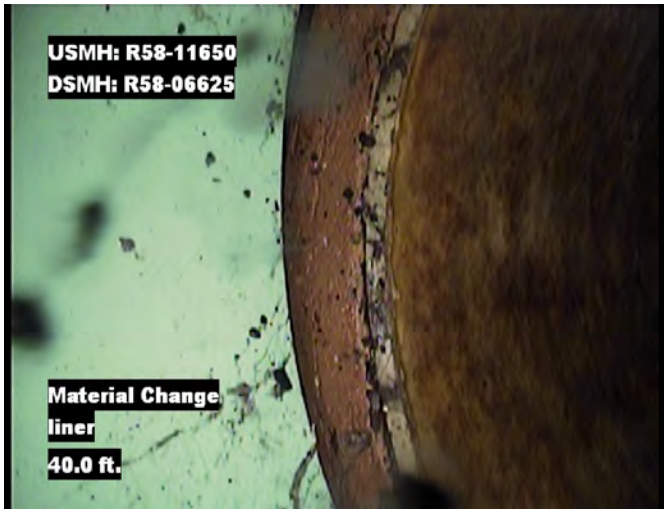
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 14.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 36.2 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 40.0 ft. Grade: 0
Condition: Material Change
Remarks: liner

Distance: 170.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-06625 Drop

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R58-11650-R58-06625	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R58-11650	R58-06625

Length surveyed	Material	Shape	Height	Width
170	Not Known	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	0		Subtotals	0	
SUMMARY	Pipe Rating		0	Pipe Rating		0	Overall Pipe Rating		0
	Structural Index		0	O&M Index		0	Overall Index		0
	Str. Quick Rating		0000	O&M Quick Rating		0000	Ovrl. Quick Rating		0000

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R58-11655	R58-11650	R58-11655-R58-11650	9/5/2017	Cabot st	Not Known	10	105.5	105.5

Pipe Size: 10 Total Ln.: 105.5 Inspected Ln.: 105.5

Project Total Ln.: 105.5 Project Inspected Ln.: 105.5

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R58-11655-R58-11650	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R58-11655	R58-11650

Length surveyed	Material	Shape	Height	Width
105.5	Not Known	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R58-11655

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R58-11655		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
25.0 ft.	Tap Break-in		9 - 0	4	5	
29.9 ft.	General Observation lateral cutout not there		0 - 0		5	
44.7 ft.	Tap Break-in		9 - 0	4	5	
69.3 ft.	Tap Break-in		3 - 0	4	5	
105.5 ft.	Manhole R58-11650		0 - 0		5	

R58-11650

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Image Report 4/Page

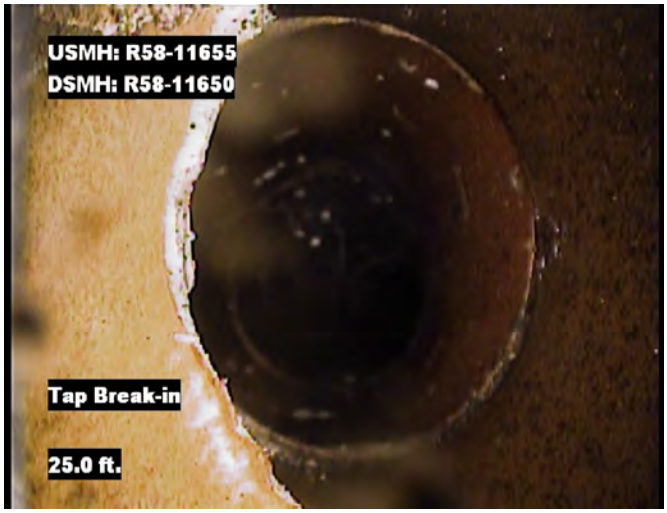
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

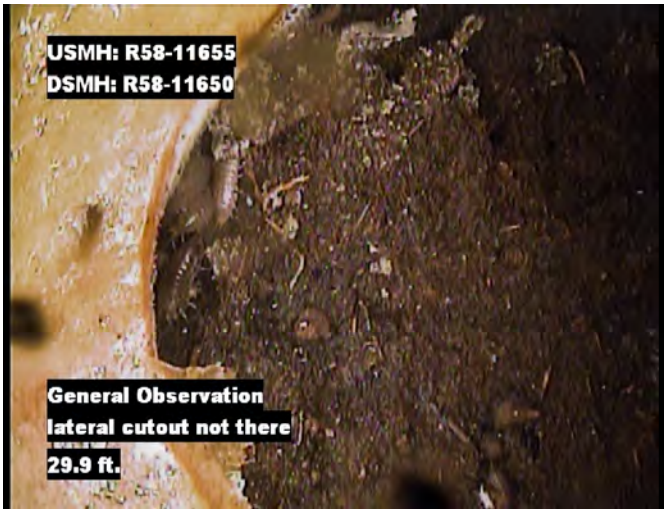
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R58-11655

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 25.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 29.9 ft. Grade: 0
Condition: General Observation
Remarks: lateral cutout not there

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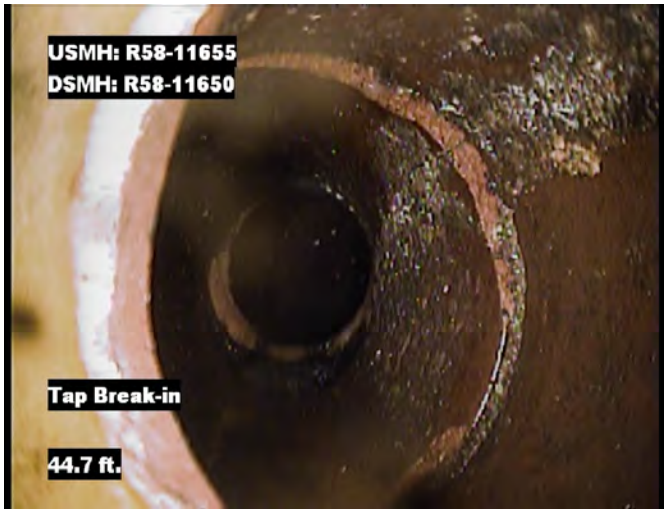
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 44.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 69.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 105.5 ft. Grade: 0
Condition: Manhole
Remarks: R58-11650

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Cabot st	20170905	14:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R58-11655-R58-11650	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	N/A	R58-11655	R58-11650

Length surveyed	Material	Shape	Height	Width
105.5	Not Known	Circular	10	10

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	0		Subtotals	0	
SUMMARY	Pipe Rating		0	Pipe Rating		0	Overall Pipe Rating		0
	Structural Index		0	O&M Index		0	Overall Index		0
	Str. Quick Rating		0000	O&M Quick Rating		0000	Ovrl. Quick Rating		0000

GREEN MOUNTAIN Pipeline Services

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**10**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Winthrop Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11665**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11660**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**128.00 ft**	Section Length	**140.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information :

1:360 Position	Code	Observation	Photo
R58_11660			
12.00	AMH	Downstream Manhole, Survey Begins / MH R58_11660	
22.50	H	Hole, from 09 to 11 o'clock, within 8 inches of joint: YES / Repair	52_53_254_A.jpg
23.60	TBA	Tap Break-In Active, at 09 o'clock, 5", within 8 inches of joint: YES	
120.60	TBI	Tap Break-In Intruding, at 03 o'clock, 4", 1", within 8 inches of joint: YES	
140.00	AMH	Upstream Manhole, Survey Ends / MH R58_11665	
R58_11665			

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
4100	**2100**	**4**	**2**	**6**	**4**	**2**	**3**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Winthrop Street**	**7/20/2011**		**10**

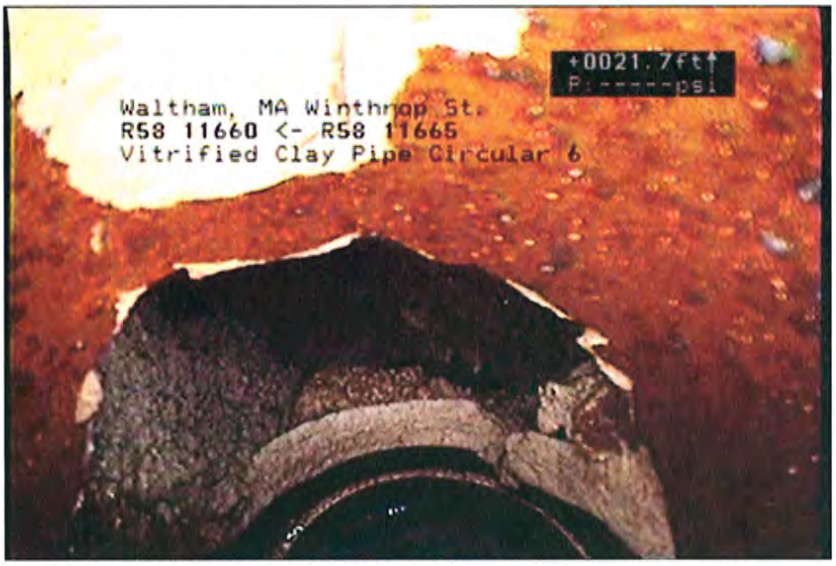

Photo: 52_53_254_A.jpg, VCR No.: Waltham TV #1
22.5FT, Hole, from 09 to 11 o'clock, within 8 inches of joint: YES

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**14**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Cabot Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11675**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11670**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**151.00 ft**	Section Length	**151.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information :

1:390 Position	Code	Observation	Photo
0.00	AMH	Upstream Manhole, Survey Begins / MH R58_11675	
2.10	FM	Fracture Multiple, from 10 to 06 o'clock, within 8 inches of joint: YES	56_57_270_A.jpg
45.00	TBA	Tap Break-In Active, at 01 o'clock, 4", within 8 inches of joint: YES	
71.90	RFJ	Roots Fine Joint, at 04 o'clock, within 8 inches of joint: YES	
86.60	TBA	Tap Break-In Active, at 02 o'clock, 5", within 8 inches of joint: YES	
90.10	RFJ	Roots Fine Joint, from 07 to 08 o'clock, within 8 inches of joint: YES	
92.20	RFJ	Roots Fine Joint, from 03 to 09 o'clock, within 8 inches of joint: YES	
96.10	RML	Roots Medium Lateral, at 12 o'clock, 40 %, within 8 inches of joint: NO	
97.20	TBA	Tap Break-In Active, at 12 o'clock, 4", within 8 inches of joint: NO	
124.80	MWLS	Water Level, Sag In Pipe, 20 % of Cross Sectional Area	
147.50	MWLS	Water Level, Sag In Pipe, 40 % of Cross Sectional Area	
147.50	FM	Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES	56_57_280_A.jpg
151.00	AMH	Downstream Manhole, Survey Ends / MH R58_11670	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
4200	**3224**	**8**	**14**	**22**	**4**	**2.33**	**2.75**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Cabot Street**	**7/20/2011**		**14**

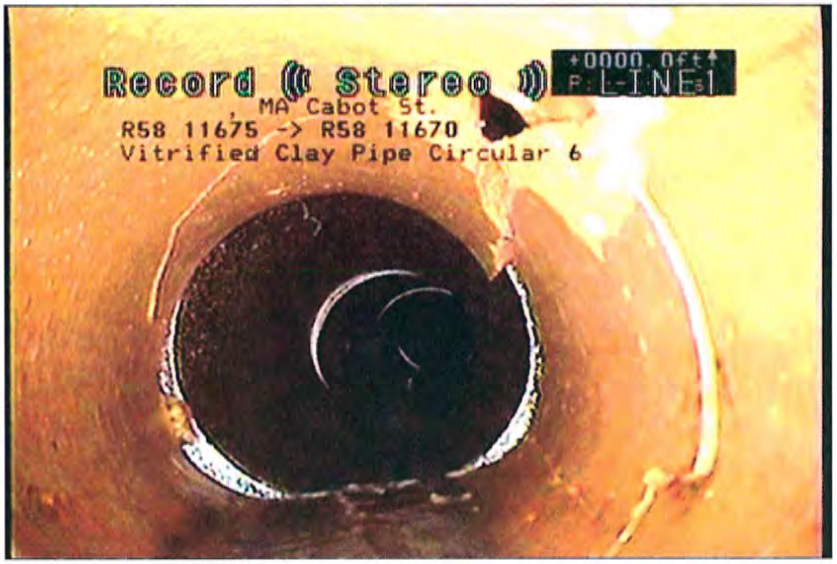

Photo: 56_57_270_A.jpg, VCR No.: Waltham TV #1
2.1FT, Fracture Multiple, from 10 to 06 o'clock, within 8 inches of joint: YES

Photo: 56_57_280_A.jpg, VCR No.: Waltham TV #1
147.5FT, Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/19/2011	**Cabot & Boynton**	**Dry**	**DJA**		**16**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/19/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R58_11695**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11690**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**17.70 ft**	Section Length	**17.70 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Will Complete Inspection From Opposite Direction.**

1:50	Position	Code	Observation	Photo
R58_11695	0.00	AMH	Upstream Manhole, Survey Begins / MH R58_11695	
	16.80	HVV	Hole Void Visible, from 12 to 06 o'clock, within 8 inches of joint: YES	35_36_187_A.JPG
	17.70	MSA	Survey Abandoned / Due To Hole In Pipe.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5100	**0000**	**5**	**0**	**5**	**5**	**0**	**5**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Boynton Street**	**7/19/2011**		**16**

Photo: 35_36_187_A.JPG, VCR No.: Waltham TV #1
16.8FT, Hole Void Visible, from 12 to 06 o'clock, within 8 inches of joint: YES

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11185	R59-11180	R59-11185-R59-11180	9/27/2017	Prospect st	Vitrified Clay Pipe	15	390	390

Pipe Size: 15 Total Ln.: 390 Inspected Ln.: 390

Project Total Ln.: 390.0 Project Inspected Ln.: 390.0

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Defect Listing Plot Left

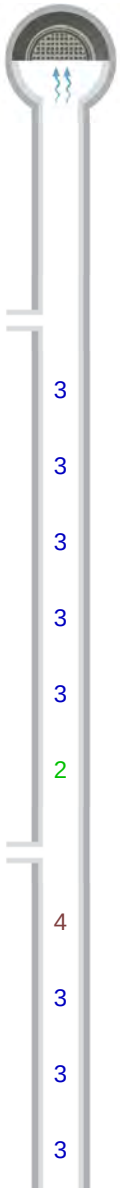
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	423A	Pipe Segment Reference		
Quick Maint. Rating	1100	R59-11185-R59-11180		
Quick Overall Rating	423A	Upstream MH	Downstream MH	
		R59-11185	R59-11180	
Length surveyed	Material	Shape	Height	Width
390	Vitrified Clay Pipe	Circular	15	15
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R59-11180

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11180		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
11.6 ft.	Tap Break-in		2 - 0	4	5	
14.9 ft. 3	Fracture Longitudinal		12 - 0		5	
22.4 ft. 3	Crack Multiple		11 - 1		5	
25.5 ft. 3	Fracture Longitudinal		12 - 0		5	
27.0 ft. 3	Fracture Longitudinal		12 - 0		5	
29.4 ft. 3	Fracture Longitudinal		12 - 0		5	
46.6 ft. 2	Crack Longitudinal		12 - 0		5	
55.3 ft.	Tap Factory Capped		2 - 0	4	5	
68.7 ft. 4	Fracture Multiple		10 - 2		5	
70.3 ft. 3	Fracture Longitudinal		12 - 0		5	
73.3 ft. 3	Fracture Longitudinal		12 - 0		5	
78.1 ft. 3	Fracture Longitudinal		9 - 0		5	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	423A	R59-11185-R59-11180	
Quick Maint. Rating	1100	Upstream MH	Downstream MH
Quick Overall Rating	423A	R59-11185	R59-11180

Length surveyed	Material	Shape	Height	Width
390	Vitrified Clay Pipe	Circular	15	15

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

	80.5 ft.	Tap Factory Active		2 - 0	4	5	
4	83.2 ft.	Fracture Multiple		12 - 2		5	
3	85.6 ft.	Fracture Longitudinal		12 - 0		5	
	105.5 ft.	Tap Break-in		2 - 0	4	5	
3	111.2 ft.	Fracture Longitudinal		12 - 0		5	
3	117.6 ft.	Fracture Longitudinal		12 - 0		5	
	129.5 ft.	Tap Factory Capped		10 - 0	4	5	
1	153.9 ft.	Roots Fine Joint		5 - 2		5	
	155.3 ft.	Tap Factory		2 - 0	4	5	
	169.0 ft.	Tap Break-in Active		9 - 0	4	5	
	181.2 ft.	Tap Factory Capped		10 - 0	4	5	
	219.5 ft.	Tap Factory		2 - 0	4	5	
	229.2 ft.	Tap Factory Capped		10 - 0	4	5	
	276.5 ft.	Tap Factory Active		12 - 0	4	5	
	297.3 ft.	Tap Factory		12 - 0	4	5	
	390.0 ft.	Manhole R59-11185		0 - 0		5	

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Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st	20170927	11:05
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Quick Struct. Rating	423A	Pipe Segment Reference		
Quick Maint. Rating	1100	R59-11185-R59-11180		
Quick Overall Rating	423A	Upstream MH	Downstream MH	
		R59-11185	R59-11180	
Length surveyed	Material	Shape	Height	Width
390	Vitrified Clay Pipe	Circular	15	15
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				

R59-11185

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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

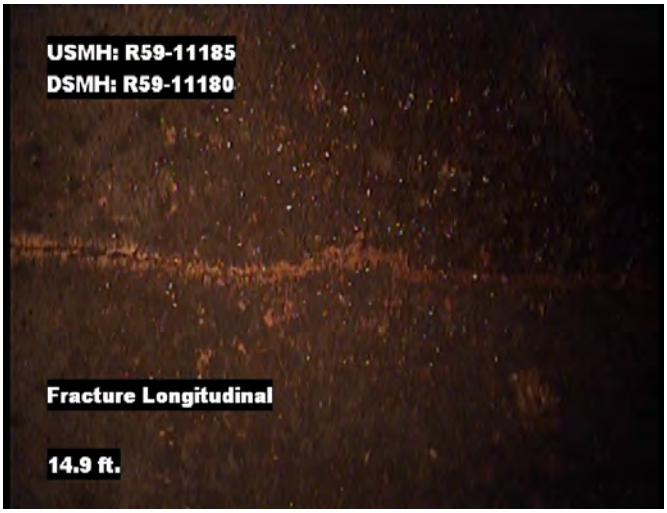
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R59-11180		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	11.6 ft.	Grade:	0
Condition:	Tap Break-in		
Remarks:	N/A		



Distance:	14.9 ft.	Grade:	3
Condition:	Fracture Longitudinal		
Remarks:	N/A		

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Image Report 4/Page

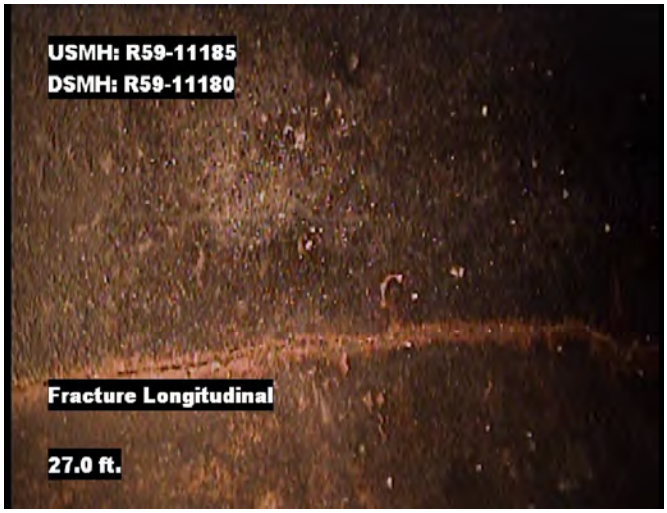
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

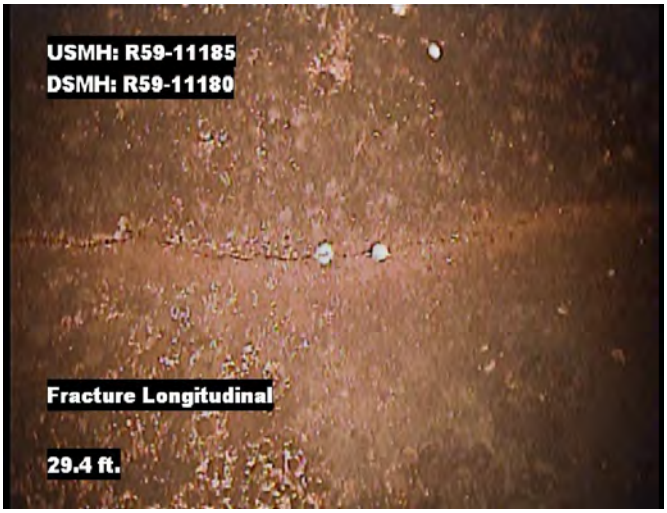
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 22.4 ft. Grade: 3
Condition: Crack Multiple
Remarks: N/A

Distance: 25.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 27.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 29.4 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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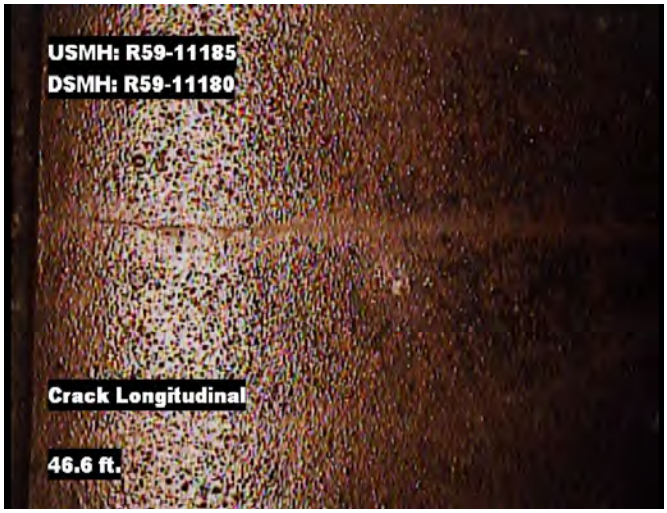
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 46.6 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 55.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 68.7 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 70.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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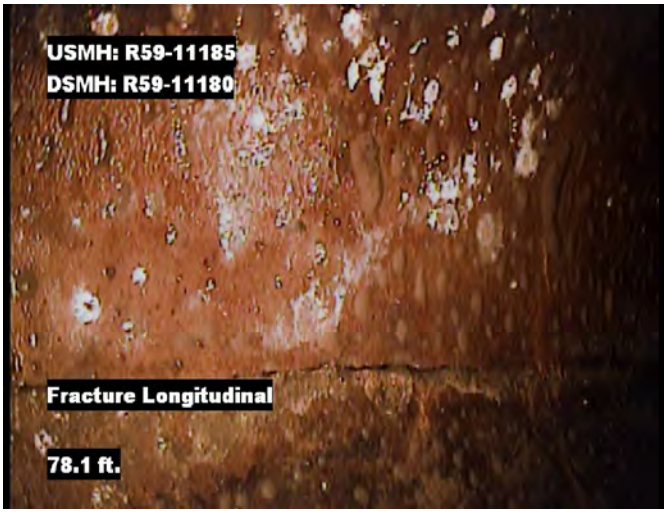
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

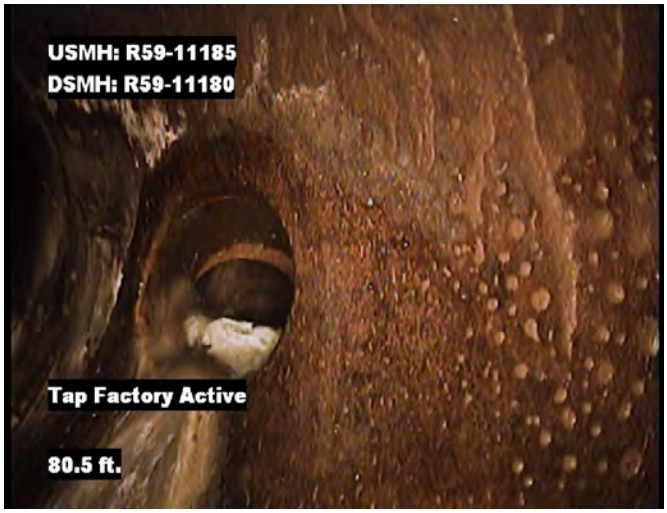
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 73.3 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 78.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 80.5 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 83.2 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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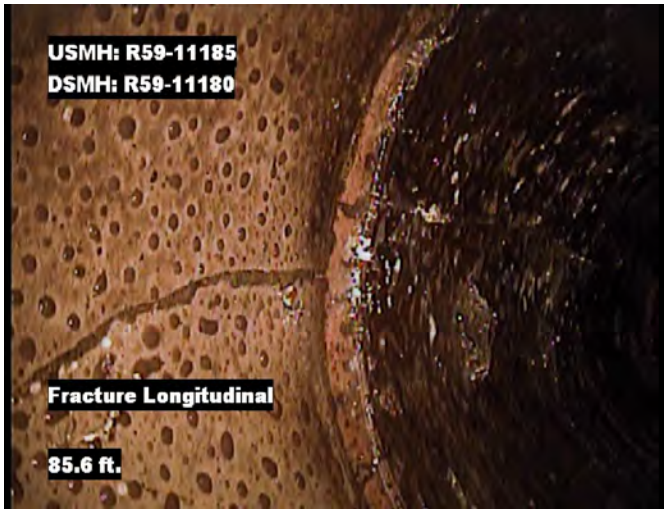
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

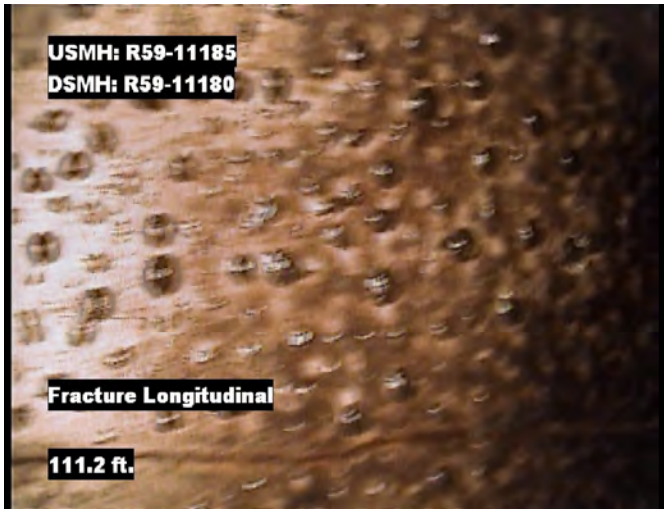
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

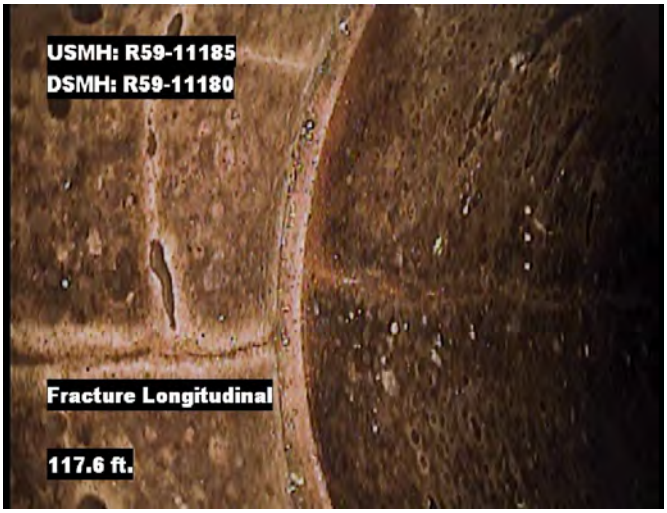


Distance: 85.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 105.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 111.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 117.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

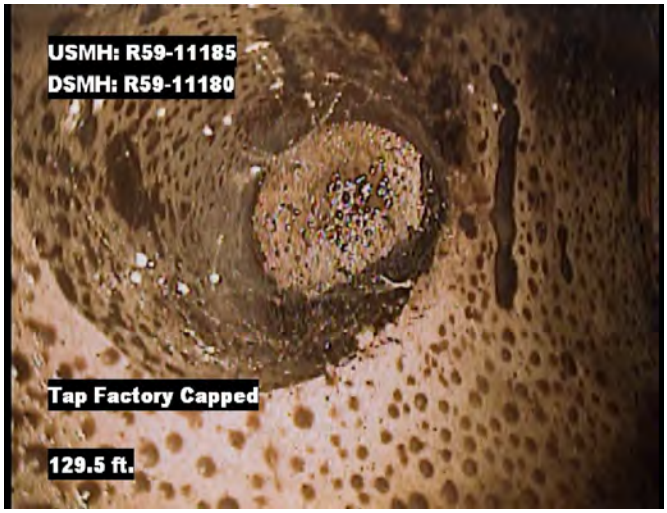
Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

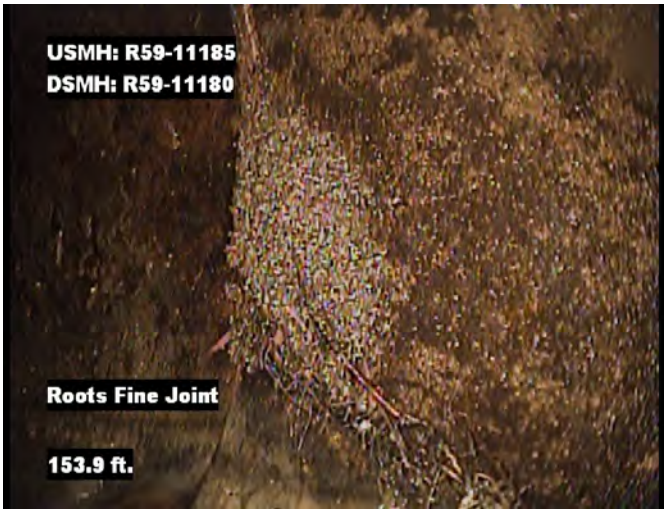
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 129.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 153.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 155.3 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 169.0 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

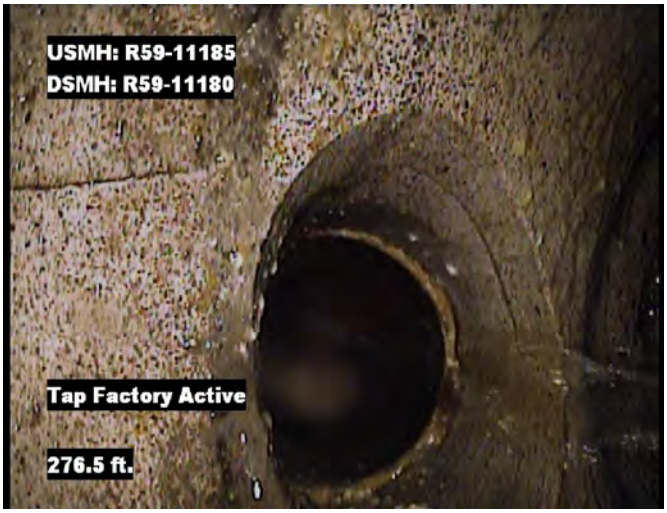
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 181.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 219.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 229.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 276.5 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 297.3 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 390.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11185

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170927	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	423A	Pipe Segment Reference		
Quick Maint. Rating	1100	R59-11185-R59-11180		
Quick Overall Rating	423A	Upstream MH	Downstream MH	
		R59-11185	R59-11180	

Length surveyed	Material	Shape	Height	Width
390	Vitrified Clay Pipe	Circular	15	15

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	1	2	2	0	0	2	1	2
	3	11	33	3	0	0	3	11	33
	4	2	8	4	0	0	4	2	8
	5	0	0	5	0	0	5	0	0

Continuous Defects

Code	ID	Length

	Subtotals	14		Subtotals	1		Subtotals	15	
SUMMARY	Pipe Rating		43	Pipe Rating		1	Overall Pipe Rating		44
	Structural Index		3.1	O&M Index		1.0	Overall Index		2.9
	Str. Quick Rating		423A	O&M Quick Rating		1100	Ovrl. Quick Rating		423A

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11190	R59-11185	R59-11190-R59-11185	9/6/2017	Prospect st	Vitrified Clay Pipe	8	227	223.4

Pipe Size: 8 Total Ln.: 227 Inspected Ln.: 223.4

Project Total Ln.: 227.0 Project Inspected Ln.: 223.4

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	4100	R59-11190-R59-11185	
Quick Maint. Rating	2100	Upstream MH	Downstream MH
Quick Overall Rating	4121	R59-11190	R59-11185

Length surveyed	Material	Shape	Height	Width
223.4	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R59-11190

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11190		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
1.0 ft.	Fracture Multiple		5 - 8		5	
4						
28.0 ft.	Tap Factory Capped		9 - 0	4	5	
48.5 ft.	Tap Factory Capped		3 - 0	4	5	
50.5 ft.	Tap Factory		10 - 0	4	5	
71.2 ft.	Tap Break-in		12 - 0	4	5	
73.1 ft.	Tap Factory Capped		9 - 0	4	5	
97.7 ft.	Tap Factory Capped		3 - 0	4	5	
118.3 ft.	Tap Factory Capped		9 - 0	4	5	
140.8 ft.	Tap Factory		3 - 0	4	5	
161.3 ft.	Tap Factory Capped		9 - 0	4	5	
186.0 ft.	Tap Factory Capped		3 - 0	4	5	
204.5 ft.	Obstacle Rocks		6 - 0		5	
2						

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	2100	R59-11190-R59-11185		
Quick Overall Rating	4121	Upstream MH	Downstream MH	
		R59-11190	R59-11185	
Length surveyed	Material	Shape	Height	Width
223.4	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

223.4 ft.	Survey Abandoned		0 - 0		5	
	needs further cleaning rocks					

Ted Berry Company
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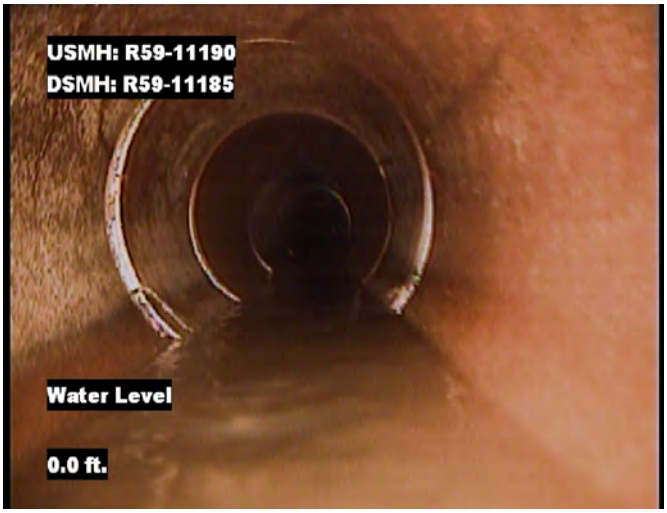
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

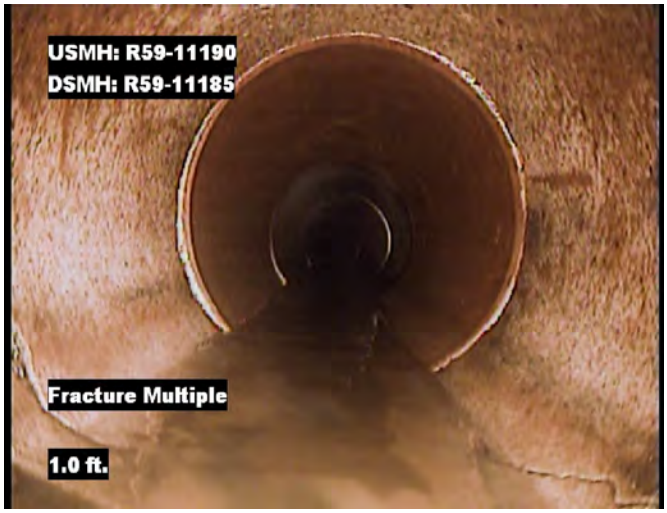
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11190



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 1.0 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 28.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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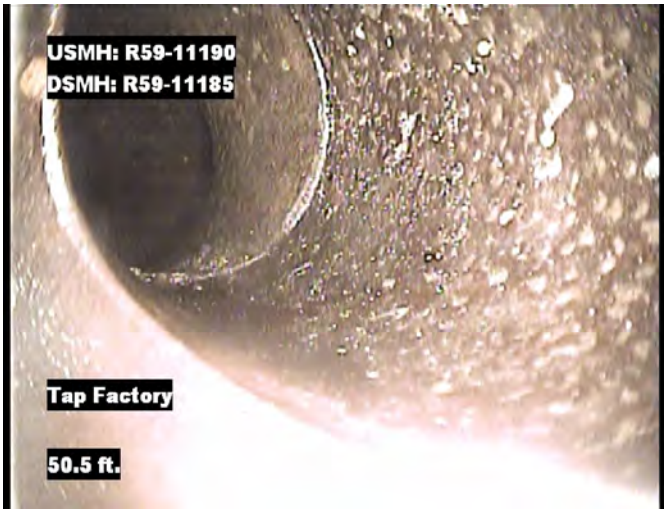
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

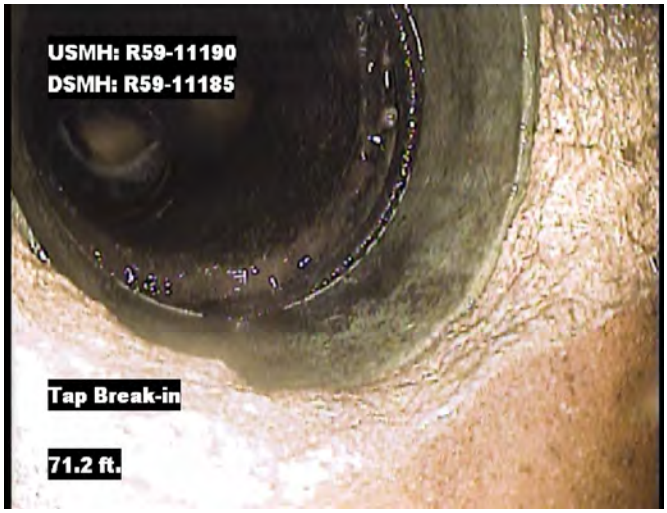
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 48.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 50.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 71.2 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 73.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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Image Report 4/Page

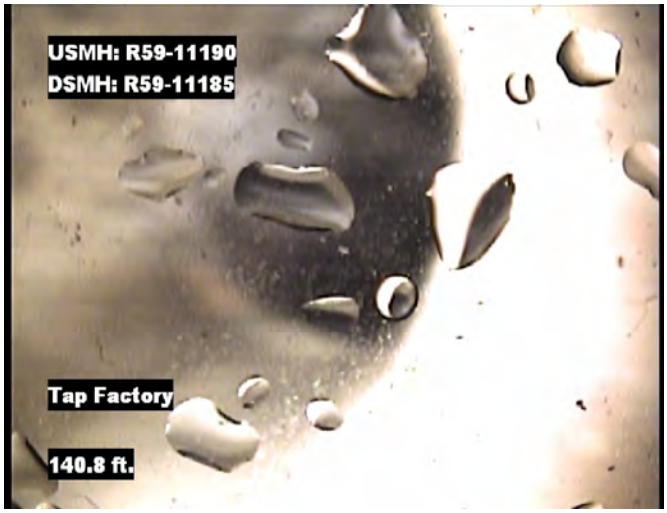
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

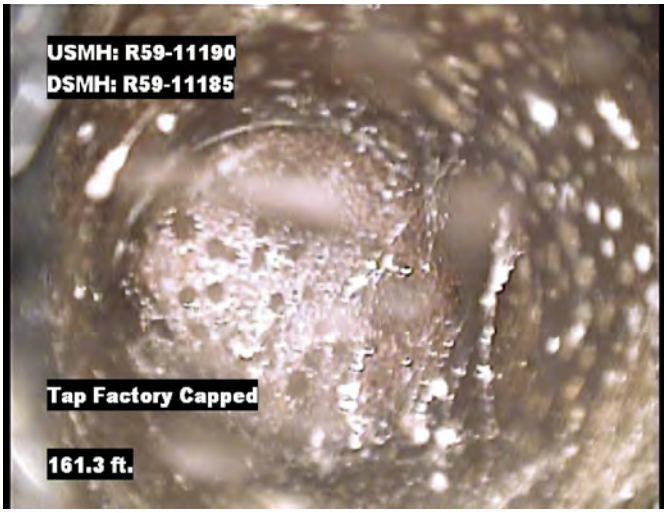
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 97.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 118.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 140.8 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 161.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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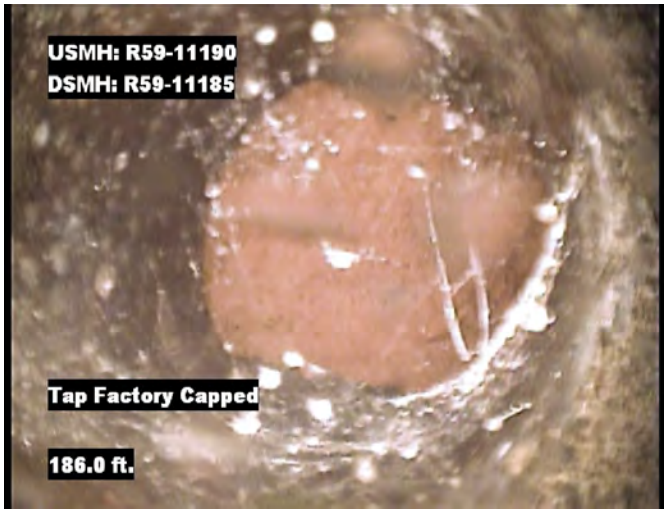
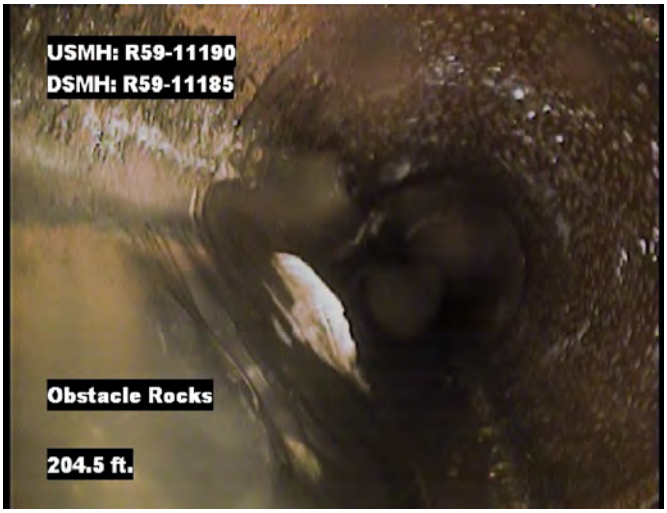
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

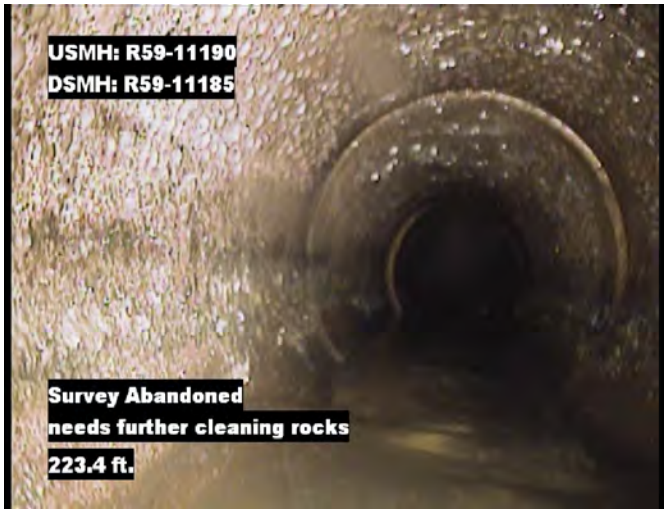
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 186.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 204.5 ft. Grade: 2
Condition: Obstacle Rocks
Remarks: N/A



Distance: 223.4 ft. Grade: 0
Condition: Survey Abandoned
Remarks: needs further cleaning rocks

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170906	10:40

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	2100	R59-11190-R59-11185		
Quick Overall Rating	4121	Upstream MH	Downstream MH	
		R59-11190	R59-11185	
Length surveyed	Material	Shape	Height	Width
223.4	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	1	2	2	1	2
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	1		Subtotals	2	
SUMMARY	Pipe Rating		4	Pipe Rating		2	Overall Pipe Rating		6
	Structural Index		4.0	O&M Index		2.0	Overall Index		3.0
	Str. Quick Rating		4100	O&M Quick Rating		2100	Ovrl. Quick Rating		4121

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11190	R59-11185	R59-11190-R59-11185	9/28/2017	Prospect st	Vitrified Clay Pipe	8	227	227

Pipe Size: 8 Total Ln.: 227 Inspected Ln.: 227

Project Total Ln.: 227.0 Project Inspected Ln.: 227.0

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:08

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R59-11190-R59-11185		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R59-11190	R59-11185	

Length surveyed	Material	Shape	Height	Width
227	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R59-11190

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11190		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
2.0 ft.	Fracture Longitudinal		7 - 0		5	
28.3 ft.	Tap Factory Capped		9 - 0	4	5	
48.7 ft.	Tap Factory Capped		2 - 0	4	5	
50.7 ft.	Tap Factory		10 - 0	4	5	
71.3 ft.	Tap Break-in Active		12 - 0	4	5	
73.4 ft.	Tap Factory Capped		10 - 0	4	5	
97.7 ft.	Tap Factory Capped		2 - 0	4	5	
118.5 ft.	Tap Factory Capped		10 - 0	4	5	
140.9 ft.	Tap Factory Active		3 - 0	4	5	
161.5 ft.	Tap Factory Capped		10 - 0	4	5	
186.1 ft.	Tap Factory Capped		3 - 0	4	5	
227.0 ft.	Manhole R59-11185 drop		0 - 0		5	

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:08

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	3100	R59-11190-R59-11185	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	3100	R59-11190	R59-11185

Length surveyed	Material	Shape	Height	Width
227	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R59-11185

Ted Berry Company
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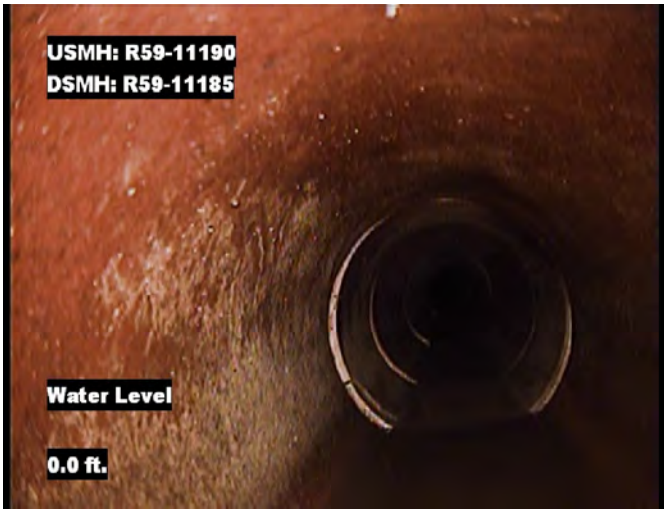
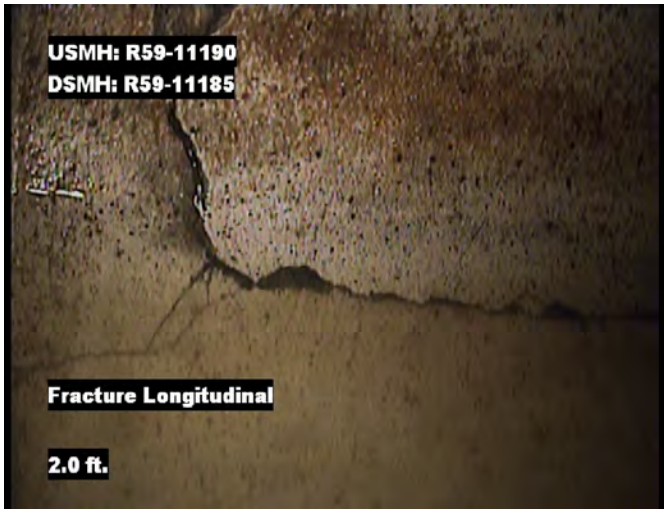
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st	20170928	09:08
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11190



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 2.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 28.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:08

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 48.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 50.7 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 71.3 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 73.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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Livermore Maine 04253
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Image Report 4/Page

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st	20170928	09:08
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Distance: 97.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 118.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 140.9 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 161.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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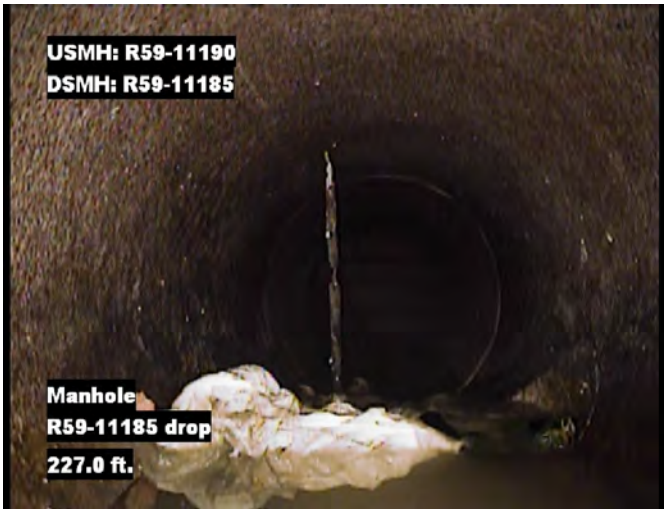
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:08

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 186.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 227.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11185 drop

Ted Berry Company
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Livermore Maine 04253
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:08

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	3100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R59-11190-R59-11185		
Quick Overall Rating	3100	Upstream MH	Downstream MH	
		R59-11190	R59-11185	

Length surveyed	Material	Shape	Height	Width
227	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		3	Pipe Rating		0	Overall Pipe Rating		3
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		3100	O&M Quick Rating		0000	Ovrl. Quick Rating		3100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11195	R59-11190	R59-11195-R59-11190	9/28/2017	Prospect st	Vitrified Clay Pipe	6	0	209.2

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 209.2

Project Total Ln.: 0.0 Project Inspected Ln.: 209.2

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	3125	R59-11195-R59-11190	
Quick Maint. Rating	3121	Upstream MH	Downstream MH
Quick Overall Rating	3226	R59-11195	R59-11190

Length surveyed	Material	Shape	Height	Width
209.2	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R59-11190

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11190		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
0.6 ft.	Fracture Circumferential		7 - 5		5	
4.8 ft.	Fracture Circumferential		7 - 11		5	
7.0 ft.	Water Level Sag		0 - 0		5	
10.0 ft.	Deposits Attached Grease		12 - 0		5	
10.7 ft.	Tap Factory Capped		3 - 0	4	5	
13.6 ft.	Deposits Attached Grease		9 - 3		20	
13.8 ft.	Water Level Sag		0 - 0		5	
25.0 ft.	Tap Factory Capped		10 - 0	4	5	
34.9 ft.	Tap Factory Capped		2 - 0	4	5	
48.7 ft.	Tap Factory Capped		10 - 0	4	5	
52.9 ft.	Tap Factory Capped		3 - 0	4	5	
84.3 ft.	Tap Factory		10 - 0	4	5	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	3125	R59-11195-R59-11190	
Quick Maint. Rating	3121	Upstream MH	Downstream MH
Quick Overall Rating	3226	R59-11195	R59-11190

Length surveyed	Material	Shape	Height	Width
209.2	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

	100.5 ft.	Tap Factory Capped		3 - 0	4	5	
	123.8 ft.	Tap Factory Active		9 - 0	4	5	
2	127.8 ft.	Water Level Sag		0 - 0		5	
3	131.5 ft.	Fracture Longitudinal		12 - 0		5	
	131.5 ft.	Tap Break-in		12 - 0	4	5	
	142.4 ft.	Tap Factory Capped		9 - 0	4	5	
	151.2 ft.	Tap Factory		9 - 0	4	5	
	159.9 ft.	Tap Factory Capped		3 - 0	4	5	
	177.6 ft.	Tap Break-in Active		12 - 0	4	5	
	193.9 ft.	Material Change		0 - 0		5	
		pvc					
	195.2 ft.	General Observation		0 - 0		5	
		lens dirty due to sags in line pulled back and cleaned 3x					
	199.5 ft.	Tap Factory Capped		3 - 0	4	5	
	209.2 ft.	Water Level		0 - 0		100	
	209.2 ft.	Survey Abandoned		0 - 0		0	
		unable to navigate					

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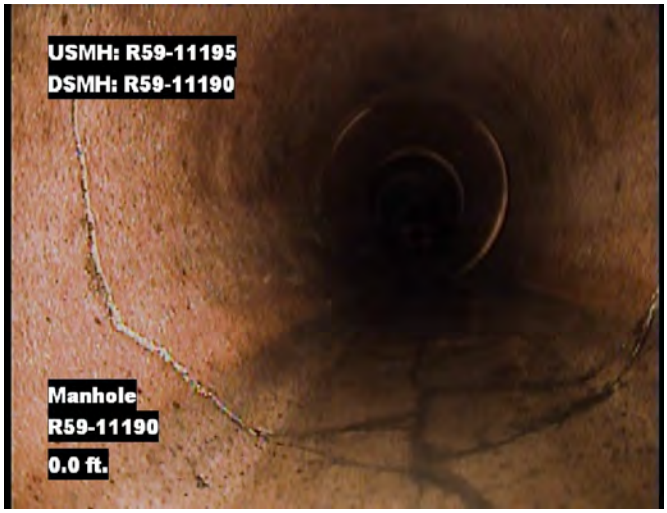
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

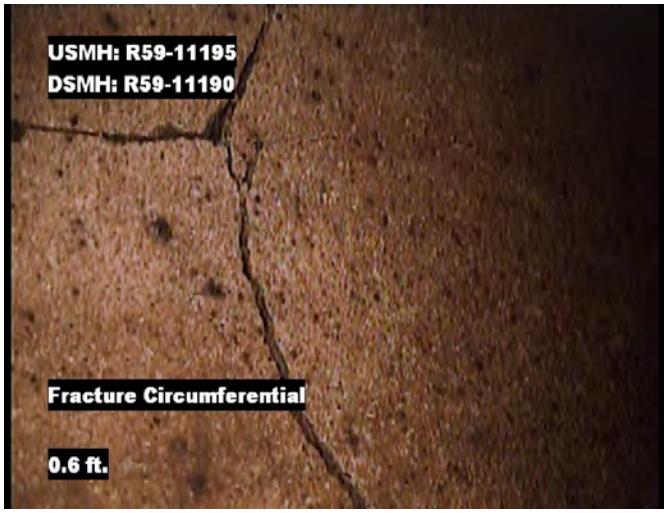
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11190

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 0.6 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 4.8 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

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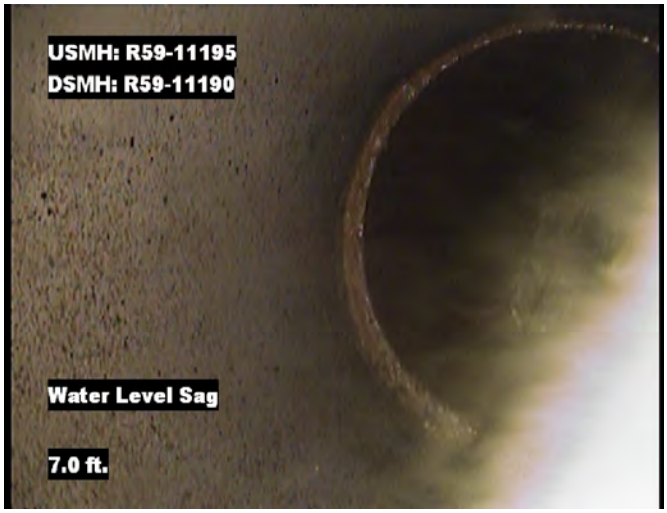
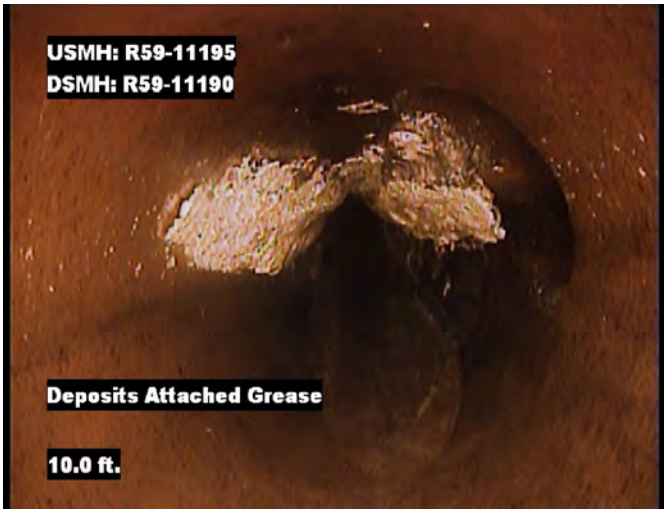
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 7.0 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A



Distance: 10.0 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 10.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 13.6 ft. Grade: 3
Condition: Deposits Attached Grease
Remarks: N/A

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st	20170928	09:41
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear hill and west valley		

Distance: 13.8 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 25.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 34.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 48.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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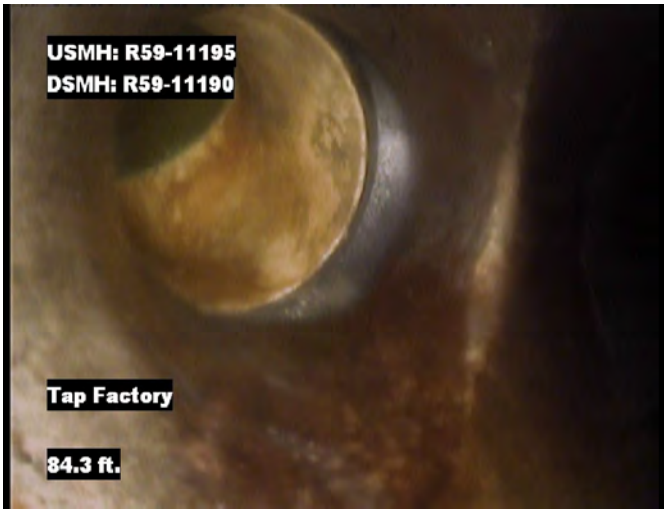
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 52.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 84.3 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 100.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 123.8 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

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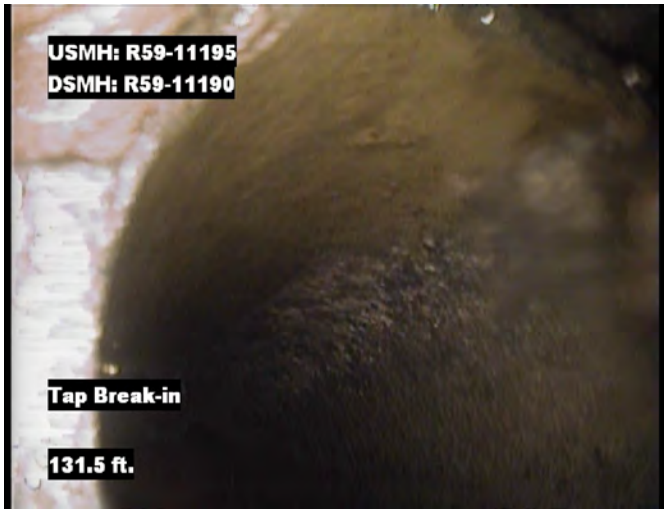
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 127.8 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 131.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 131.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 142.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

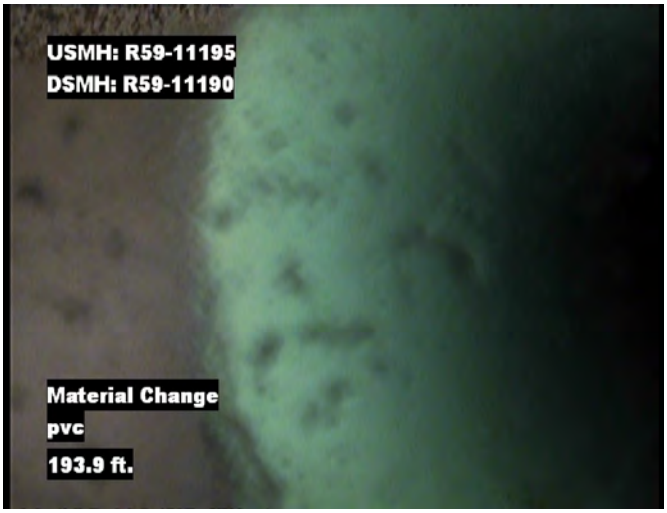
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 151.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 159.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 177.6 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A



Distance: 193.9 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Ted Berry Company
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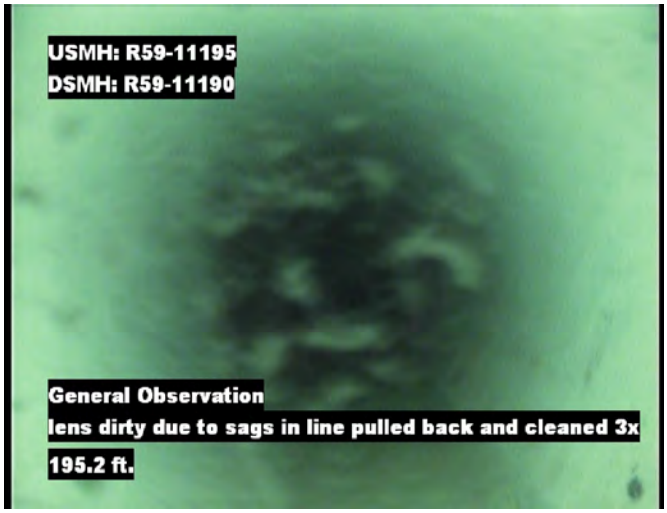
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

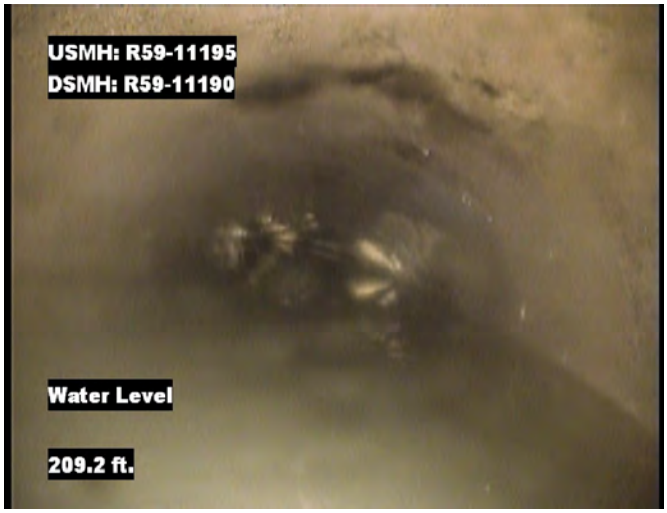
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

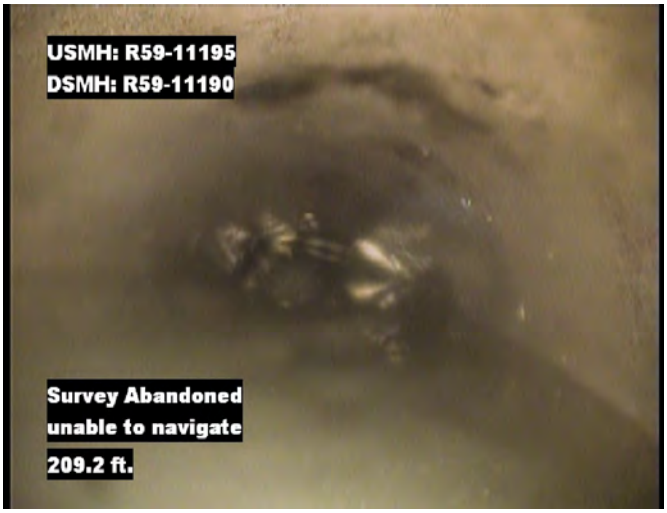


Distance: 195.2 ft. Grade: 0
Condition: General Observation
Remarks: lens dirty due to sags in line pulled back and cleaned 3x

Distance: 199.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 209.2 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 209.2 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	09:41

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	3125	Pipe Segment Reference		
Quick Maint. Rating	3121	R59-11195-R59-11190		
Quick Overall Rating	3226	Upstream MH	Downstream MH	
		R59-11195	R59-11190	

Length surveyed	Material	Shape	Height	Width
209.2	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	5	10	2	4	8	2	9	18
	3	1	3	3	1	3	3	2	6
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	6		Subtotals	5		Subtotals	11	
SUMMARY	Pipe Rating		13	Pipe Rating		11	Overall Pipe Rating		24
	Structural Index		2.2	O&M Index		2.2	Overall Index		2.2
	Str. Quick Rating		3125	O&M Quick Rating		3124	Ovrl. Quick Rating		3229

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11195	R59-11190	R59-11195-R59-11190	9/28/2017	Prospect st	Vitrified Clay Pipe	6	0	34.1

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 34.1

Project Total Ln.: 0.0 Project Inspected Ln.: 34.1

Ted Berry Company
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Defect Listing Plot Left

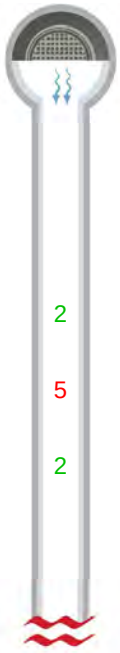
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:57

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear hill and west valley

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R59-11195-R59-11190		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R59-11195	R59-11190	
Length surveyed	Material	Shape	Height	Width
34.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R59-11195

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R59-11195					
0.0 ft.	Water Level		0 - 0		5	
12.0 ft.	Obstacle Other		6 - 0		5	
	piece of broken pipe					
34.1 ft.	Hole Soil Visible		9 - 3		0	
34.1 ft.	Joint Offset Large		0 - 0		5	
34.1 ft.	Survey Abandoned		0 - 0		5	
	reversal complete					

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:57

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear hill and west valley

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R59-11195		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	12.0 ft.	Grade:	2
Condition:	Obstacle Other		
Remarks:	piece of broken pipe		

Distance:	34.1 ft.	Grade:	5
Condition:	Hole Soil Visible		
Remarks:	N/A		

Ted Berry Company
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207-897-3348

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st	20170928	11:57
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Reversal			1314B Bear hill and west valley		

Distance: 34.1 ft. Grade: 2
Condition: Joint Offset Large
Remarks: N/A

Distance: 34.1 ft. Grade: 0
Condition: Survey Abandoned
Remarks: reversal complete

Ted Berry Company
521 Federal Rd
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:57

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear hill and west valley

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2100	R59-11195-R59-11190		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R59-11195	R59-11190	
Length surveyed	Material	Shape	Height	Width
34.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	1	2	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	1		Subtotals	3	
SUMMARY	Pipe Rating		7	Pipe Rating		2	Overall Pipe Rating		9
	Structural Index		3.5	O&M Index		2.0	Overall Index		3.0
	Str. Quick Rating		5121	O&M Quick Rating		2100	Ovrl. Quick Rating		5122

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11195A	R59-11195	R59-11195A-R59-11195	9/28/2017	Prospect st	Vitrified Clay Pipe	6	134.9	134.9

Pipe Size: 6 Total Ln.: 134.9 Inspected Ln.: 134.9

Project Total Ln.: 134.9 Project Inspected Ln.: 134.9

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

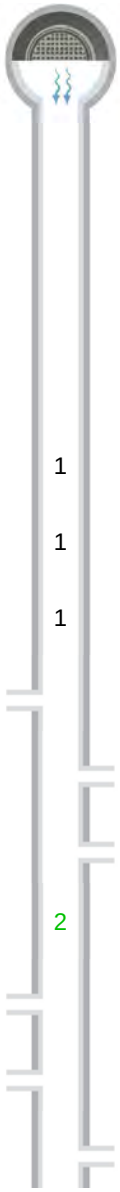
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	N/A	R59-11195A-R59-11195	
Quick Maint. Rating	2313	Upstream MH	Downstream MH
Quick Overall Rating	2313	R59-11195A	R59-11195

Length surveyed	Material	Shape	Height	Width
134.9	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R59-11195A

		Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
	0.0 ft.	Manhole R59-11195A		0 - 0		0	
	0.0 ft.	Water Level		0 - 0		5	
	0.0 ft.	Material Change PVC Stub		0 - 0		0	
	1.8 ft.	Material Change VCP		0 - 0		0	
1	3.9 ft.	Roots Fine Joint		8 - 12		5	
1	17.5 ft.	Roots Fine Joint		5 - 12		5	
1	27.4 ft.	Roots Fine Joint		4 - 12		5	
	34.3 ft.	Tap Factory Capped		3 - 0	4	5	
	36.2 ft.	Tap Factory Capped		9 - 0	4	5	
	54.0 ft.	Tap Factory		9 - 0	4	5	
2	79.0 ft.	Deposits Attached Grease		12 - 0		5	
	85.7 ft.	Tap Factory Capped		3 - 0	4	5	
	88.3 ft.	Tap Break-in		3 - 0	4	5	
	109.3 ft.	Tap Factory Capped		9 - 0	4	5	

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	2313	R59-11195A-R59-11195		
Quick Overall Rating	2313	Upstream MH	Downstream MH	
		R59-11195A	R59-11195	
Length surveyed	Material	Shape	Height	Width
134.9	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

2	128.1 ft.	Deposits Attached Grease		11 - 1		5
2	130.3 ft.	Deposits Attached Grease		10 - 2		5
	134.9 ft.	Manhole		0 - 0		5
		R59-11195				

R59-11195

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

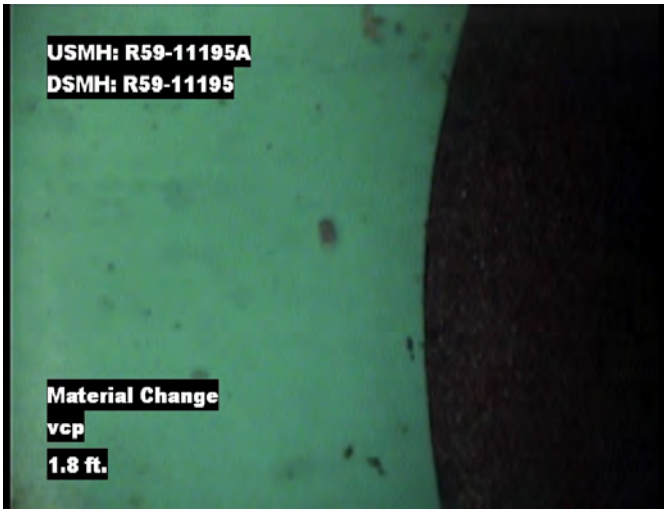
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11195A

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.0 ft. Grade: 0
Condition: Material Change
Remarks: PVC Stub



Distance: 1.8 ft. Grade: 0
Condition: Material Change
Remarks: VCP

Ted Berry Company
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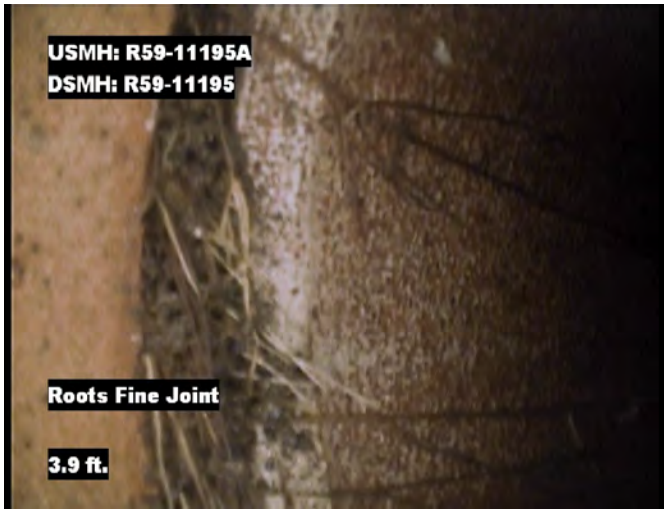
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 3.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 17.5 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 27.4 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 34.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 36.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 54.0 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 79.0 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 85.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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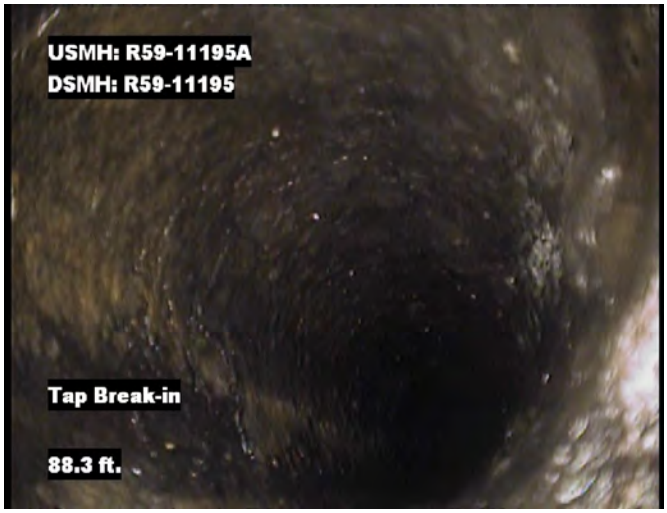
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

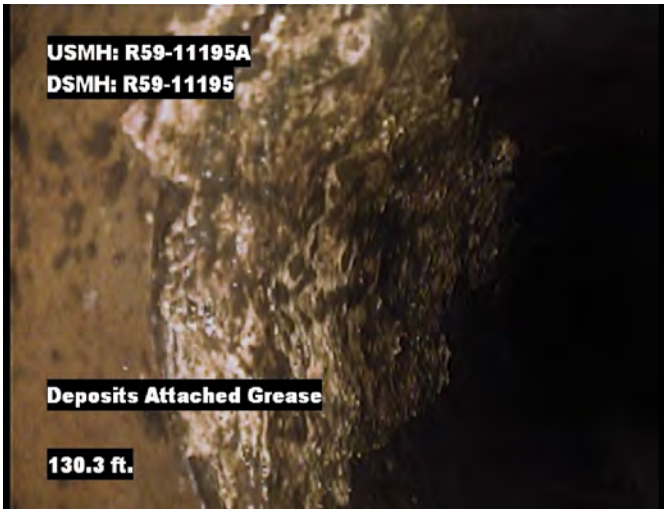
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 88.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 109.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 128.1 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A



Distance: 130.3 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Ted Berry Company
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Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance:	134.9 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R59-11195		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st	20170928	11:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	2313	R59-11195A-R59-11195		
Quick Overall Rating	2313	Upstream MH	Downstream MH	
		R59-11195A	R59-11195	
Length surveyed	Material	Shape	Height	Width
134.9	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	3	3	1	3	3
	2	0	0	2	3	6	2	3	6
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0

Continuous Defects

Code	ID	Length

	Subtotals	0		Subtotals	6		Subtotals	6	
SUMMARY	Pipe Rating		0	Pipe Rating		9	Overall Pipe Rating		9
	Structural Index		0	O&M Index		1.5	Overall Index		1.5
	Str. Quick Rating		0000	O&M Quick Rating		2313	Ovrl. Quick Rating		2313

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11215	R59-11190	R59-11215-R59-11190	9/6/2017	Prospect st ave	Vitrified Clay Pipe	6	196.8	55.1

Pipe Size: 6 Total Ln.: 196.8 Inspected Ln.: 55.1

Project Total Ln.: 196.8 Project Inspected Ln.: 55.1

Ted Berry Company
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Defect Listing Plot Left

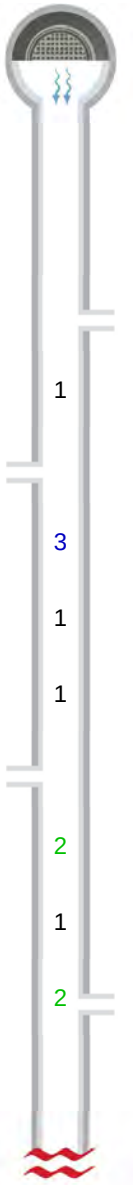
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	09:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	2100	Pipe Segment Reference		
Quick Maint. Rating	3121	R59-11215-R59-11190		
Quick Overall Rating	3122	Upstream MH	Downstream MH	
		R59-11215	R59-11190	
Length surveyed	Material	Shape	Height	Width
55.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R59-11215

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R59-11215					
0.0 ft.	Water Level		0 - 0		5	
4.5 ft.	Tap Factory Capped		9 - 0	4	5	
1						
6.3 ft.	Roots Fine Joint		10 - 2		5	
7.4 ft.	Tap Factory		3 - 0	4	5	
3						
7.4 ft.	Roots Medium Joint		10 - 1		5	
27.6 ft.	Roots Fine Joint		10 - 0		5	
1						
32.1 ft.	Roots Fine Joint		1 - 0		5	
1						
35.0 ft.	Tap Factory Capped		3 - 0	4	5	
35.9 ft.	Crack Longitudinal		10 - 0		5	
2						
39.4 ft.	Roots Fine Joint		9 - 0		5	
1						
54.0 ft.	Tap Break-in Intruding		12 - 0	4 / 2	5	
2						
55.1 ft.	Survey Abandoned		0 - 0		5	
	cant navigate under intruding service					

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	09:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11215

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 4.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 6.3 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	09:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 7.4 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 7.4 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 27.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 32.1 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	09:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 35.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 35.9 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 39.4 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 54.0 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A

Ted Berry Company
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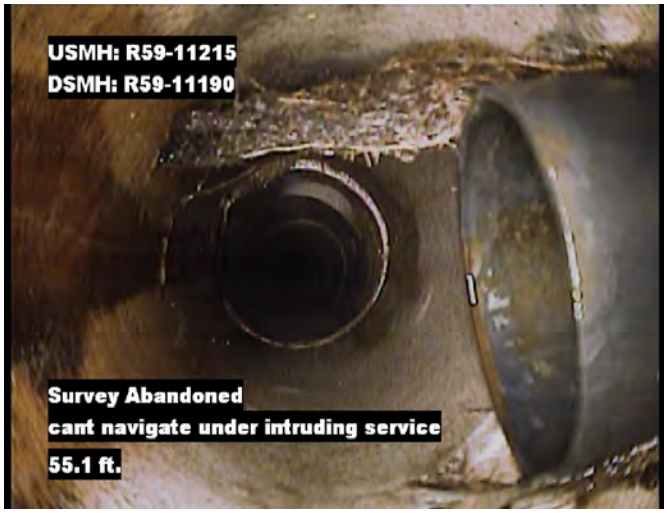
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st ave	20170906	09:56
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill valley and west end		



Distance: 55.1 ft. Grade: 0
Condition: Survey Abandoned
Remarks: cant navigate under intruding service

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	09:56

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	2100	Pipe Segment Reference		
Quick Maint. Rating	3121	R59-11215-R59-11190		
Quick Overall Rating	3122	Upstream MH	Downstream MH	
		R59-11215	R59-11190	
Length surveyed	Material	Shape	Height	Width
55.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	4	4	1	4	4
	2	1	2	2	1	2	2	2	4
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	6		Subtotals	7	
SUMMARY	Pipe Rating		2	Pipe Rating		9	Overall Pipe Rating		11
	Structural Index		2.0	O&M Index		1.5	Overall Index		1.6
	Str. Quick Rating		2100	O&M Quick Rating		3121	Ovrl. Quick Rating		3122

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11215	R59-11190	R59-11215-R59-11190	9/6/2017	Prospect st ave	Vitrified Clay Pipe	6	196.8	141.7

Pipe Size: 6 Total Ln.: 196.8 Inspected Ln.: 141.7

Project Total Ln.: 196.8 Project Inspected Ln.: 141.7

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	10:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

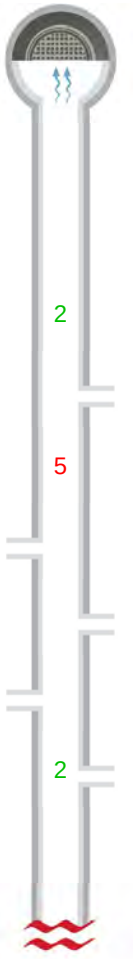
Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	2200	R59-11215-R59-11190		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R59-11215	R59-11190	

Length surveyed	Material	Shape	Height	Width
141.7	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R59-11190

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R59-11190					
0.0 ft.	Water Level		0 - 0		5	
37.7 ft.	Deposits Settled Gravel		6 - 0		5	
87.9 ft.	Tap Factory		9 - 0	4	5	
93.1 ft.	Broken Pipe		8 - 12		5	
93.7 ft.	Tap Factory Active		3 - 0	4	5	
109.8 ft.	Tap Factory Capped		9 - 0	4	5	
139.5 ft.	Tap Factory Capped		3 - 0	4	5	
141.0 ft.	Tap Break-in Intruding		12 - 0	4 / 2	5	
141.7 ft.	Survey Abandoned		0 - 0		5	
	reversal complete					

Ted Berry Company
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Livermore Maine 04253
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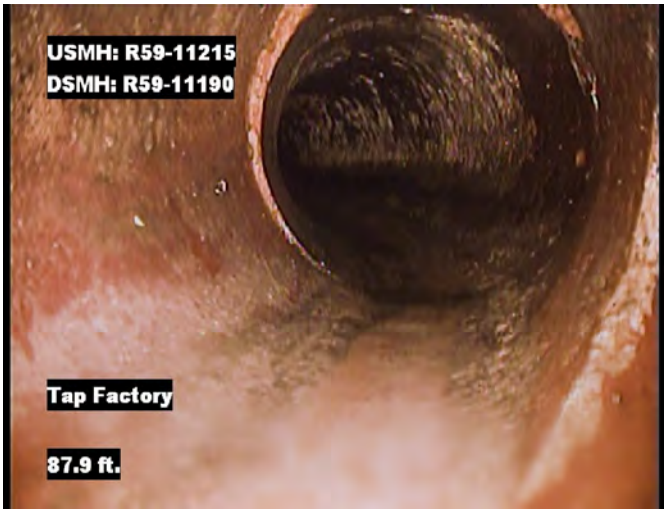
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st ave	20170906	10:28
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Reversal			1314B Bear Hill valley and west end		

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11190

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 37.7 ft. Grade: 2
Condition: Deposits Settled Gravel
Remarks: N/A



Distance: 87.9 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Ted Berry Company
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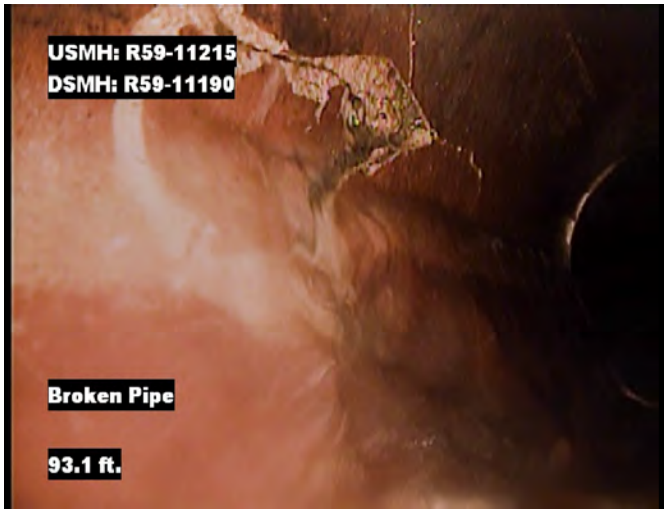
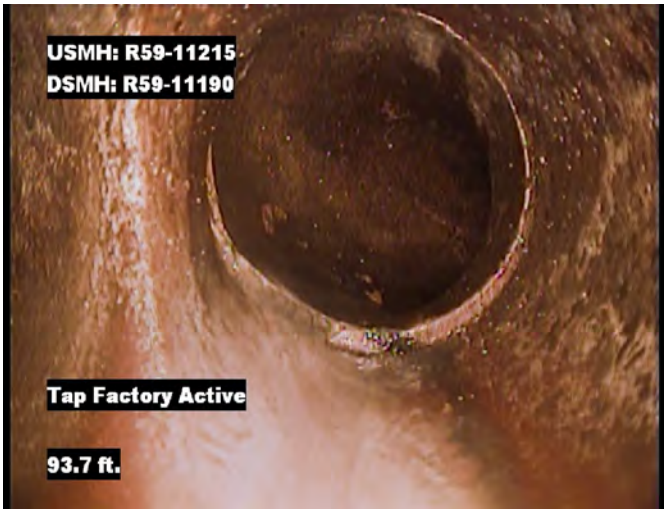
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Prospect st ave	20170906	10:28
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Reversal			1314B Bear Hill valley and west end		

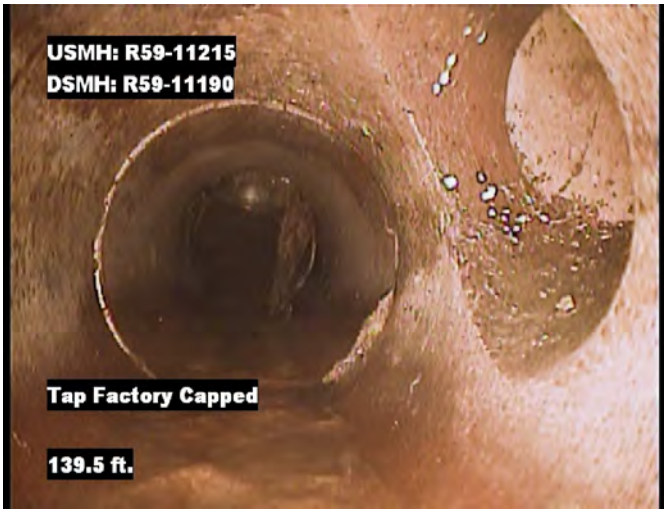


Distance: 93.1 ft. Grade: 5
Condition: Broken Pipe
Remarks: N/A



Distance: 93.7 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 109.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 139.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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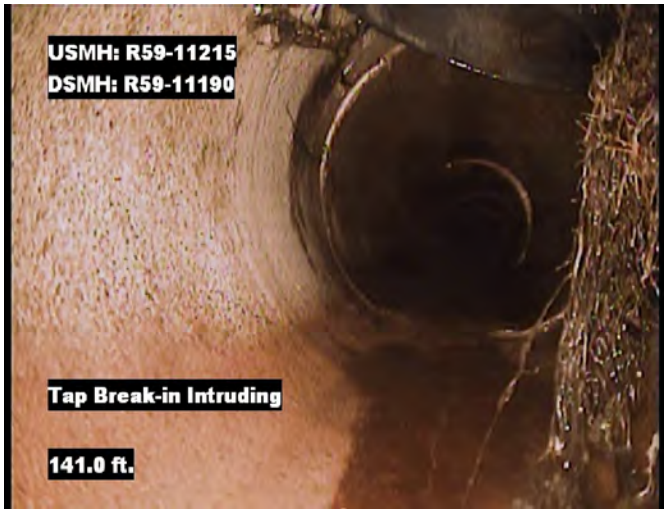
Image Report 4/Page

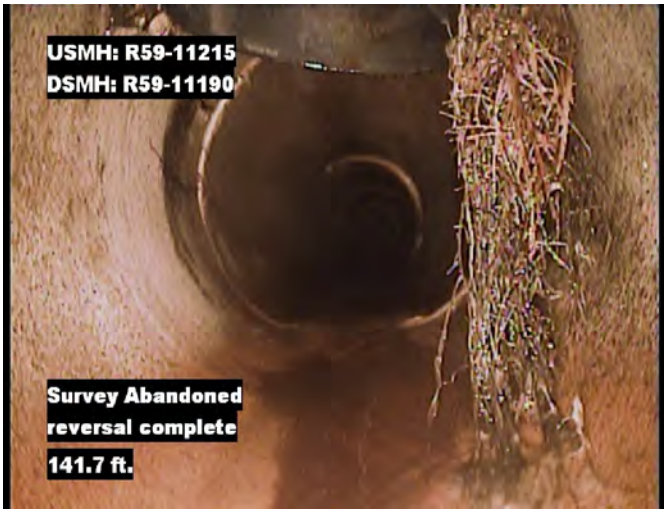
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	10:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end



Distance: 141.0 ft. Grade: 2
Condition: Tap Break-in Intruding
Remarks: N/A



Distance: 141.7 ft. Grade: 0
Condition: Survey Abandoned
Remarks: reversal complete

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Prospect st ave	20170906	10:28

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear Hill valley and west end

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	2200	R59-11215-R59-11190		
Quick Overall Rating	5122	Upstream MH	Downstream MH	
		R59-11215	R59-11190	

Length surveyed	Material	Shape	Height	Width
141.7	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	2	4	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	2		Subtotals	3	
SUMMARY	Pipe Rating		5	Pipe Rating		4	Overall Pipe Rating		9
	Structural Index		5.0	O&M Index		2.0	Overall Index		3.0
	Str. Quick Rating		5100	O&M Quick Rating		2200	Ovrl. Quick Rating		5122

Ted Berry Company
521 Federal Rd
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207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11220	R59-11185	R59-11220-R59-11185	9/27/2017	Charles st	Vitrified Clay Pipe	6	0	72

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 72

Project Total Ln.: 0.0 Project Inspected Ln.: 72.0

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	14:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	5131	R59-11220-R59-11185	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5131	R59-11220	R59-11185

Length surveyed	Material	Shape	Height	Width
72	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R59-11220

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R59-11220					
0.0 ft.	Water Level		0 - 0		5	
14.8 ft.	Tap Factory Capped		9 - 0	4	5	
32.0 ft.	Fracture Longitudinal		7 - 0		5	
72.0 ft.	Broken Pipe Soil Visible		10 - 2		5	
72.0 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate through break					

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	14:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11220

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 14.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 32.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
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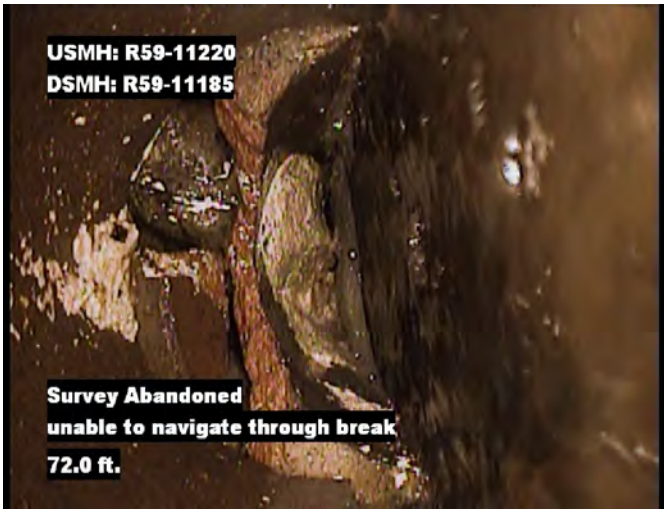
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	14:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 72.0 ft. Grade: 5
Condition: Broken Pipe Soil Visible
Remarks: N/A



Distance: 72.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate through break

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	14:55

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	5131	Pipe Segment Reference		
Quick Maint. Rating	N/A	R59-11220-R59-11185		
Quick Overall Rating	5131	Upstream MH	Downstream MH	
		R59-11220	R59-11185	

Length surveyed	Material	Shape	Height	Width
72	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	0		Subtotals	2	
SUMMARY	Pipe Rating		8	Pipe Rating		0	Overall Pipe Rating		8
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		5131	O&M Quick Rating		0000	Ovrl. Quick Rating		5131

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11220	R59-11185	R59-11220-R59-11185	10/4/2017	Charles st	Vitrified Clay Pipe	6	0	1

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 1

Project Total Ln.: 0.0 Project Inspected Ln.: 1.0

Ted Berry Company
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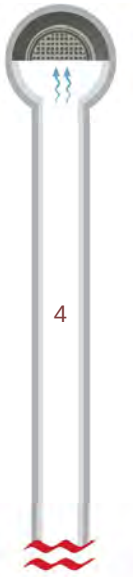
Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Charles st	20171004	11:05
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Reversal			1314B Bear hill valley and west end		

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R59-11220-R59-11185		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R59-11220	R59-11185	
Length surveyed	Material	Shape	Height	Width
1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				



R59-11185

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R59-11185					
0.0 ft.	Water Level		0 - 0		50	
1.0 ft.	Camera Underwater		0 - 0		0	
1.0 ft.	Water Level		0 - 0		100	
1.0 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate					

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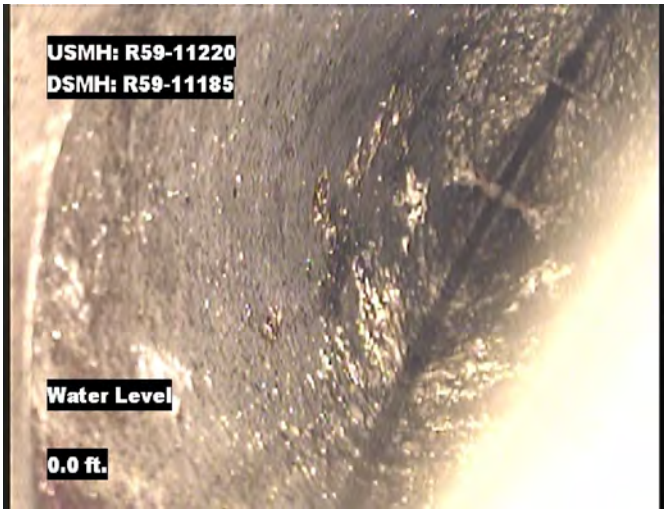
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20171004	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

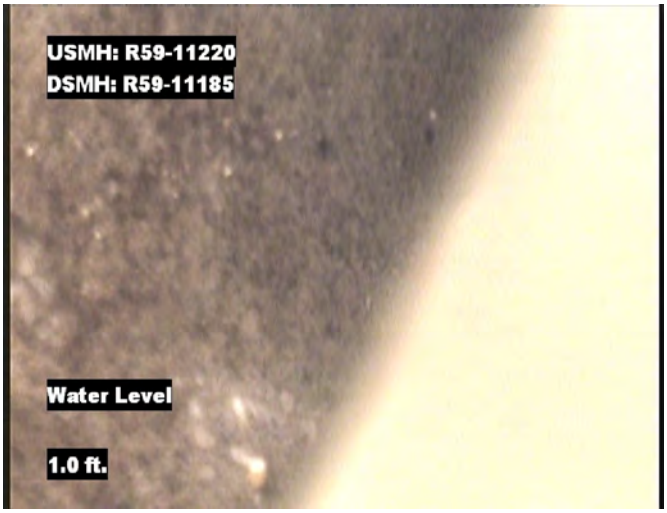
Purpose of Survey	Project Name
Reversal	1314B Bear hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11185



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 1.0 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A



Distance: 1.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Ted Berry Company
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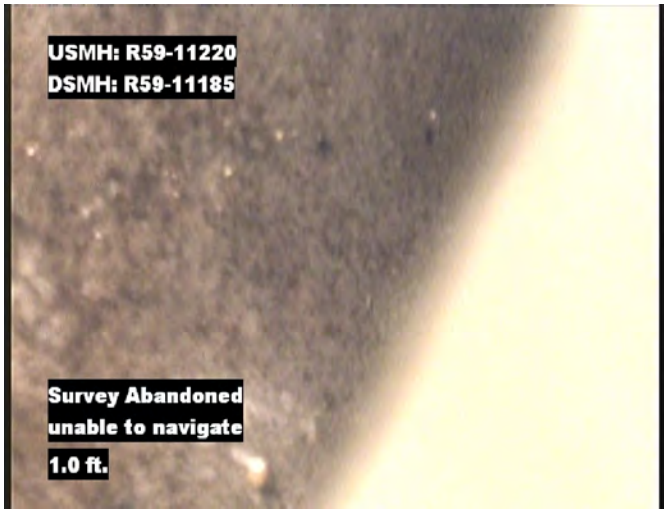
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20171004	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear hill valley and west end



Distance: 1.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20171004	11:05

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Reversal	1314B Bear hill valley and west end

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R59-11220-R59-11185		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R59-11220	R59-11185	

Length surveyed	Material	Shape	Height	Width
1	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4100	Ovrl. Quick Rating		4100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11370	R59-11185	R59-11370-R59-11185	9/27/2017	Charles st	Vitrified Clay Pipe	15	294.6	294.6

Pipe Size: 15 Total Ln.: 294.6 Inspected Ln.: 294.6

Project Total Ln.: 294.6 Project Inspected Ln.: 294.6

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	13:52

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	5141	R59-11370-R59-11185	
Quick Maint. Rating	2100	Upstream MH	Downstream MH
Quick Overall Rating	5141	R59-11370	R59-11185

Length surveyed	Material	Shape	Height	Width
294.6	Vitrified Clay Pipe	Circular	15	15

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R59-11370

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11370		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
42.7 ft.	Tap Factory		12 - 0	4	5	
61.5 ft.	Deposits Settled Gravel		6 - 0		5	
124.3 ft.	Tap Factory Active		12 - 0	4	5	
212.3 ft.	Tap Factory		12 - 0	4	5	
234.6 ft.	Tap Factory		12 - 0	4	5	
235.3 ft.	Broken Pipe Void Visible		7 - 11		5	
292.9 ft.	Fracture Multiple		7 - 10		5	
294.6 ft.	Manhole R59-11185		0 - 0		5	

R59-11185

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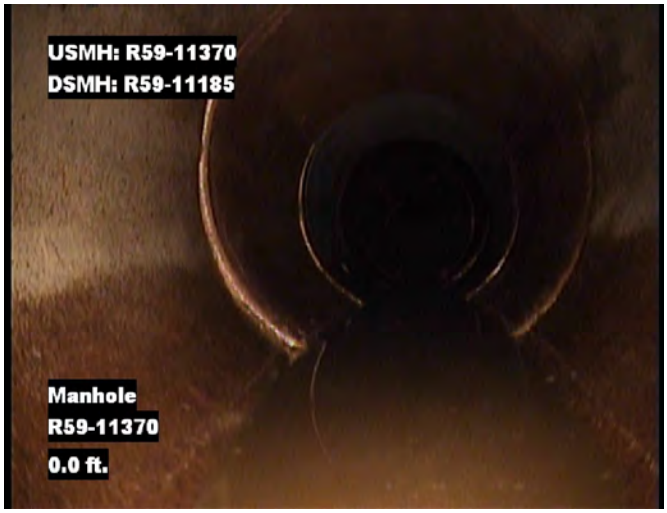
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	13:52

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11370

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 42.7 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 61.5 ft. Grade: 2
Condition: Deposits Settled Gravel
Remarks: N/A

Ted Berry Company
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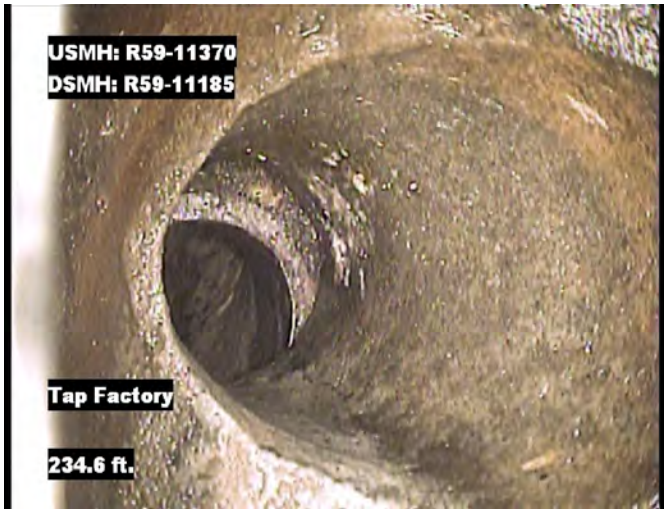
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	13:52

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 124.3 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 212.3 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 234.6 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 235.3 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	13:52

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 292.9 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 294.6 ft. Grade: 0
Condition: Manhole
Remarks: R59-11185

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170927	13:52

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	5141	Pipe Segment Reference		
Quick Maint. Rating	2100	R59-11370-R59-11185		
Quick Overall Rating	5141	Upstream MH	Downstream MH	
		R59-11370	R59-11185	

Length surveyed	Material	Shape	Height	Width
294.6	Vitrified Clay Pipe	Circular	15	15

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	1	2	2	1	2
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	1		Subtotals	3	
SUMMARY	Pipe Rating		9	Pipe Rating		2	Overall Pipe Rating		11
	Structural Index		4.5	O&M Index		2.0	Overall Index		3.7
	Str. Quick Rating		5141	O&M Quick Rating		2100	Ovrl. Quick Rating		5141

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11550	R59-11545	R59-11550-R59-11545	9/6/2017	Russell st	Vitrified Clay Pipe	6	296.5	296.5

Pipe Size: 6 Total Ln.: 296.5 Inspected Ln.: 296.5

Project Total Ln.: 296.5 Project Inspected Ln.: 296.5

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	3111	R59-11550-R59-11545		
Quick Overall Rating	5131	Upstream MH: R59-11550	Downstream MH: R59-11545	
Length surveyed: 296.5	Material: Vitrified Clay Pipe	Shape: Circular	Height: 6	Width: 6
Direction: Downstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: Jetting	Lining Method:

Remarks

R59-11550

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11550		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
11.2 ft.	Tap Factory		3 - 0	4	5	
5 11.2 ft.	Broken Pipe Void Visible		4 - 6		5	
22.5 ft.	Tap Factory Capped		3 - 0	4	5	
32.3 ft.	Tap Factory Capped		9 - 0	4	5	
3 53.8 ft.	Roots Medium Joint		2 - 6		5	
54.9 ft.	Tap Factory		9 - 0	4	5	
1 54.9 ft.	Roots Fine Joint		11 - 6		5	
58.0 ft.	Tap Factory		3 - 0	4	5	
104.3 ft.	Tap Factory Capped		3 - 0	4	5	
110.5 ft.	Tap Factory Active		9 - 0	4	5	
110.5 ft.	Tap Break-in		12 - 0	4	5	
133.0 ft.	Tap Factory		3 - 0	4	5	

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5100	R59-11550-R59-11545	
Quick Maint. Rating	3111	Upstream MH	Downstream MH
Quick Overall Rating	5131	R59-11550	R59-11545

Length surveyed	Material	Shape	Height	Width
296.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

142.4 ft.	Tap Factory Capped		9 - 0	4	5	
150.5 ft.	Tap Factory		3 - 0	4	5	
182.5 ft.	Tap Factory Capped		3 - 0	4	5	
204.5 ft.	Tap Factory		3 - 0	4	5	
215.8 ft.	Tap Break-in		10 - 0	4	5	
218.6 ft.	Tap Factory Capped		9 - 0	4	5	
220.4 ft.	Tap Factory Capped		3 - 0	4	5	
270.1 ft.	Tap Factory Capped		9 - 0	4	5	
272.3 ft.	Tap Factory Capped		3 - 0	4	5	
284.1 ft.	Tap Break-in		10 - 0	4	5	
290.3 ft.	Tap Factory		3 - 0	4	5	
296.5 ft.	Manhole R59-11545		0 - 0		5	

R59-11545

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11550

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 11.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 11.2 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Ted Berry Company
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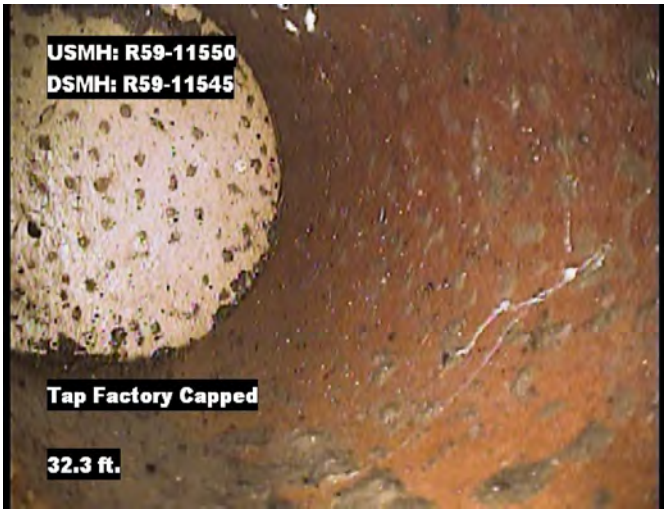
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

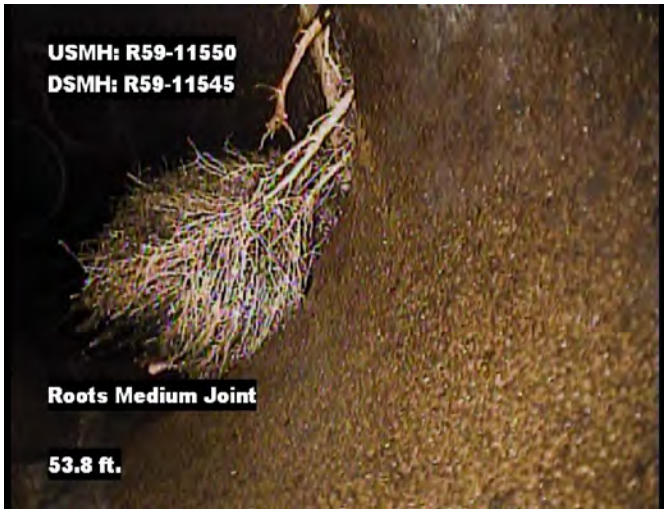
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 22.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 32.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 53.8 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 54.9 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

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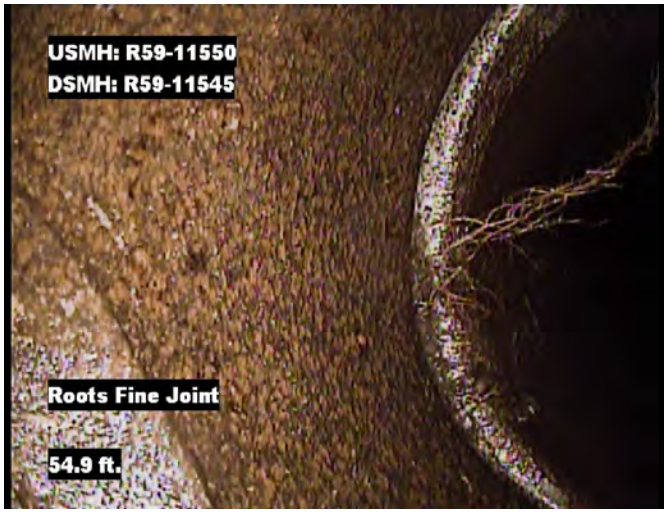
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 54.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 58.0 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 104.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 110.5 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

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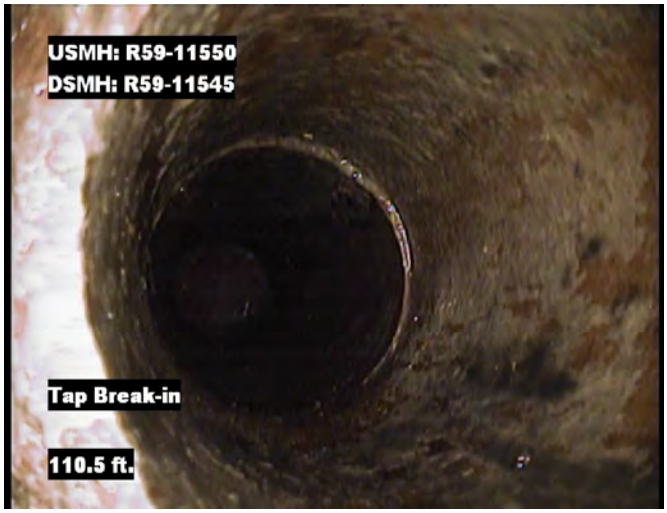
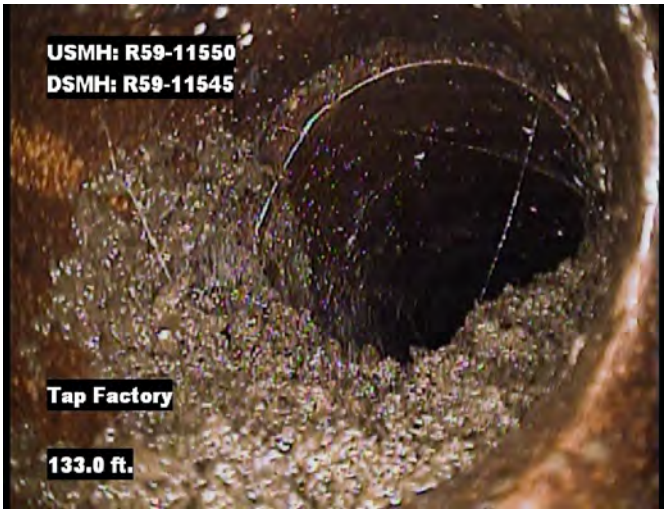
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

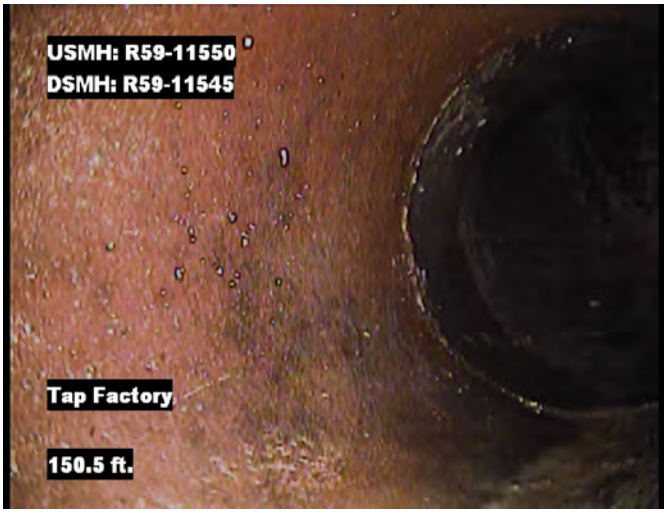


Distance: 110.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 133.0 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 142.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 150.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

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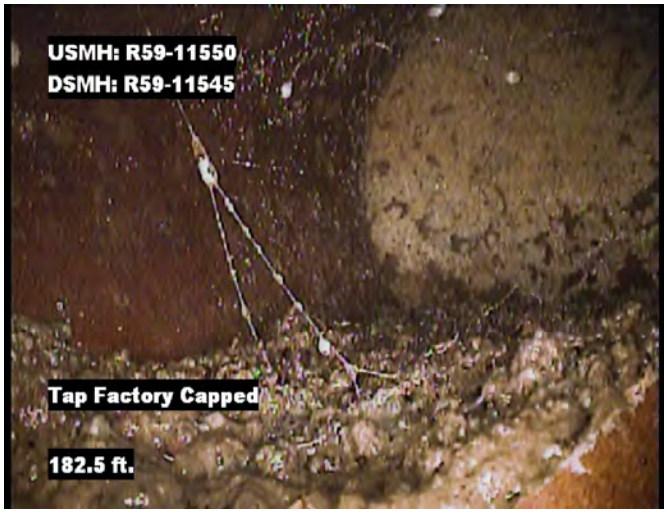
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end



Distance: 182.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 204.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 215.8 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 218.6 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance: 220.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 270.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 272.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 284.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

Distance:	290.3 ft.	Grade:	0
Condition:	Tap Factory		
Remarks:	N/A		

Distance:	296.5 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R59-11545		

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Russell st	20170906	12:50

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill valley and west end

		Pipe Segment Reference	
Quick Struct. Rating	5100	R59-11550-R59-11545	
Quick Maint. Rating	3111	Upstream MH	Downstream MH
Quick Overall Rating	5131	R59-11550	R59-11545

Length surveyed	Material	Shape	Height	Width
296.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	0	0	2	0	0	2	0	0
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	2		Subtotals	3	
SUMMARY	Pipe Rating		5	Pipe Rating		4	Overall Pipe Rating		9
	Structural Index		5.0	O&M Index		2.0	Overall Index		3.0
	Str. Quick Rating		5100	O&M Quick Rating		3111	Ovrl. Quick Rating		5131

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R59-11220A	R59-11220	R59-11220A-R59-11220	9/28/2017	Charles st	Vitrified Clay Pipe	6	223	223

Pipe Size: 6 Total Ln.: 223 Inspected Ln.: 223

Project Total Ln.: 223.0 Project Inspected Ln.: 223.0

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	5121	Pipe Segment Reference		
Quick Maint. Rating	2115	R59-11220A-R59-11220		
Quick Overall Rating	5122	Upstream MH: R59-11220A	Downstream MH: R59-11220	
Length surveyed: 223	Material: Vitrified Clay Pipe	Shape: Circular	Height: 6	Width: 6
Direction: Downstream	Sewer Use: Sanitary	Flow Control: Not Controlled	Pre-Cleaning: Heavy Cleaning	Lining Method:
Remarks				

R59-11220A

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R59-11220A		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
2.1 ft.	Crack Longitudinal		7 - 0		5	
5.7 ft.	Tap Factory Capped		10 - 0	4	5	
10.7 ft.	Tap Factory Active		10 - 0	4	5	
36.0 ft.	Tap Factory Capped		10 - 0	4	5	
40.0 ft.	Tap Factory Capped		2 - 0	4	5	
45.9 ft.	Tap Factory		2 - 0	4	5	
47.0 ft.	Broken Pipe Void Visible		3 - 11		5	
64.2 ft.	Tap Factory Capped		10 - 0	4	5	
76.0 ft.	Tap Factory Capped		2 - 0	4	5	
115.3 ft.	Tap Factory Capped		10 - 0	4	5	
130.5 ft.	Tap Break-in		12 - 0	4	5	
135.7 ft.	Deposits Attached Grease		10 - 2		0	

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	5121	R59-11220A-R59-11220	
Quick Maint. Rating	2115	Upstream MH	Downstream MH
Quick Overall Rating	5122	R59-11220A	R59-11220

Length surveyed	Material	Shape	Height	Width
223	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

	138.4 ft.	Tap Factory Active		3 - 0	4	5	
1	153.6 ft.	Roots Fine Joint		8 - 0		5	
	155.4 ft.	Tap Factory		9 - 0	4	5	
	164.6 ft.	Tap Factory Capped		10 - 0	4	5	
1	179.7 ft.	Roots Fine Joint		8 - 2		5	
1	182.0 ft.	Roots Fine Joint		11 - 1		5	
	184.8 ft.	Tap Break-in Active		12 - 0	4	5	
	193.1 ft.	Tap Factory Capped		10 - 0	4	5	
	205.0 ft.	Material Change pvc		0 - 0		5	
	205.8 ft.	Tap Factory		12 - 0	4	5	
	206.7 ft.	Material Change vcp		0 - 0		5	
	211.2 ft.	Tap Factory		3 - 0	4	5	
1	212.2 ft.	Roots Fine Joint		11 - 1		5	
1	216.3 ft.	Roots Fine Joint		12 - 1		5	
	223.0 ft.	Manhole R59-11220		0 - 0		5	

R59-11220

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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Quick Struct. Rating	5121
Quick Maint. Rating	2115
Quick Overall Rating	5122

Pipe Segment Reference	
R59-11220A-R59-11220	
Upstream MH	Downstream MH
R59-11220A	R59-11220

Length surveyed	Material	Shape	Height	Width
223	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Ted Berry Company
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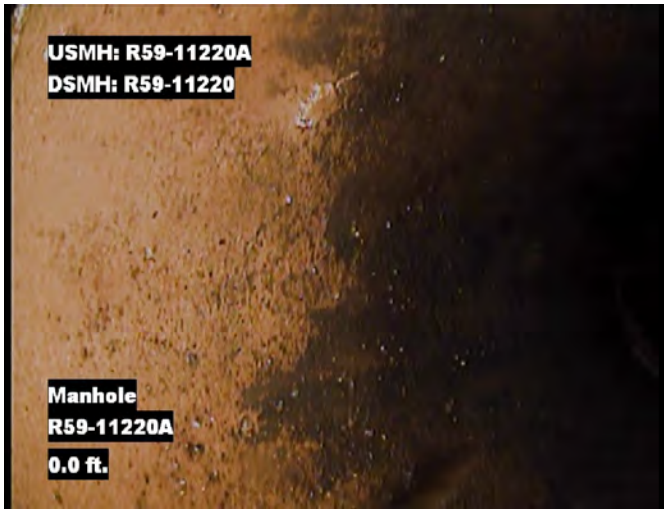
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R59-11220A

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 2.1 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 5.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

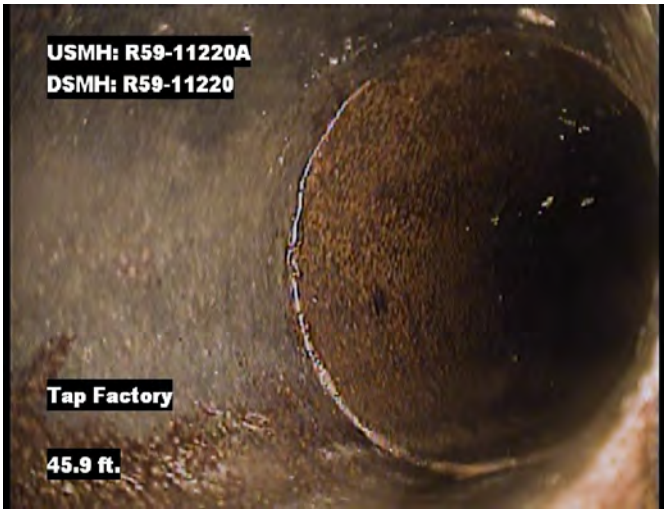
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 10.7 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Distance: 36.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 40.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 45.9 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Ted Berry Company
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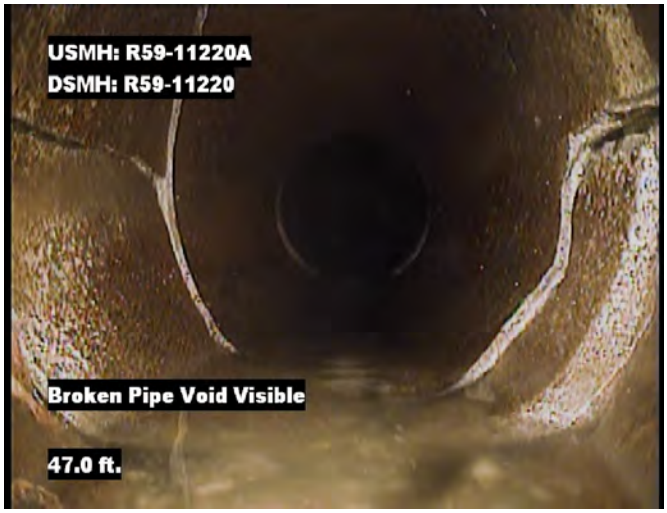
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 47.0 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A

Distance: 64.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 76.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 115.3 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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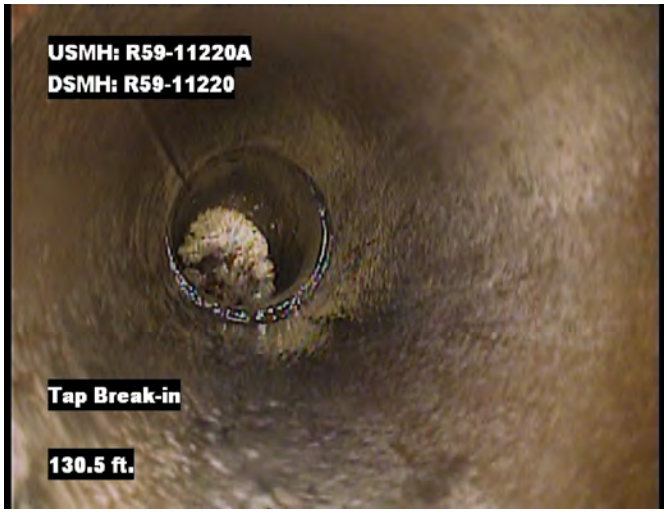
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

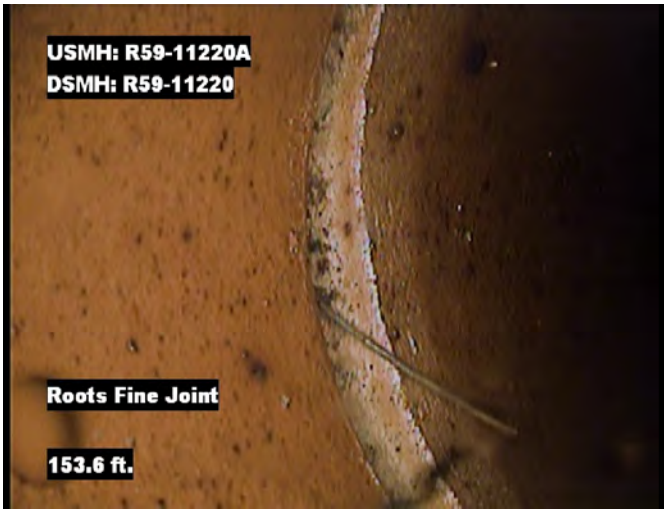
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley



Distance: 130.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 135.7 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 138.4 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A



Distance: 153.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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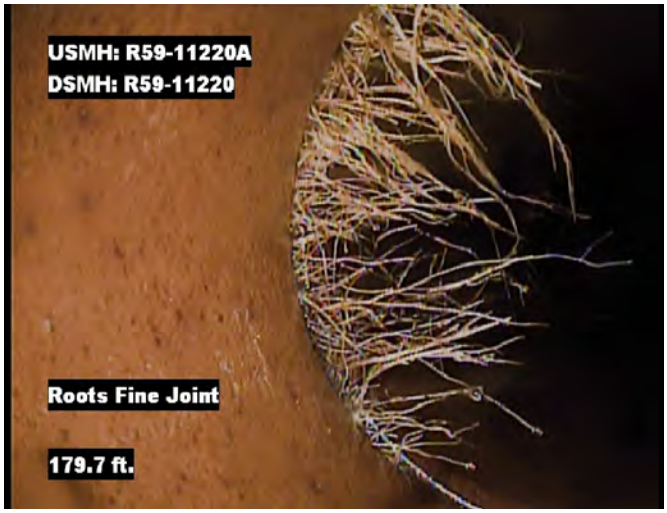
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 155.4 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 164.6 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 179.7 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 182.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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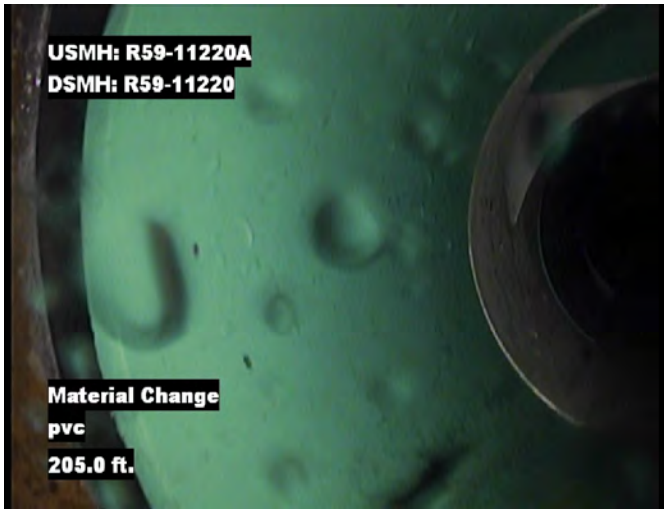
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

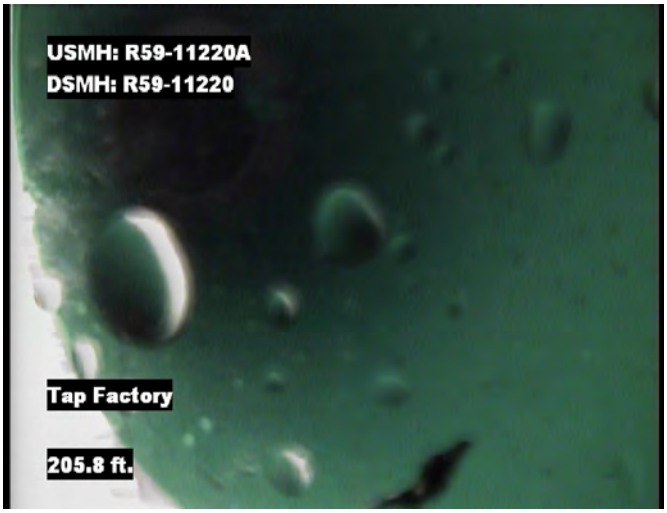
Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance: 184.8 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 193.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 205.0 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 205.8 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

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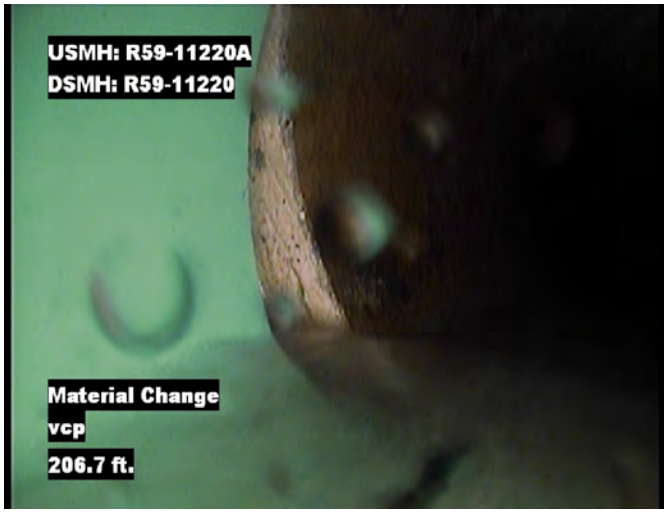
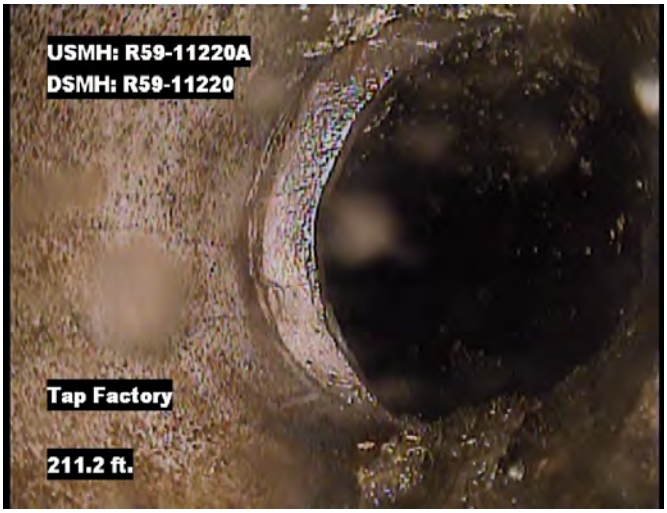
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

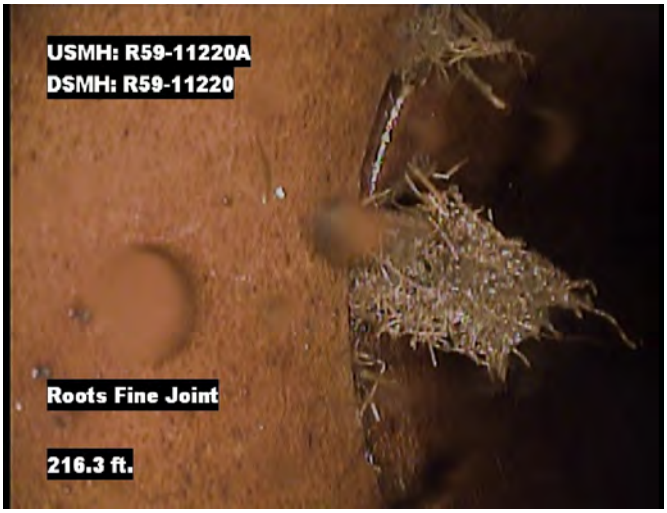


Distance:	206.7 ft.	Grade:	0
Condition:	Material Change		
Remarks:	vcp		



Distance:	211.2 ft.	Grade:	0
Condition:	Tap Factory		
Remarks:	N/A		

Distance:	212.2 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		



Distance:	216.3 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

Distance:	223.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R59-11220		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Charles st	20170928	07:48

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear hill and west valley

		Pipe Segment Reference	
Quick Struct. Rating	5121	R59-11220A-R59-11220	
Quick Maint. Rating	2115	Upstream MH	Downstream MH
Quick Overall Rating	5122	R59-11220A	R59-11220

Length surveyed	Material	Shape	Height	Width
223	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	5	5	1	5	5
	2	1	2	2	1	2	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	6		Subtotals	8	
SUMMARY	Pipe Rating		7	Pipe Rating		7	Overall Pipe Rating		14
	Structural Index		3.5	O&M Index		1.2	Overall Index		1.8
	Str. Quick Rating		5121	O&M Quick Rating		2115	Ovrl. Quick Rating		5122

GREEN MOUNTAIN Pipeline Services

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

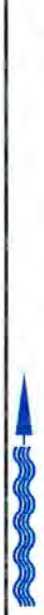
Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**46**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Bedford Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_07660**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_07655**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**213.50 ft**	Section Length	**213.60 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #2**	Lining Method	**Other**

Add. Information :



1:540 Position		Code	Observation	Photo
R67_07655				
0.10		AMH	Downstream Manhole, Survey Begins / MH R67_07655	
12.70		MWLS	Water Level, Sag In Pipe, 80 % of Cross Sectional Area	
18.10		MCU	Camera Underwater	
28.10		H	Hole, from 10 to 02 o'clock, within 8 inches of joint: YES / Repair	59_60_296_A.JPG
32.90		TBA	Tap Break-In Active, at 12 o'clock, 4", within 8 inches of joint: NO	
34.70	S1	MCU	Camera Underwater, Start	
145.70		FM	Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES	59_60_299_A.jpg
166.60		TBA	Tap Break-In Active, at 12 o'clock, 5", within 8 inches of joint: YES	
171.20		TFA	Tap Factory Made Active, at 12 o'clock, 5", within 8 inches of joint: YES	
213.60		AMH	Upstream Manhole, Survey Ends / MH R67_07660	
213.60	F1	MCU	Camera Underwater, Finish	
R67_07660				

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5141	**514F**	**9**	**153**	**162**	**4.5**	**4.03**	**4.05**

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E-mail: corey.gmps@myfairpoint.net

Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Bedford Street**	**7/20/2011**		**46**

Photo: 59_60_296_A.JPG, VCR No.: Waltham TV #2
28.1FT, Hole, from 10 to 02 o'clock, within 8 inches of joint: YES

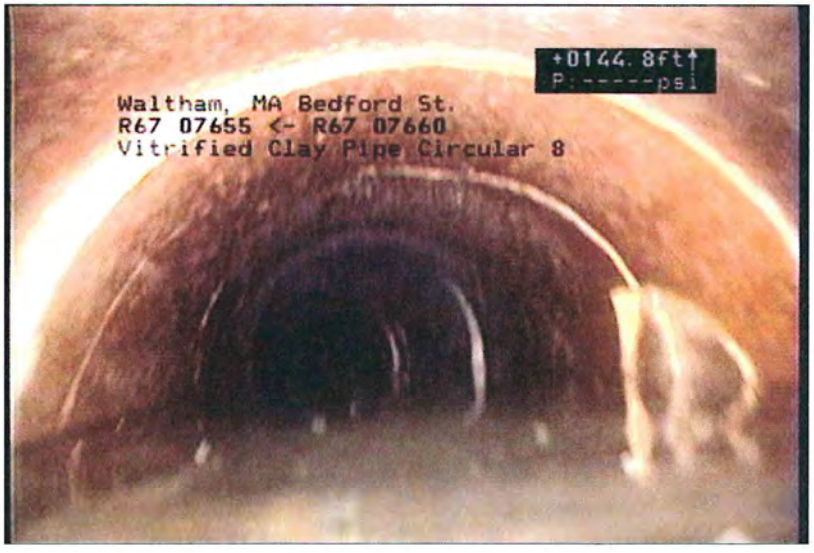

Photo: 59_60_299_A.jpg, VCR No.: Waltham TV #2
145.7FT, Fracture Multiple, from 12 to 12 o'clock, within 8 inches of joint: YES

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
6/30/2011	**Cabot & Boynton**	**Dry**	**DJA**		**47**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**6/30/2011**	**Jetting**	

Street	**Bedford Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_07665**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_07660**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**3.40 ft**	Section Length	**3.40 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Will Complete Inspection From Opposite Direction.**

1:50	Position	Code	Observation	Photo
R67_07665	0.00	AMH	Upstream Manhole, Survey Begins / MH R67_07665	
	3.40	JOL	Joint Offset Large	9_10_82_A.JPG
	3.40	MSA	Survey Abandoned / Due To Offset Joint.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
2100	**0000**	**2**	**0**	**2**	**2**	**0**	**2**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Bedford Street**	**6/30/2011**		47

Photo: 9_10_82_A.JPG, VCR No.: Waltham TV #1
3.4FT, Joint Offset Large

GREEN MOUNTAIN Pipeline Services

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244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**48**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Bedford Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_07665**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_07660**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**0.00 ft**	Section Length	**0.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #2**	Lining Method	**Other**

Add. Information : **Unable To Complete Inspection Due To 90 Degrees Coming Out of Invert.**

1:50	Position	Code	Observation	Photo
R67_07660	0.00	MSA	Survey Abandoned / 90 Degrees Coming Out Of Invert To Narrow/Invert Underwater .	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	**0000**	**0**	**0**	**0**	**0**	**0**	**0**

Ted Berry Company
521 Federal Rd
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207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-01005	R67-07860	R67-01005-R67-07860	9/12/2017	South st	Vitrified Clay Pipe	8	0	77.4

Pipe Size: 8 Total Ln.: 0 Inspected Ln.: 77.4

Project Total Ln.: 0.0 Project Inspected Ln.: 77.4

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

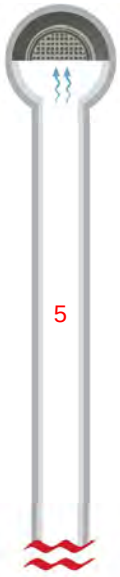
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170912	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Sidewalk	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	5100	R67-01005-R67-07860		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R67-01005	R67-07860	
Length surveyed	Material	Shape	Height	Width
77.4	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R67-07860

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R67-07860					
0.0 ft.	Water Level		0 - 0		5	
77.4 ft.	Infiltration Gusher		7 - 12		5	
77.4 ft.	Shape or Size Change		0 - 0	8 / 6	5	
77.4 ft.	Survey Abandoned		0 - 0		5	
	unable to navigate size change					

Ted Berry Company
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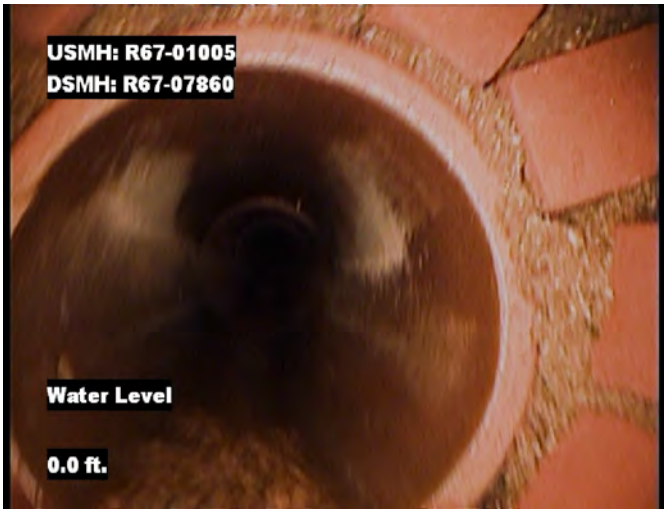
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170912	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Sidewalk	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07860



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 77.4 ft. Grade: 5
Condition: Infiltration Gusher
Remarks: N/A

Distance: 77.4 ft. Grade: 0
Condition: Shape or Size Change
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170912	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Sidewalk	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 77.4 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate size change

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170912	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Sidewalk	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	5100	R67-01005-R67-07860		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R67-01005	R67-07860	

Length surveyed	Material	Shape	Height	Width
77.4	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	1	5	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		5	Overall Pipe Rating		5
	Structural Index		0	O&M Index		5.0	Overall Index		5.0
	Str. Quick Rating		0000	O&M Quick Rating		5100	Ovrl. Quick Rating		5100

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521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07680	R67-07670	R67-07680-R67-07670	8/30/2017	South st	Vitrified Clay Pipe	6	0	10.5

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 10.5

Project Total Ln.: 0.0 Project Inspected Ln.: 10.5

Ted Berry Company
521 Federal Rd
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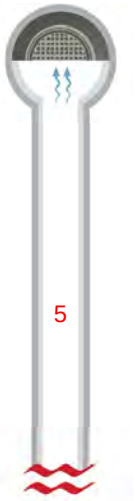
207-897-3348

Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	South st	20170830	12:49
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07680-R67-07670		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R67-07680	R67-07670	
Length surveyed	Material	Shape	Height	Width
10.5	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	
Remarks				



R67-07670

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R67-07670					
0.0 ft.	Water Level		0 - 0		5	
6.2 ft.	Broken Pipe		12 - 0		0	
10.5 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate through broken pipe					

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	12:49

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07670

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 6.2 ft. Grade: 5
Condition: Broken Pipe
Remarks: N/A

Distance: 10.5 ft. Grade: 0
Condition: Survey Abandoned
Remarks: unable to navigate through broken pipe

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	12:49

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07680-R67-07670		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R67-07680	R67-07670	

Length surveyed	Material	Shape	Height	Width
10.5	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		5	Pipe Rating		0	Overall Pipe Rating		5
	Structural Index		5.0	O&M Index		0	Overall Index		5.0
	Str. Quick Rating		5100	O&M Quick Rating		0000	Ovrl. Quick Rating		5100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07735	R67-07680	R67-07735-R67-07680	8/30/2017	South st	Vitrified Clay Pipe	6	207.8	207.8

Pipe Size: 6 Total Ln.: 207.8 Inspected Ln.: 207.8

Project Total Ln.: 207.8 Project Inspected Ln.: 207.8

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	11:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R67-07735-R67-07680		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R67-07735	R67-07680	
Length surveyed	Material	Shape	Height	Width
207.8	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

R67-07735

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R67-07735		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
18.2 ft.	Tap Factory Capped		3 - 0	4	5	
42.5 ft.	Tap Factory Capped		9 - 0	4	5	
54.7 ft.	Tap Break-in		12 - 0	4	5	
68.9 ft.	Tap Factory Capped		3 - 0	4	5	
93.8 ft.	Tap Factory Capped		9 - 0	4	5	
118.2 ft.	Tap Factory Capped		3 - 0	4	5	
139.3 ft.	Water Level		0 - 0		15	
147.2 ft.	Camera Underwater		0 - 0		0	
188.5 ft.	Tap Factory Capped		9 - 0	4	5	
207.8 ft.	Manhole R67-07680		0 - 0		5	

R67-07680

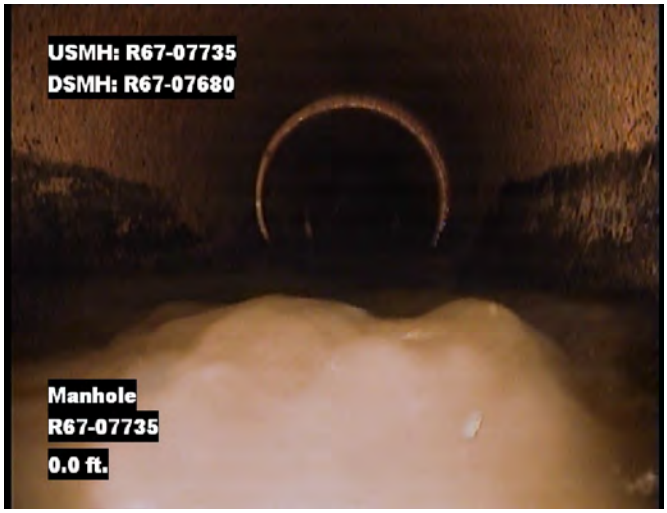
Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	11:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07735

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 18.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 42.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	11:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 54.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 68.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 93.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 118.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

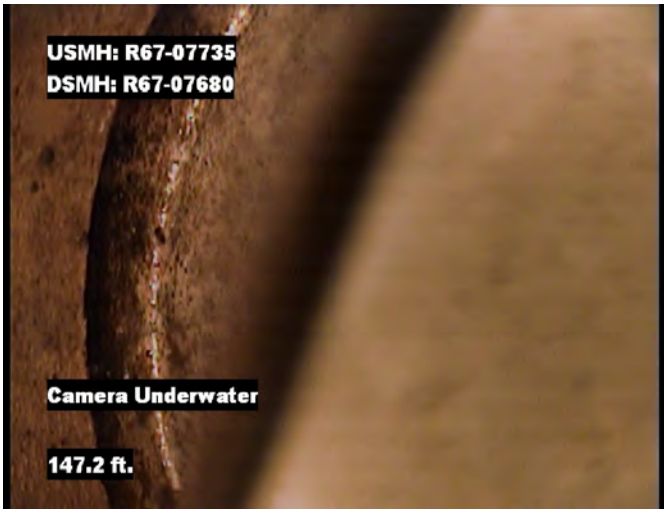
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	11:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 139.3 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 147.2 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A

Distance: 188.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 207.8 ft. Grade: 0
Condition: Manhole
Remarks: R67-07680

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170830	11:34

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	4100	R67-07735-R67-07680		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R67-07735	R67-07680	
Length surveyed	Material	Shape	Height	Width
207.8	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	1	4	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	1		Subtotals	1	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		4.0	Overall Index		4.0
	Str. Quick Rating		0000	O&M Quick Rating		4100	Ovrl. Quick Rating		4100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07780	R67-07775	R67-07780-R67-07775	8/28/2017	Shakespear rd	PolyVinyl Chloride	8	75.3	59.5

Pipe Size: 8 Total Ln.: 75.3 Inspected Ln.: 59.5

Project Total Ln.: 75.3 Project Inspected Ln.: 59.5

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

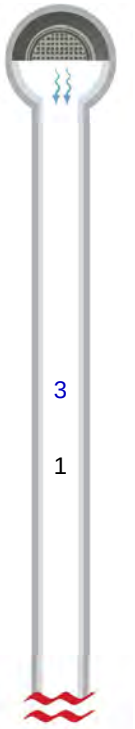
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170828	14:38

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3111	R67-07780-R67-07775		
Quick Overall Rating	3111	Upstream MH	Downstream MH	
		R67-07780	R67-07775	
Length surveyed	Material	Shape	Height	Width
59.5	PolyVinyl Chloride	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R67-07780

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R67-07780					
0.0 ft.	Water Level		0 - 0		5	
2.5 ft.	Material Change		0 - 0		0	
	vcp					
5.4 ft.	Roots Medium Joint		12 - 12		5	
16.9 ft.	Roots Fine Joint		10 - 12		5	
50.4 ft.	General Observation		0 - 0		5	
	flannel shirt					
59.5 ft.	Survey Abandoned		0 - 0		5	
	needs cleaning					

Ted Berry Company
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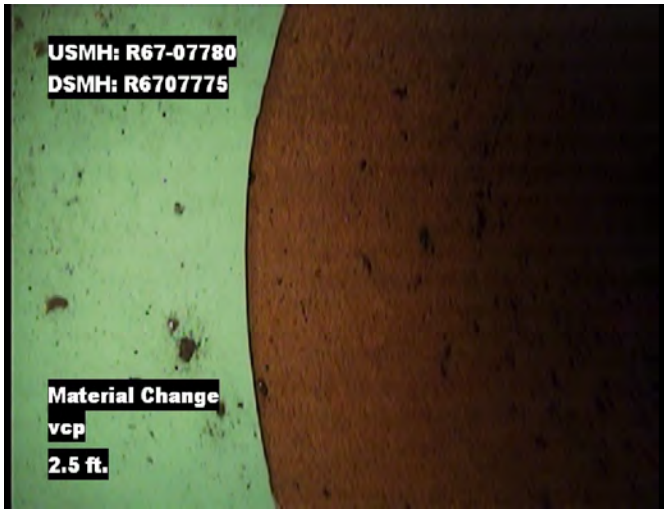
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Shakespear rd	20170828	14:38
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R67-07780		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		



Distance:	2.5 ft.	Grade:	0
Condition:	Material Change		
Remarks:	vcp		

Distance:	5.4 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	N/A		

Ted Berry Company
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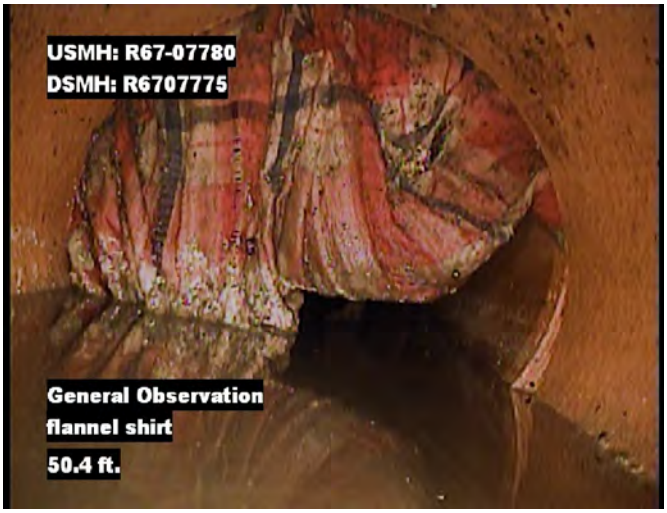
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170828	14:38

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 16.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 50.4 ft. Grade: 0
Condition: General Observation
Remarks: flannel shirt

Distance: 59.5 ft. Grade: 0
Condition: Survey Abandoned
Remarks: needs cleaning

Ted Berry Company
521 Federal Rd
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170828	14:38

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	N/A	Pipe Segment Reference		
Quick Maint. Rating	3111	R67-07780-R67-07775		
Quick Overall Rating	3111	Upstream MH	Downstream MH	
		R67-07780	R67-07775	
Length surveyed	Material	Shape	Height	Width
59.5	PolyVinyl Chloride	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	0	0	2	0	0	2	0	0
	3	0	0	3	1	3	3	1	3
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	0		Subtotals	2		Subtotals	2	
SUMMARY	Pipe Rating		0	Pipe Rating		4	Overall Pipe Rating		4
	Structural Index		0	O&M Index		2.0	Overall Index		2.0
	Str. Quick Rating		0000	O&M Quick Rating		3111	Ovrl. Quick Rating		3111

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07780	R67-07775	R67-07780-R67-07775	8/29/2017	Shakespear rd	PolyVinyl Chloride	8	75.3	75.3

Pipe Size: 8 Total Ln.: 75.3 Inspected Ln.: 75.3

Project Total Ln.: 75.3 Project Inspected Ln.: 75.3

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170829	13:11

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

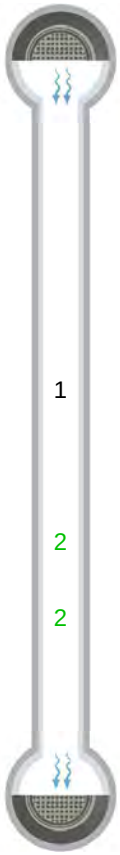
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	2100	R67-07780-R67-07775	
Quick Maint. Rating	2111	Upstream MH	Downstream MH
Quick Overall Rating	2211	R67-07780	R67-07775

Length surveyed	Material	Shape	Height	Width
75.3	PolyVinyl Chloride	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks



R67-07780

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R67-07780					
0.0 ft.	Water Level		0 - 0		5	
2.0 ft.	Material Change		0 - 0		0	
	vcp					
5.0 ft.	Roots Fine Joint		2 - 0		5	
1						
51.6 ft.	General Observation		0 - 0		5	
	flannel shirt					
52.9 ft.	Obstacle In Joint		7 - 5		5	
2						
66.4 ft.	Fracture Circumferential		6 - 9		5	
2						
75.3 ft.	Manhole		0 - 0		5	
	R67-07775					

R67-07775

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170829	13:11

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07780

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 2.0 ft. Grade: 0
Condition: Material Change
Remarks: vcp

Distance: 5.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Ted Berry Company
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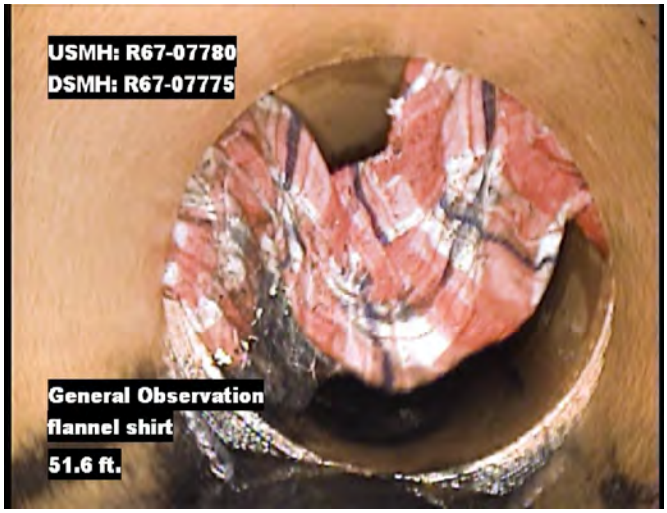
Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Shakespear rd	20170829	13:11
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		



Distance:	51.6 ft.	Grade:	0
Condition:	General Observation		
Remarks:	flannel shirt		

Distance:	52.9 ft.	Grade:	2
Condition:	Obstacle In Joint		
Remarks:	N/A		

Distance:	66.4 ft.	Grade:	2
Condition:	Fracture Circumferential		
Remarks:	N/A		

Distance:	75.3 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R67-07775		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Shakespear rd	20170829	13:11

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	2100
Quick Maint. Rating	2111
Quick Overall Rating	2211

Pipe Segment Reference: R67-07780-R67-07775

Upstream MH	Downstream MH
R67-07780	R67-07775

Length surveyed	Material	Shape	Height	Width
75.3	PolyVinyl Chloride	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	1	1	1	1	1
	2	1	2	2	1	2	2	2	4
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	2		Subtotals	3	
SUMMARY	Pipe Rating		2	Pipe Rating		3	Overall Pipe Rating		5
	Structural Index		2.0	O&M Index		1.5	Overall Index		1.7
	Str. Quick Rating		2100	O&M Quick Rating		2111	Ovrl. Quick Rating		2211

Ted Berry Company
521 Federal Rd
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07815	R67-07810	R67-07815-R67-07810	8/29/2017	South st	Vitrified Clay Pipe	8	124.3	124.3

Pipe Size: 8 Total Ln.: 124.3 Inspected Ln.: 124.3

Project Total Ln.: 124.3 Project Inspected Ln.: 124.3

Ted Berry Company
521 Federal Rd
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Defect Listing Plot Left

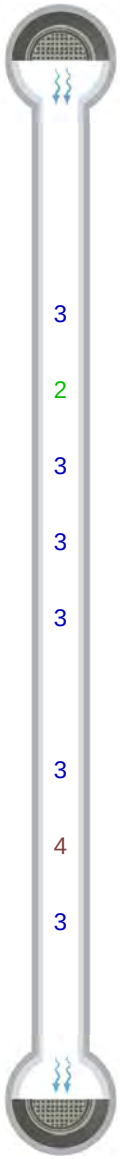
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4136	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07815-R67-07810		
Quick Overall Rating	4136	Upstream MH	Downstream MH	
		R67-07815	R67-07810	
Length surveyed	Material	Shape	Height	Width
124.3	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



R67-07815

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R67-07815		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
4.0 ft. 3	Fracture Longitudinal		12 - 0		5	
19.9 ft. 2	Fracture Circumferential		7 - 10		5	
43.8 ft. 3	Fracture Longitudinal		4 - 0		5	
47.7 ft. 3	Fracture Longitudinal		1 - 0		5	
49.6 ft. 3	Fracture Longitudinal		12 - 0		5	
55.8 ft.	Infiltration Stain		1 - 5		5	
63.7 ft. 3	Fracture Longitudinal		9 - 0		5	
67.0 ft. 4	Fracture Multiple		12 - 12		5	
107.5 ft. 3	Fracture Longitudinal		12 - 0		5	
124.3 ft.	Manhole R67-07810		0 - 0		5	

R67-07810

Ted Berry Company
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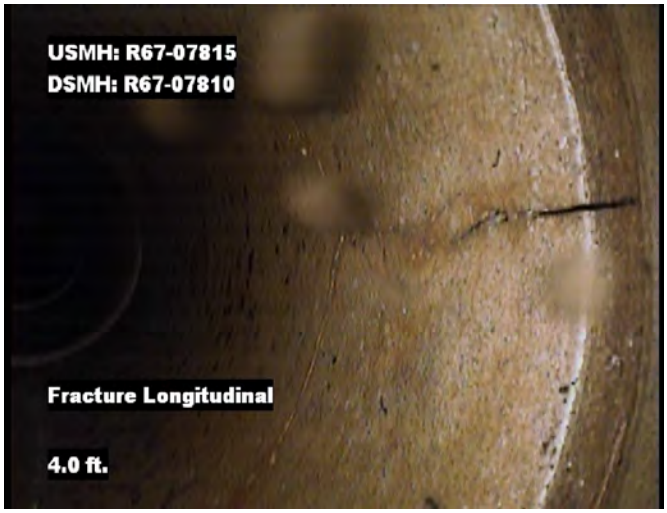
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

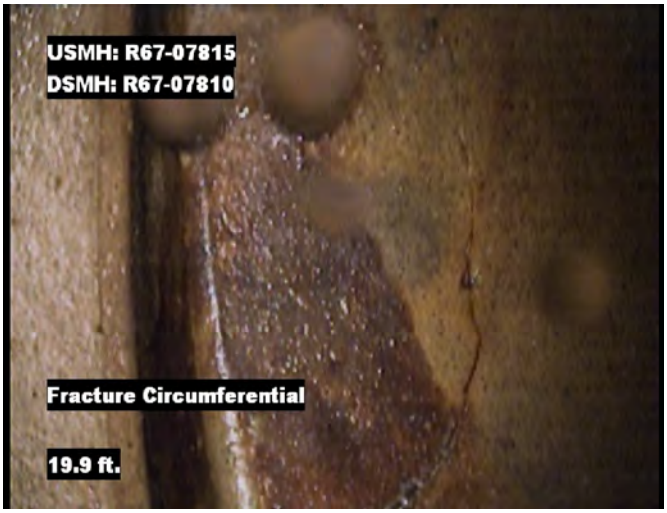
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07815

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 4.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 19.9 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Ted Berry Company
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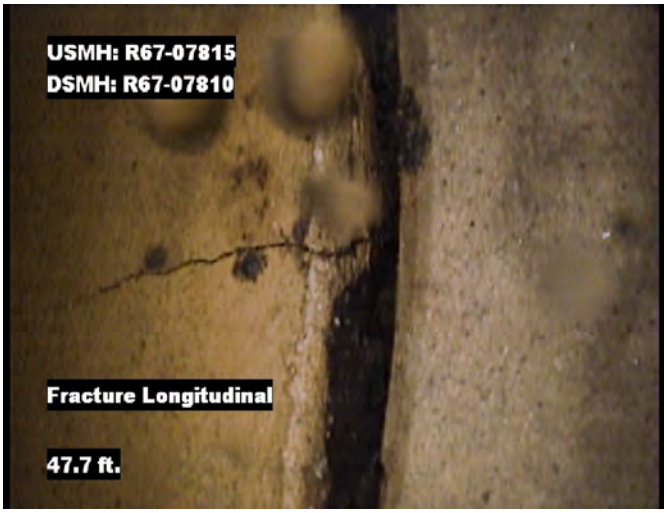
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:44

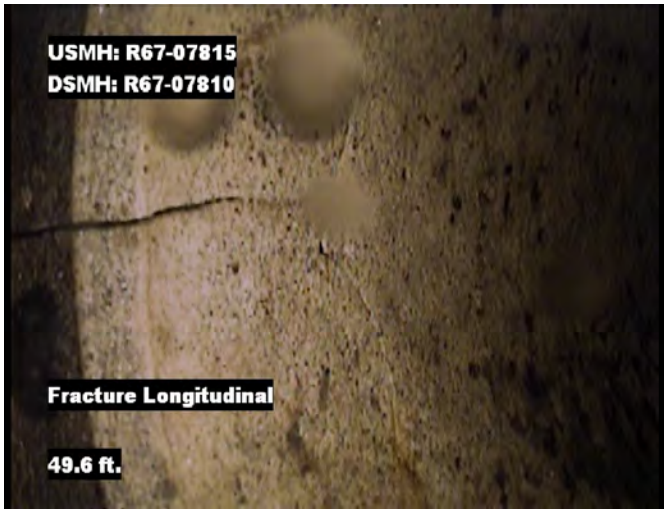
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

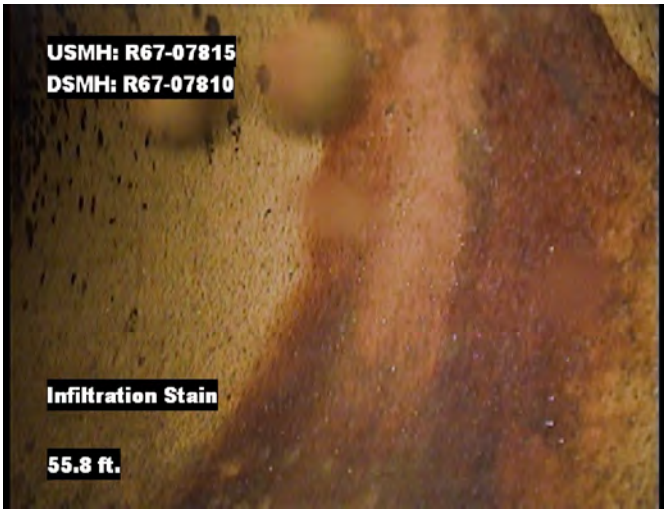
Distance: 43.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 47.7 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 49.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 55.8 ft. Grade: 0
Condition: Infiltration Stain
Remarks: N/A

Ted Berry Company
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Livermore Maine 04253
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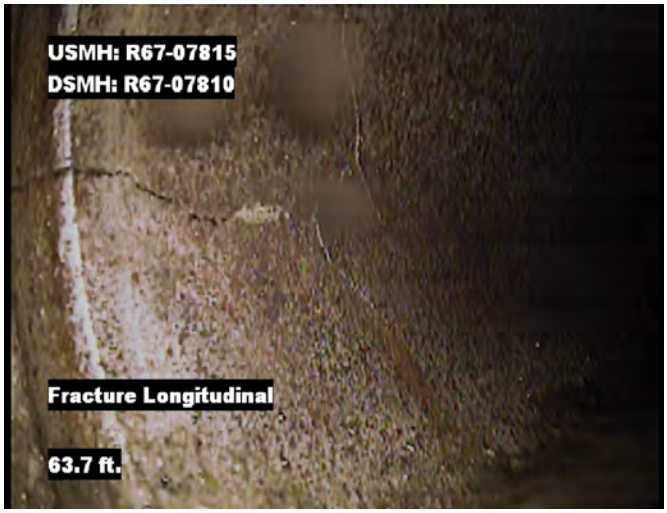
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

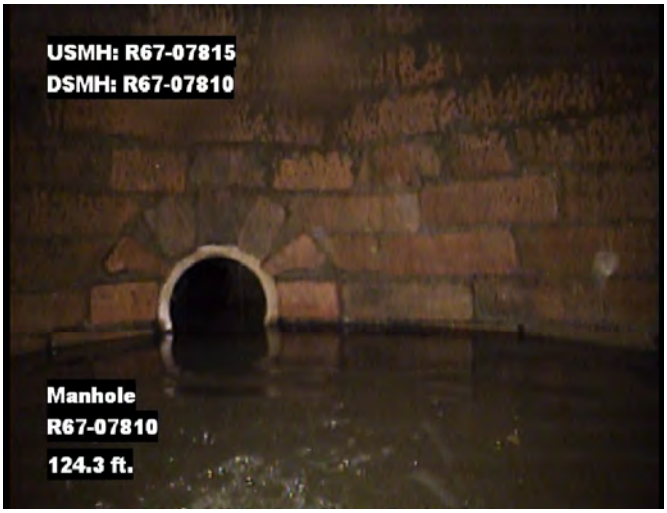
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 63.7 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 67.0 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 107.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 124.3 ft. Grade: 0
Condition: Manhole
Remarks: R67-07810

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:44

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4136	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07815-R67-07810		
Quick Overall Rating	4136	Upstream MH	Downstream MH	
		R67-07815	R67-07810	

Length surveyed	Material	Shape	Height	Width
124.3	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	0	0	2	1	2
	3	6	18	3	0	0	3	6	18
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	8		Subtotals	0		Subtotals	8	
SUMMARY	Pipe Rating		24	Pipe Rating		0	Overall Pipe Rating		24
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		4136	O&M Quick Rating		0000	Ovrl. Quick Rating		4136

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07825	R67-07820	R67-07825-R67-07820	8/29/2017	South st	Vitrified Clay Pipe	8	82.2	82.2

Pipe Size: 8 Total Ln.: 82.2 Inspected Ln.: 82.2

Project Total Ln.: 82.2 Project Inspected Ln.: 82.2

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:15

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4131	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07825-R67-07820		
Quick Overall Rating	4131	Upstream MH	Downstream MH	
		R67-07825	R67-07820	
Length surveyed	Material	Shape	Height	Width
82.2	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R67-07825

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R67-07825		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
42.7 ft.	Tap Break-in		12 - 0	4	5	
49.9 ft.	Fracture Multiple		11 - 1		5	
62.1 ft.	Fracture Longitudinal		4 - 0		5	
66.1 ft.	Fracture Circumferential		7 - 11		5	
82.2 ft.	Manhole R67-07820		0 - 0		5	

R67-07820

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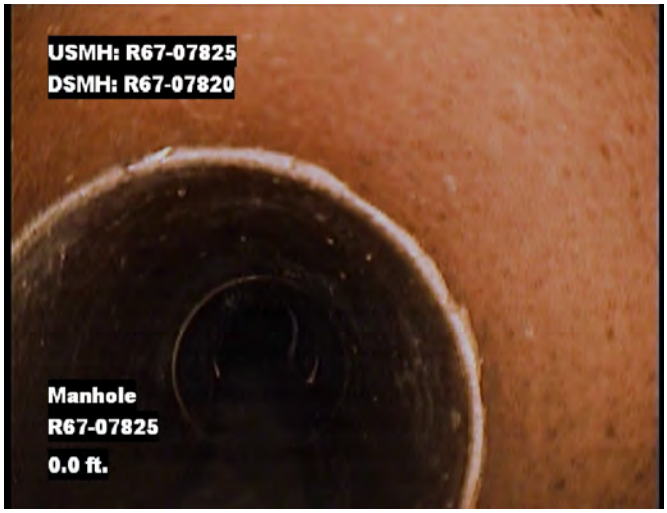
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:15

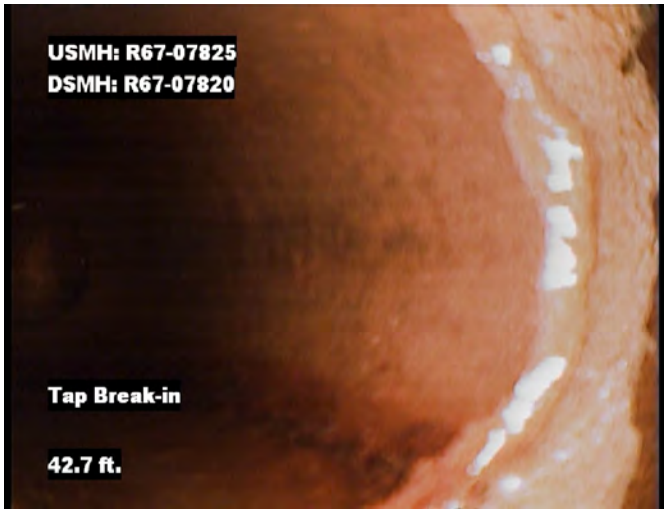
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

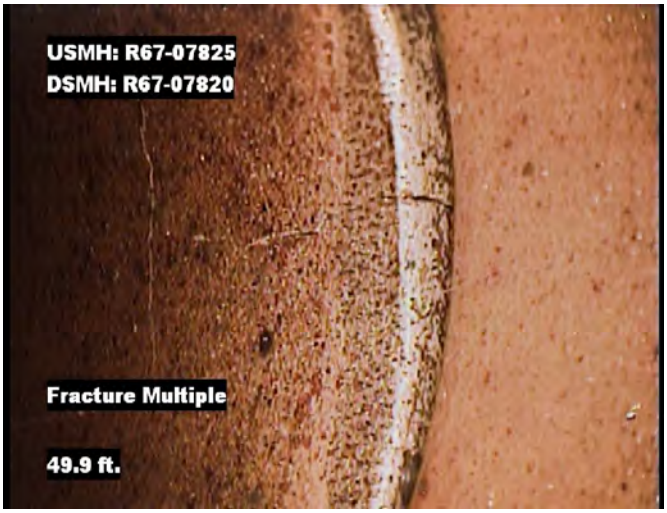


Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07825

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 42.7 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 49.9 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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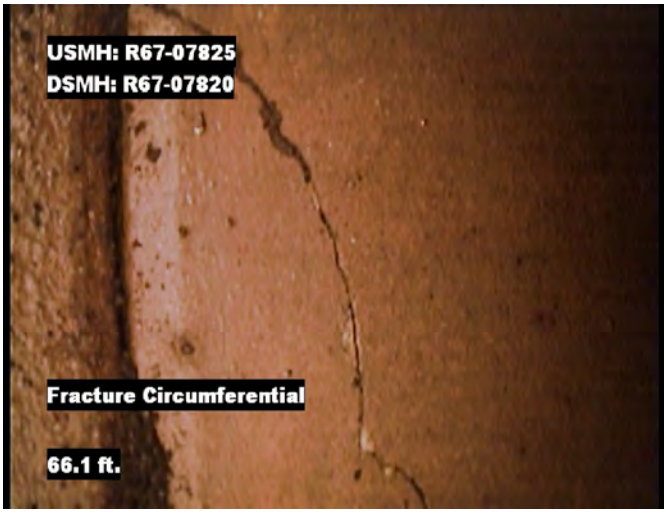
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:15

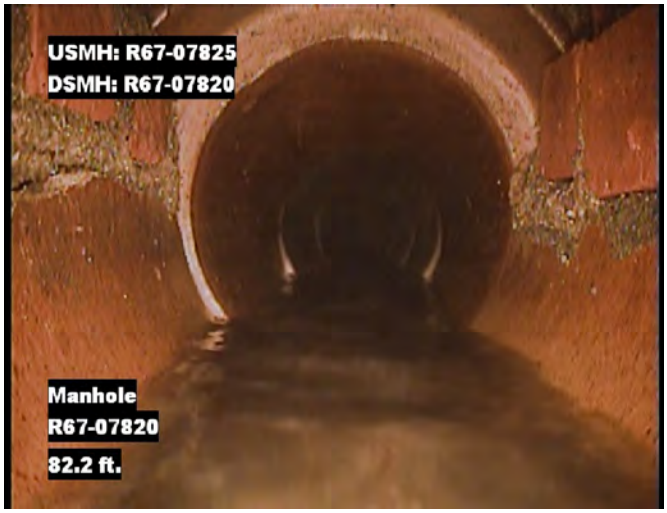
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 62.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 66.1 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



Distance: 82.2 ft. Grade: 0
Condition: Manhole
Remarks: R67-07820

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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	10:15

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4131	Pipe Segment Reference		
Quick Maint. Rating	N/A	R67-07825-R67-07820		
Quick Overall Rating	4131	Upstream MH	Downstream MH	
		R67-07825	R67-07820	

Length surveyed	Material	Shape	Height	Width
82.2	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	1	2	2	0	0	2	1	2
	3	1	3	3	0	0	3	1	3
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	3		Subtotals	0		Subtotals	3	
SUMMARY	Pipe Rating		9	Pipe Rating		0	Overall Pipe Rating		9
	Structural Index		3.0	O&M Index		0	Overall Index		3.0
	Str. Quick Rating		4131	O&M Quick Rating		0000	Ovrl. Quick Rating		4131

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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R67-07840	R67-07825	R67-07840-R67-07825	8/29/2017	South st	Vitrified Clay Pipe	8	132.3	132.3

Pipe Size: 8 Total Ln.: 132.3 Inspected Ln.: 132.3

Project Total Ln.: 132.3 Project Inspected Ln.: 132.3

Ted Berry Company
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207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	3200	Pipe Segment Reference		
Quick Maint. Rating	4400	R67-07840-R67-07825		
Quick Overall Rating	4432	Upstream MH	Downstream MH	
		R67-07840	R67-07825	
Length surveyed	Material	Shape	Height	Width
132.3	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

R67-07825

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R67-07825		0 - 0		0	
0.0 ft.	Water Level		0 - 0		15	
10.1 ft.	Camera Underwater	Start S01	0 - 0		0	
29.8 ft.	Camera Underwater	End F01	0 - 0		0	
41.3 ft.	Tap Break-in		12 - 0	4	5	
41.5 ft.	Fracture Longitudinal		12 - 0		5	
59.7 ft.	Fracture Longitudinal		12 - 0		5	
120.3 ft.	Tap Break-in		12 - 0	4	5	
132.3 ft.	Manhole R67-07840		0 - 0		5	

R67-07840

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207-897-3348

Image Report 4/Page

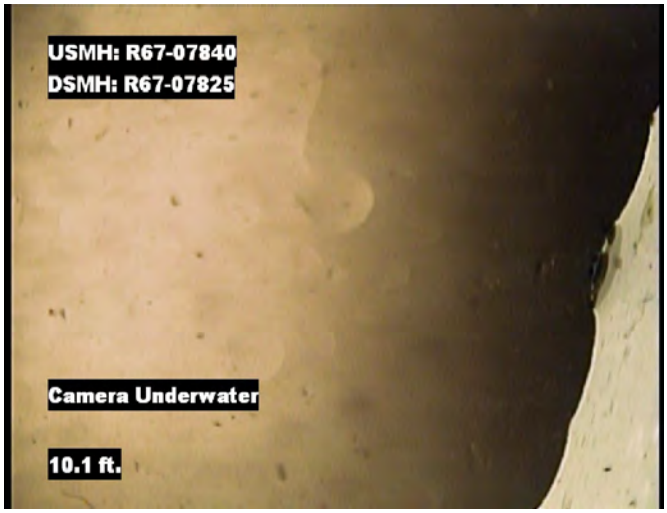
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R67-07825

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 10.1 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A

Distance: 29.8 ft. Grade: 4
Condition: Camera Underwater
Remarks: N/A

Ted Berry Company
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Livermore Maine 04253
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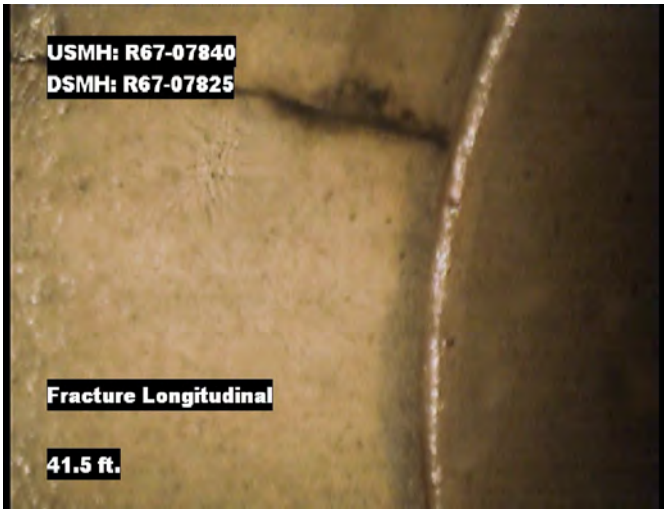
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	11:33

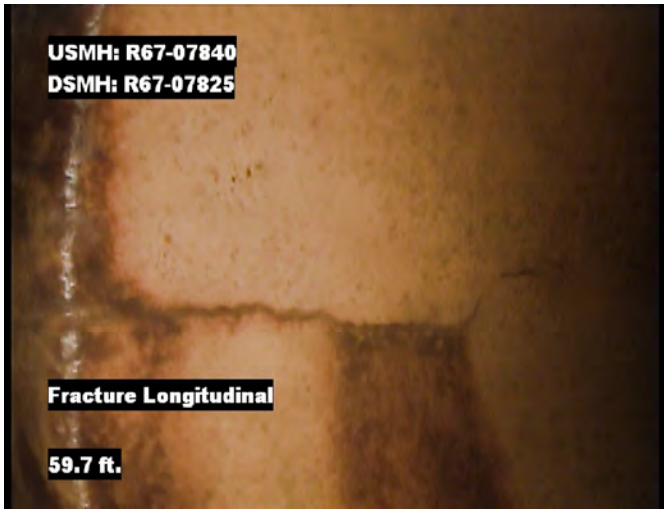
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

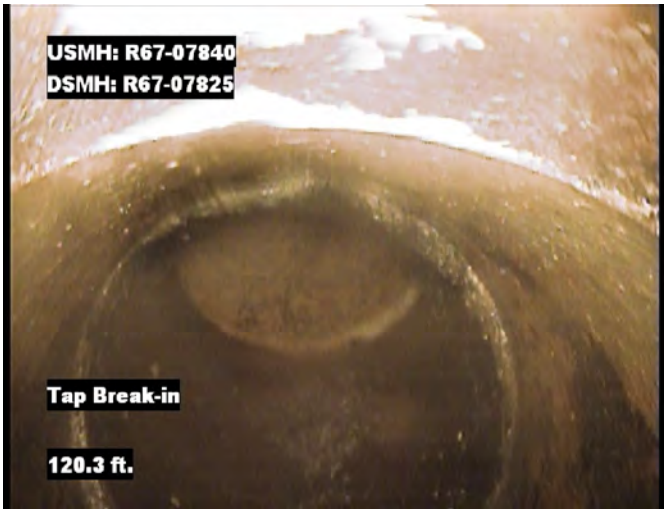
Distance: 41.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 41.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 59.7 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 120.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

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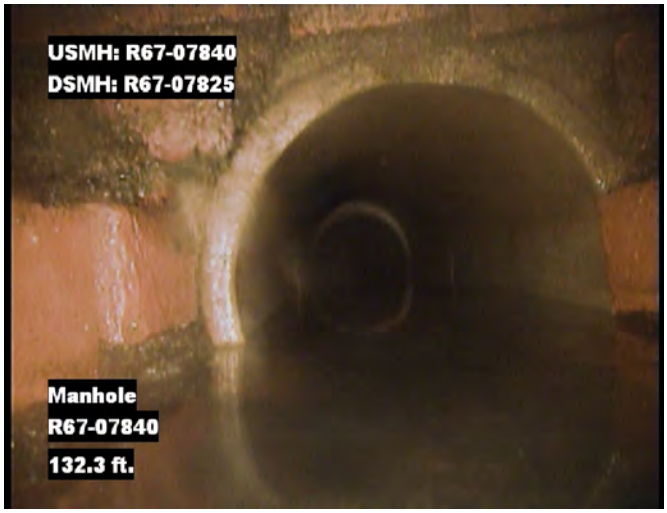
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	132.3 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R67-07840		

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207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	South st	20170829	11:33

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	3200	Pipe Segment Reference		
Quick Maint. Rating	4400	R67-07840-R67-07825		
Quick Overall Rating	4432	Upstream MH	Downstream MH	
		R67-07840	R67-07825	
Length surveyed	Material	Shape	Height	Width
132.3	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	Jetting	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	2	6	3	0	0	3	2	6
	4	0	0	4	0	0	4	0	0
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code ID Length									
MCU F01 19.7	0	0	0	4	4	16	4	4	16
	Subtotals	2		Subtotals	4		Subtotals	6	
SUMMARY	Pipe Rating		6	Pipe Rating		16	Overall Pipe Rating		22
	Structural Index		3.0	O&M Index		4.0	Overall Index		3.7
	Str. Quick Rating		3200	O&M Quick Rating		4400	Ovrl. Quick Rating		4432

GREEN MOUNTAIN Pipeline Services

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
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E-mail: corey.gmps@myfairpoint.net

Inspection Report / Inspection: 1

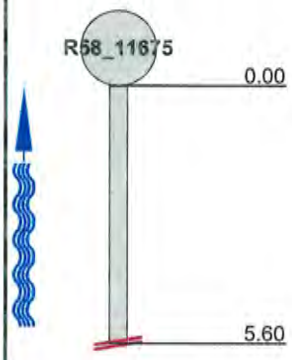
Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**49**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Cabot Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11680**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11675**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**5.60 ft**	Section Length	**5.60 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information :

1:50	Position	Code	Observation	Photo
R58_11675	0.00	AMH	Downstream Manhole, Survey Begins / MH R58_11675	
	5.60	MSA	Survey Abandoned / Due To Offset Joint.	



QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	**0000**	**0**	**0**	**0**	**0**	**0**	**0**

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/20/2011	**Cabot & Boynton**	**Dry**	**DJA**		**50**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/20/2011**	**Jetting**	

Street	**Cabot Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11680**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11675**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**0.00 ft**	Section Length	**0.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**6 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Unable To Complete Inspection.**

1:50	Position	Code	Observation	Photo
R67_11680	0.00	MSA	Survey Abandoned / Narrow Invert/ 3" Cut Out For Invert.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	**0000**	**0**	**0**	**0**	**0**	**0**	**0**

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/19/2011	**Cabot & Boynton**	**Dry**	**DJA**		**52**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/19/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11710**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R58_11700**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**138.60 ft**	Section Length	**138.60 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Unable To Complete Inspection From Opposite Direction.**

1:360	Position	Code	Observation	Photo
R58_11700	0.00	AMH	Downstream Manhole, Survey Begins / MH R58_11700	
	61.00	TBA	Tap Break-In Active, at 12 o'clock, 4", within 8 inches of joint: NO	
	67.20	MCU	Camera Underwater	
	84.50	MWLS	Water Level, Sag In Pipe, 85 % of Cross Sectional Area	
	93.50	JSM	Joint Separated Medium	
	104.10	DAE	Deposits Attached Encrustation, 5 % of Cross Sectional Area, At 10 o'clock, Within 8 inches of joint: NO	
	127.60	MCU	Camera Underwater	
	138.60	MSA	Survey Abandoned / Due To Rock.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
1100	**5142**	**1**	**15**	**16**	**1**	**3.75**	**3.2**

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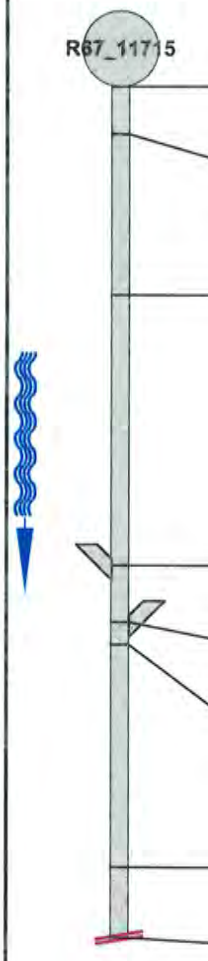
Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/19/2011	**Cabot & Boynton**	**Dry**	**DJA**		**53**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/19/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11715**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_11710**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**61.00 ft**	Section Length	**118.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Unable To Complete Inspection From Opposite Direction.**



1:165 Position	Code	Observation	Photo
0.00	AMH	Upstream Manhole, Survey Begins / MH R67_1715	
3.40	XP	Collapse Pipe Sewer, 40 %	36_37_190_A.JPG
15.00	FL	Fracture Longitudinal, at 12 o'clock, within 8 inches of joint: YES	
34.30	TFA	Tap Factory Made Active, at 03 o'clock, 5", within 8 inches of joint: YES	
38.40	TBA	Tap Break-In Active, at 10 o'clock, 5", within 8 inches of joint: YES	
40.00	MWLS	Water Level, Sag In Pipe, 60 % of Cross Sectional Area	
56.00	MCU	Camera Underwater	
61.00	MSA	Survey Abandoned / Heavy Sand From Broken Pipe Downstream.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5131	**4200**	**8**	**8**	**16**	**4**	**4**	**4**

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Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Boynton Street**	**7/19/2011**		**53**

Photo: 36_37_190_A.JPG, VCR No.: Waltham TV #1
3.4FT, Collapse Pipe Sewer, 40 %

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/19/2011	**Cabot & Boynton**	**Dry**	**DJA**		**54**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/19/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11720**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_11715**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**118.00 ft**	Section Length	**118.00 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information :

1:300	Position	Code	Observation	Photo
R67_11720	0.00	AMH	Upstream Manhole, Survey Begins / MH R67_11720	
	47.80	TBA	Tap Break-In Active, at 09 o'clock, 4", within 8 inches of joint: YES	
R67_11715	118.00	AMH	Downstream Manhole, Survey Ends / MH R67_11715	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	**0000**	**0**	**0**	**0**	**0**	**0**	**0**

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Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/8/2011	**Cabot & Boynton**	**Dry**	**EH**		**55**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/8/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11725**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_11720**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Downstream**
Location Code	**Light Highway**	Length surveyed	**108.40 ft**	Section Length	**108.40 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Will Complete Inspection From Opposite Direction.**

1:285 Position	Code	Observation	Photo
R67_11720			
0.00	AMH	Upstream Manhole, Survey Begins / MH R67_11720	
8.20	BVV	Broken Void Visible, from 10 to 01 o'clock, within 8 inches of joint: YES	29_30_152_A.jpg
10.80	RFJ	Roots Fine Joint, from 02 to 03 o'clock, within 8 inches of joint: YES	
14.00	RFJ	Roots Fine Joint, from 04 to 05 o'clock, within 8 inches of joint: YES	
55.30	FM	Fracture Multiple, from 09 to 03 o'clock, within 8 inches of joint: YES	29_30_155_A.jpg
56.50	TSA	Tap Saddle Active, at 12 o'clock, 4", within 8 inches of joint: NO	
68.90	RFJ	Roots Fine Joint, from 02 to 03 o'clock, within 8 inches of joint: YES	
95.30	MWLS	Water Level, Sag In Pipe, 5 % of Cross Sectional Area	
107.50	MMC	Material Change, Polyvinyl Chloride (PVC) / Repair	
108.40	JOL	Joint Offset Large / At PVC Repair.	
108.40	MSA	Survey Abandoned / Unable To Advance Past Repair.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5141	**2400**	**11**	**8**	**19**	**3.67**	**2**	**2.71**

GREEN MOUNTAIN Pipeline Services
241 Waterman Road, Royalton, VT 05068

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

Inspection photos / Inspection: 1

City :	Street :	Date :	Pipe Segment Reference :	Section No :
Waltham, MA	**Boynton Street**	**7/8/2011**		**55**

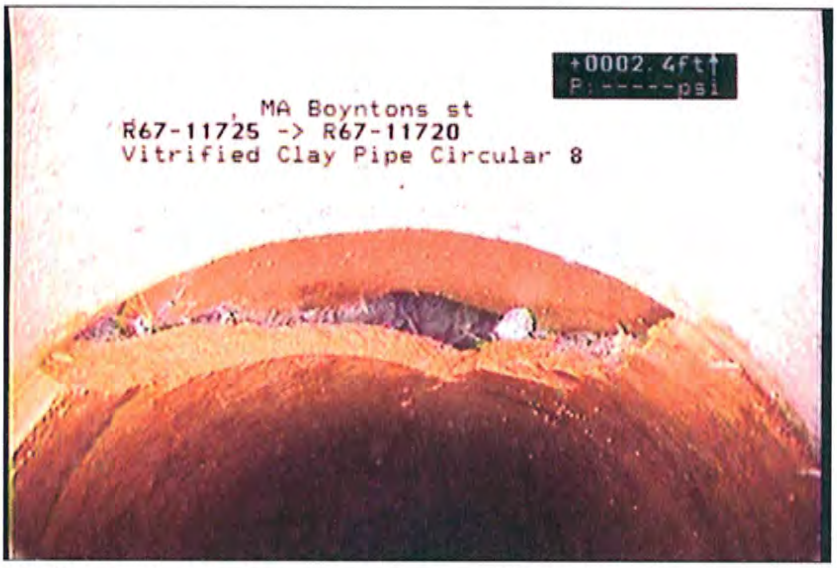


Photo: 29_30_152_A.jpg, VCR No.: Waltham TV #1
8.2FT, Broken Void Visible, from 10 to 01 o'clock, within 8 inches of joint: YES

Photo: 29_30_155_A.jpg, VCR No.: Waltham TV #1
55.3FT, Fracture Multiple, from 09 to 03 o'clock, within 8 inches of joint: YES

GREEN MOUNTAIN Pipeline Services

Green Mountain Pipeline Services, Inc.
244 Waterman Road
Royalton, VT 05068
Tel: 802-763-7022
Fax: 802-763-7048
E-mail: corey.gmps@myfairpoint.net

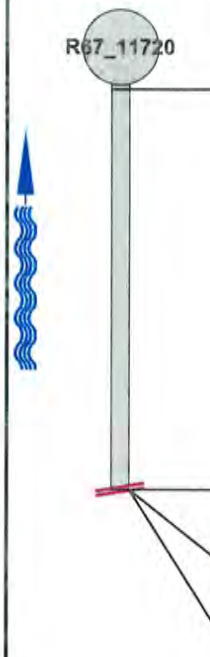
Inspection Report / Inspection: 1

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
7/8/2011	**Cabot & Boynton**	**Dry**	**EH**		**56**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
12345	**City of Waltham**	**Waltham, MA**	**7/8/2011**	**Jetting**	

Street	**Boynton Street**	Use of Sewer	**Sanitary**	Upstream MH	**R67_11725**
City	**Waltham, MA**	Drainage Area		Downstream MH	**R67_11720**
Loc. details		Flow Control	**Not Controlled**	Dir. of Survey	**Upstream**
Location Code	**Light Highway**	Length surveyed	**8.70 ft**	Section Length	**8.80 ft**

Purpose of Survey	**Routine Assessment**	Joint Length	**3.00 ft**
Year Laid		Dia./Height	**8 inch**
Year Rehabilitated		Material	**Vitrified Clay Pipe**
Tape / Media No.	**Waltham TV #1**	Lining Method	**Other**

Add. Information : **Total Line 120'. Inspection Complete.**



1:50 Position	Code	Observation	Photo
0.10	AMH	Downstream Manhole, Survey Begins / MH R67_11720	
8.80	MMC	Material Change, Polyvinyl Chloride (PVC) / Repair	
8.80	JSL	Joint Separated Large	
8.80	MSA	Survey Abandoned / Unable To Advance Past Repair.	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
2100	**0000**	**2**	**0**	**2**	**2**	**0**	**2**

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R68-07705	R68-11390	R68-07705-R68-11390	8/29/2017	Highland st	Vitrified Clay Pipe	8	244.3	244.3

Pipe Size: 8 Total Ln.: 244.3 Inspected Ln.: 244.3

Project Total Ln.: 244.3 Project Inspected Ln.: 244.3

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5131	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-07705-R68-11390		
Quick Overall Rating	5131	Upstream MH	Downstream MH	
		R68-07705	R68-11390	

Length surveyed	Material	Shape	Height	Width
244.3	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R68-07705

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R68-07705		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
0.0 ft.	General Observation Spider webs throughout pipe segment		0 - 0		0	
9.9 ft.	Tap Factory Capped		9 - 0	4	5	
20.2 ft.	Tap Factory		9 - 0	4	5	
32.2 ft.	Tap Factory		9 - 0	4	5	
46.3 ft.	Tap Factory		9 - 0	4	5	
5 65.1 ft.	Broken Pipe		11 - 1		5	
86.5 ft.	Tap Break-in		12 - 0	4	5	
107.1 ft.	Tap Factory		9 - 0	4	5	
137.5 ft.	Tap Break-in		12 - 0	4	5	
3 137.5 ft.	Fracture Longitudinal		12 - 0		5	
147.1 ft.	Tap Break-in		12 - 0	4	5	
151.2 ft.	Tap Factory Capped		9 - 0	4	5	

Ted Berry Company
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Defect Listing Plot Left

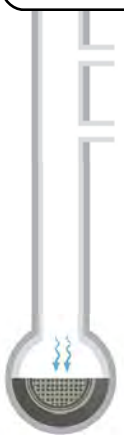
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5131	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-07705-R68-11390		
Quick Overall Rating	5131	Upstream MH	Downstream MH	
		R68-07705	R68-11390	
Length surveyed	Material	Shape	Height	Width
244.3	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks



177.1 ft.	Tap Break-in		12 - 0	4	5	
191.4 ft.	Tap Factory Capped		9 - 0	4	5	
236.8 ft.	Material Change		0 - 0		5	
	pvc					
244.3 ft.	Manhole		0 - 0		5	
	R68-11390					

R68-11390

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

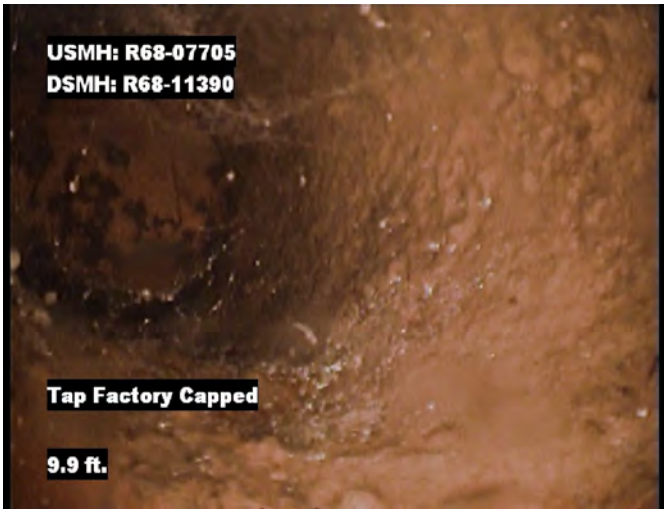
Image Report 4/Page

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Highland st	20170829	07:54
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R68-07705

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.0 ft. Grade: 0
Condition: General Observation
Remarks: Spider webs throughout pipe segment



Distance: 9.9 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
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207-897-3348

Image Report 4/Page

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Highland st	20170829	07:54
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance:	20.2 ft.	Grade:	0
Condition:	Tap Factory		
Remarks:	N/A		

Distance:	32.2 ft.	Grade:	0
Condition:	Tap Factory		
Remarks:	N/A		

Distance:	46.3 ft.	Grade:	0
Condition:	Tap Factory		
Remarks:	N/A		

Distance:	65.1 ft.	Grade:	5
Condition:	Broken Pipe		
Remarks:	N/A		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 86.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 107.1 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 137.5 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 137.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 147.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 151.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 177.1 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 191.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
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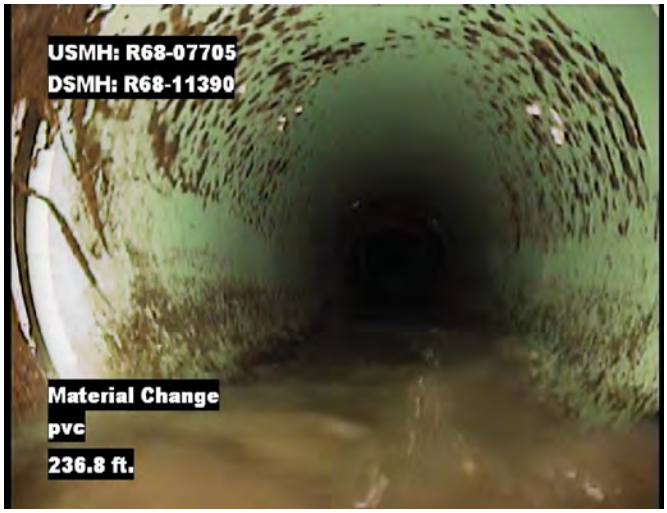
Image Report 4/Page

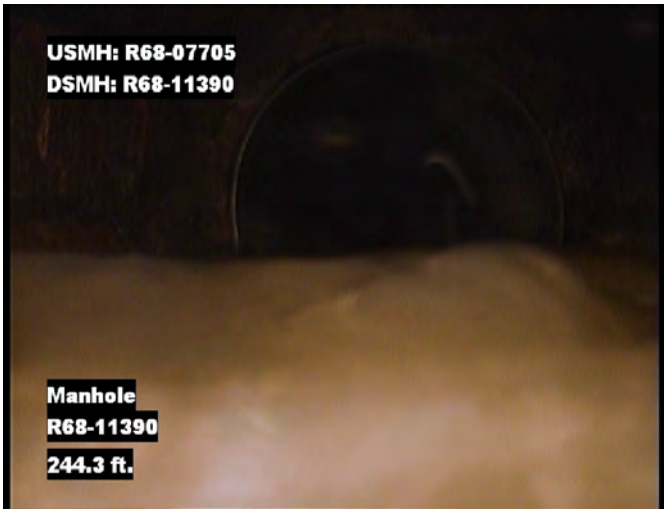
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	236.8 ft.	Grade:	0
Condition:	Material Change		
Remarks:	pvc		



Distance:	244.3 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R68-11390		

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170829	07:54

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5131	R68-07705-R68-11390	
Quick Maint. Rating	N/A	Upstream MH	Downstream MH
Quick Overall Rating	5131	R68-07705	R68-11390

Length surveyed	Material	Shape	Height	Width
244.3	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	1	3	3	0	0	3	1	3
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	2		Subtotals	0		Subtotals	2	
SUMMARY	Pipe Rating		8	Pipe Rating		0	Overall Pipe Rating		8
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		5131	O&M Quick Rating		0000	Ovrl. Quick Rating		5131

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R68-07725	R68-07720	R68-07725-R68-07720	8/29/2017	Hope ave	Vitrified Clay Pipe	6	50.1	50.1

Pipe Size: 6 Total Ln.: 50.1 Inspected Ln.: 50.1

Project Total Ln.: 50.1 Project Inspected Ln.: 50.1

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Hope ave	20170829	15:01

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-07725-R68-07720		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R68-07725	R68-07720	
Length surveyed	Material	Shape	Height	Width
50.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R68-07720

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R68-07720					
0.0 ft.	Water Level		0 - 0		5	
20.8 ft.	Tap Factory Capped		9 - 0	4	5	
26.2 ft.	Tap Factory		2 - 0	4	5	
33.5 ft.	Fracture Multiple		10 - 2		5	
50.1 ft.	Manhole		0 - 0		5	
	R68-07725					

R68-07725

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Hope ave	20170829	15:01

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R68-07720

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 20.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 26.2 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

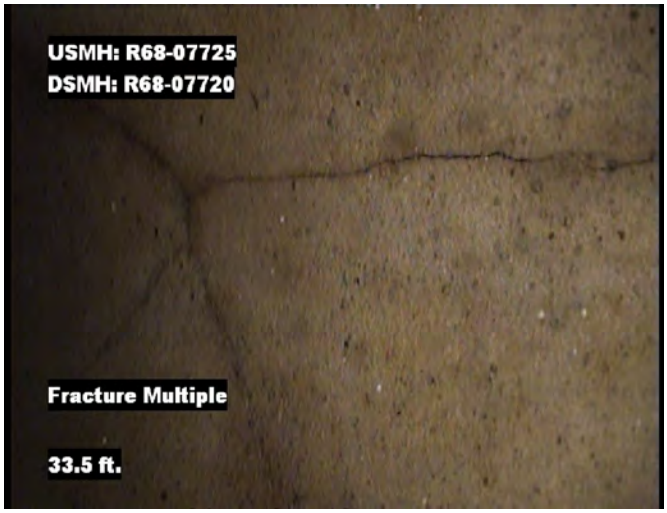
Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Hope ave	20170829	15:01

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 33.5 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 50.1 ft. Grade: 0
Condition: Manhole
Remarks: R68-07725

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Hope ave	20170829	15:01

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-07725-R68-07720		
Quick Overall Rating	4100	Upstream MH	Downstream MH	
		R68-07725	R68-07720	
Length surveyed	Material	Shape	Height	Width
50.1	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Upstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		4	Pipe Rating		0	Overall Pipe Rating		4
	Structural Index		4.0	O&M Index		0	Overall Index		4.0
	Str. Quick Rating		4100	O&M Quick Rating		0000	Ovrl. Quick Rating		4100

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R68-07890	R68-07885	R68-07890-R68-07885	8/31/2017	Dartmouth st	Vitrified Clay Pipe	6	294.8	294.8

Pipe Size: 6 Total Ln.: 294.8 Inspected Ln.: 294.8

Project Total Ln.: 294.8 Project Inspected Ln.: 294.8

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5100	R68-07890-R68-07885	
Quick Maint. Rating	3222	Upstream MH	Downstream MH
Quick Overall Rating	5132	R68-07890	R68-07885

Length surveyed	Material	Shape	Height	Width
294.8	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

R68-07890

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R68-07890					
0.0 ft.	Water Level		0 - 0		5	
14.5 ft.	Tap Factory		9 - 0	4	5	
24.5 ft.	Tap Factory Capped		3 - 0	4	5	
35.0 ft.	Tap Break-in		12 - 0	4	5	
62.4 ft.	Tap Factory Capped		9 - 0	4	5	
74.2 ft.	Tap Factory Capped		3 - 0	4	5	
78.8 ft.	Tap Break-in Active		3 - 0	4	5	
102.0 ft.	Material Change		0 - 0		5	
	pvc					
105.6 ft.	Material Change		0 - 0		5	
	vcp					
108.0 ft.	Tap Factory Capped		9 - 0	4	5	
115.9 ft.	Roots Fine Joint		11 - 1		5	
118.7 ft.	Tap Factory		9 - 0	4	5	
121.6 ft.	Tap Break-in		12 - 0	4	5	

1

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5100	R68-07890-R68-07885	
Quick Maint. Rating	3222	Upstream MH	Downstream MH
Quick Overall Rating	5132	R68-07890	R68-07885

Length surveyed	Material	Shape	Height	Width
294.8	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

	124.1 ft.	Tap Factory Capped		3 - 0	4	5	
	135.8 ft.	Tap Factory Capped		9 - 0	4	5	
5	160.8 ft.	Broken Pipe		6 - 8		5	
	161.0 ft.	Tap Break-in Active		9 - 0	4	5	
1	164.3 ft.	Roots Fine Joint		1 - 8		5	
1	168.3 ft.	Roots Fine Joint		2 - 10		5	
2	170.0 ft.	Deposits Attached Grease		9 - 0		5	
	171.7 ft.	Tap Factory Capped withroots		3 - 0	4	5	
	174.1 ft.	General Observation grease ball		0 - 0		5	
	175.4 ft.	Tap Factory with roots		9 - 0	4	5	
3	175.4 ft.	Roots Medium Lateral		9 - 0		5	
3	176.2 ft.	Roots Medium Joint		11 - 4		5	
2	178.3 ft.	Roots Tap Joint		7 - 5		80	
	178.4 ft.	Tap Factory Capped with roots		3 - 0	4	5	
	219.3 ft.	Tap Break-in		12 - 0	4	5	
	221.1 ft.	Tap Break-in Active		1 - 0	4	5	

Ted Berry Company
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207-897-3348

Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	3222	R68-07890-R68-07885		
Quick Overall Rating	5132	Upstream MH	Downstream MH	
		R68-07890	R68-07885	
Length surveyed	Material	Shape	Height	Width
294.8	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

223.4 ft.	Tap Factory Capped		2 - 0	4	5	
227.4 ft.	Tap Factory Capped		9 - 0	4	5	
247.4 ft.	Tap Factory		3 - 0	4	5	
251.5 ft.	Material Change		0 - 0		5	
	pvc					
294.8 ft.	Manhole		0 - 0		5	
	R68-07885					

R68-07885

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Dartmouth st	20170831	07:35
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R68-07890

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 14.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 24.5 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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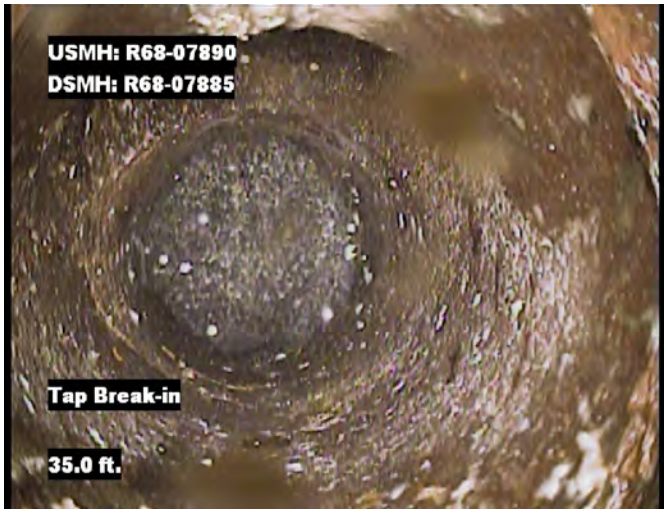
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

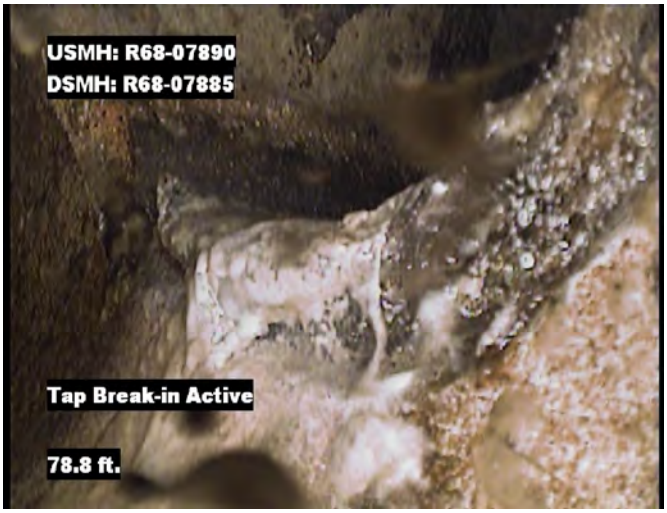
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 35.0 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 62.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 74.2 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 78.8 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

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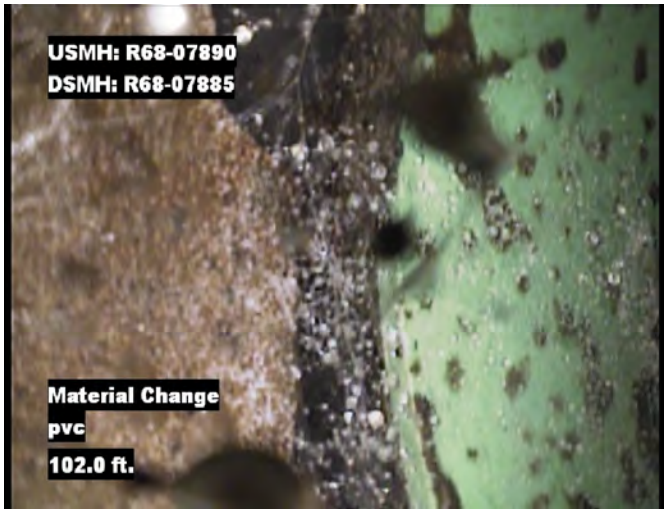
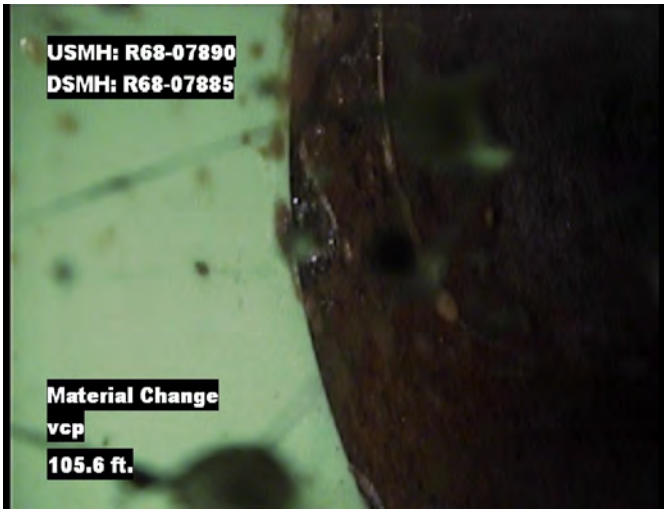
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

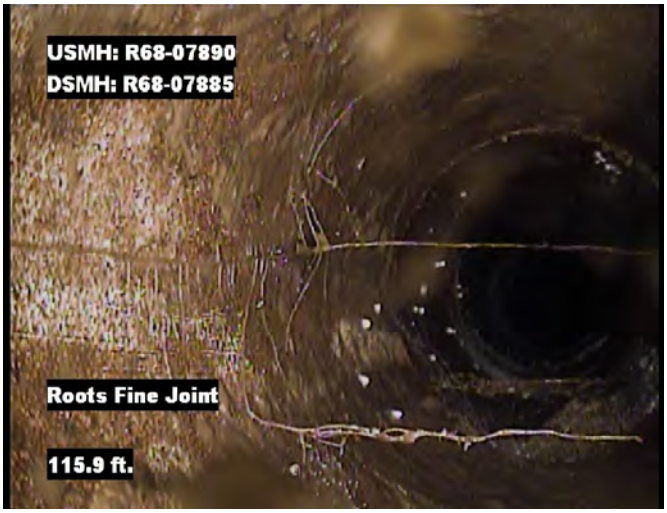


Distance: 102.0 ft. Grade: 0
Condition: Material Change
Remarks: pvc



Distance: 105.6 ft. Grade: 0
Condition: Material Change
Remarks: vcp

Distance: 108.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A



Distance: 115.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 118.7 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 121.6 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 124.1 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 135.8 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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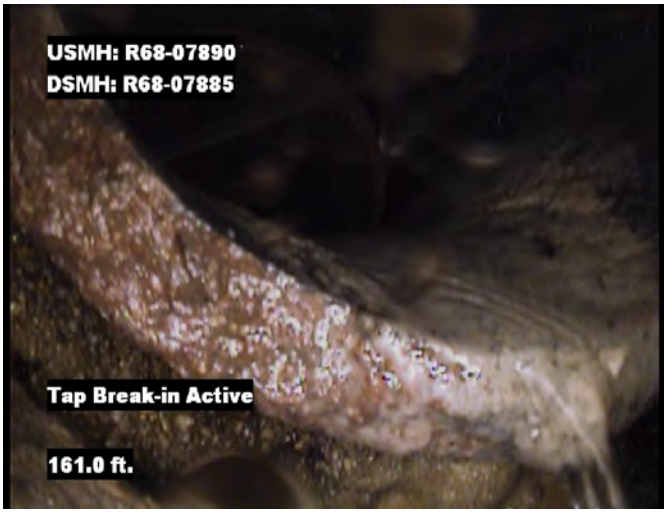
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 160.8 ft. Grade: 5
Condition: Broken Pipe
Remarks: N/A



Distance: 161.0 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 164.3 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 168.3 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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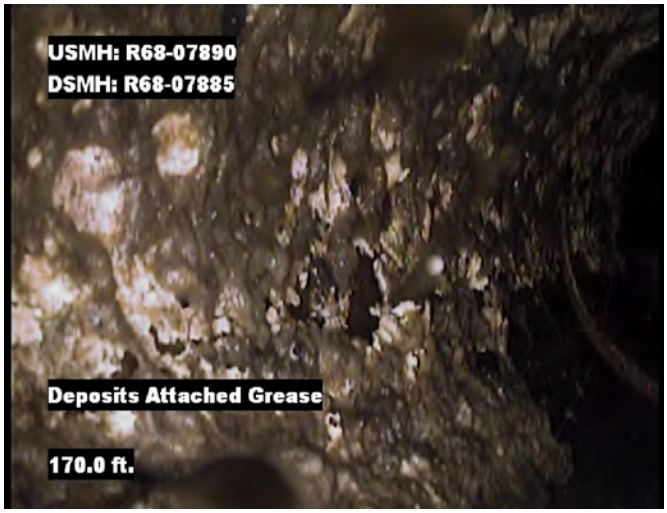
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 170.0 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 171.7 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: withroots

Distance: 174.1 ft. Grade: 0
Condition: General Observation
Remarks: grease ball

Distance: 175.4 ft. Grade: 0
Condition: Tap Factory
Remarks: with roots

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Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Dartmouth st	20170831	07:35
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance: 175.4 ft. Grade: 3
Condition: Roots Medium Lateral
Remarks: N/A

Distance: 176.2 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 178.3 ft. Grade: 2
Condition: Roots Tap Joint
Remarks: N/A

Distance: 178.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: with roots

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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 219.3 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A

Distance: 221.1 ft. Grade: 0
Condition: Tap Break-in Active
Remarks: N/A

Distance: 223.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 227.4 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

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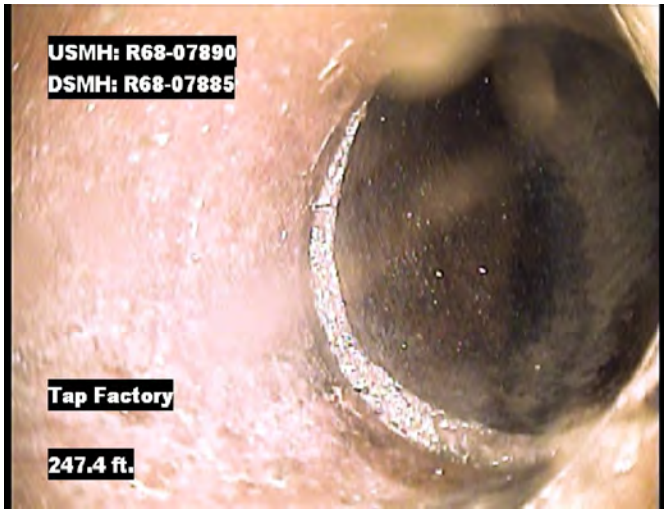
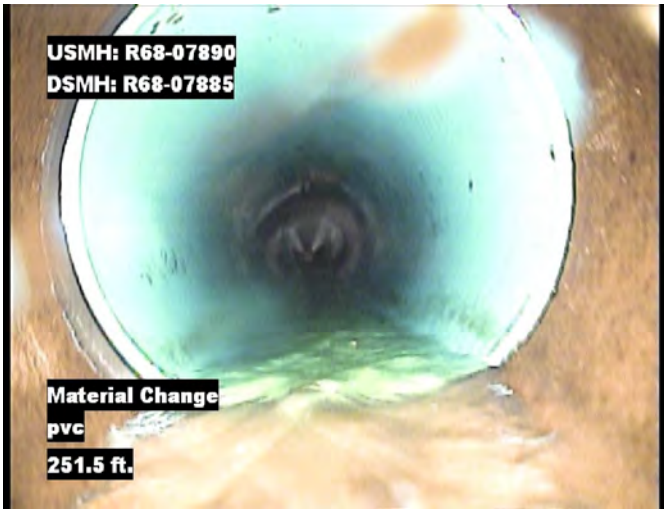
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 247.4 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 251.5 ft. Grade: 0
Condition: Material Change
Remarks: pvc

Distance: 294.8 ft. Grade: 0
Condition: Manhole
Remarks: R68-07885

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Dartmouth st	20170831	07:35

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

		Pipe Segment Reference	
Quick Struct. Rating	5100	R68-07890-R68-07885	
Quick Maint. Rating	3222	Upstream MH	Downstream MH
Quick Overall Rating	5132	R68-07890	R68-07885

Length surveyed	Material	Shape	Height	Width
294.8	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	Heavy Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	3	3	1	3	3
	2	0	0	2	2	4	2	2	4
	3	0	0	3	2	6	3	2	6
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5
Continuous Defects									
Code / ID / Length									
	Subtotals	1		Subtotals	7		Subtotals	8	
SUMMARY	Pipe Rating		5	Pipe Rating		13	Overall Pipe Rating		18
	Structural Index		5.0	O&M Index		1.9	Overall Index		2.3
	Str. Quick Rating		5100	O&M Quick Rating		3222	Ovrl. Quick Rating		5132

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R68-11380	R68-11375	R68-11380-R68-11375	9/12/2017	Pratt ave	Vitrified Clay Pipe	6	0	0

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 0

Project Total Ln.: 0.0 Project Inspected Ln.: 0.0

Ted Berry Company
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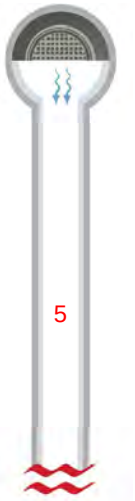
Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Pratt ave	20170912	09:21
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-11380-R68-11375		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R68-11380	R68-11375	
Length surveyed	Material	Shape	Height	Width
N/A	Vitrified Clay Pipe	Circular	6	6
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				



R68-11380

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole		0 - 0		0	
	R68-11380					
0.0 ft.	Water Level		0 - 0		5	
0.0 ft.	Broken Pipe Void Visible		6 - 0		0	
0.0 ft.	Survey Abandoned		0 - 0		0	
	unable to navigate past broken pipe on bottom of invert					

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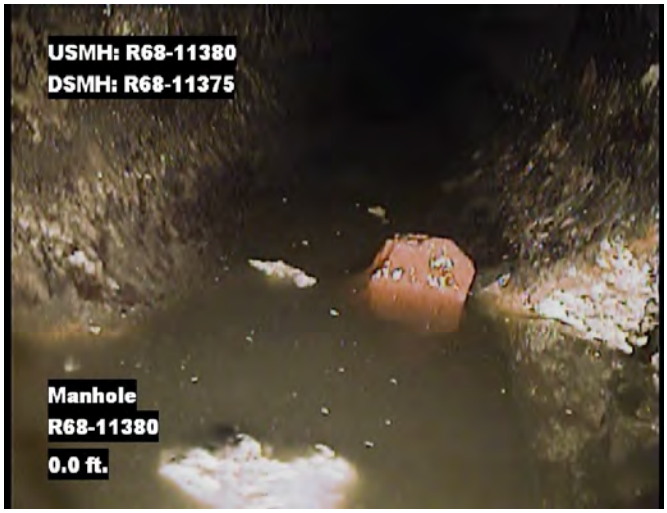
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Pratt ave	20170912	09:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

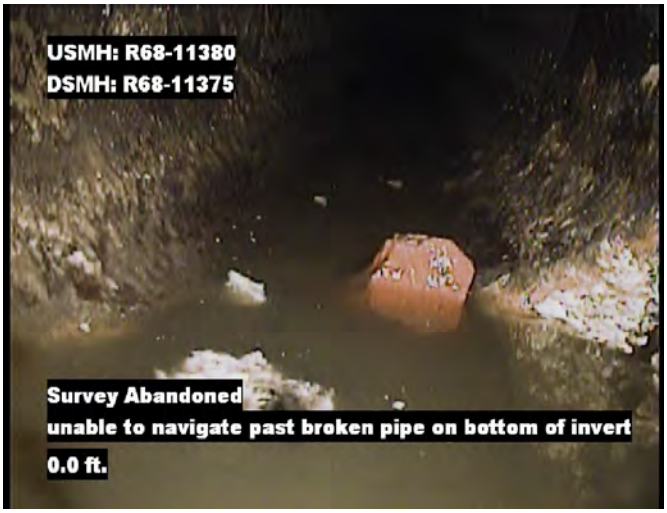
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	0.0 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R68-11380		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	0.0 ft.	Grade:	5
Condition:	Broken Pipe Void Visible		
Remarks:	N/A		



Distance:	0.0 ft.	Grade:	0
Condition:	Survey Abandoned		
Remarks:	unable to navigate past broken pipe on bottom of invert		

Ted Berry Company
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PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Pratt ave	20170912	09:21

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	5100	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-11380-R68-11375		
Quick Overall Rating	5100	Upstream MH	Downstream MH	
		R68-11380	R68-11375	

Length surveyed	Material	Shape	Height	Width
N/A	Vitrified Clay Pipe	Circular	6	6

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	0	0	3	0	0	3	0	0
	4	0	0	4	0	0	4	0	0
	5	1	5	5	0	0	5	1	5

Continuous Defects

Code	ID	Length

	Subtotals	1		Subtotals	0		Subtotals	1	
SUMMARY	Pipe Rating		5	Pipe Rating		0	Overall Pipe Rating		5
	Structural Index		5.0	O&M Index		0	Overall Index		5.0
	Str. Quick Rating		5100	O&M Quick Rating		0000	Ovrl. Quick Rating		5100

Ted Berry Company
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Project Summary

Project Name:	Wright Pierce - Waltham MA							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R68-11385	R68-11170	R68-11385-R68-11170	8/30/2017	Highland st	Vitrified Clay Pipe	8	250.5	250.5

Pipe Size: 8 Total Ln.: 250.5 Inspected Ln.: 250.5

Project Total Ln.: 250.5 Project Inspected Ln.: 250.5

Ted Berry Company
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Defect Listing Plot Left

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4133	Pipe Segment Reference	R68-11385-R68-11170
Quick Maint. Rating	N/A		
Quick Overall Rating	4133	Upstream MH: R68-11385	Downstream MH: R68-11170

Length surveyed	Material	Shape	Height	Width
250.5	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

R68-11385

	Code:	Continuous:	Pos:	Val 1 / 2 :	% :	Gallons:
0.0 ft.	Manhole R68-11385		0 - 0		0	
0.0 ft.	Water Level		0 - 0		5	
5.0 ft.	Tap Factory Capped		3 - 0	4	5	
51.0 ft.	Tap Factory Active		3 - 0	4	5	
55.0 ft.	Tap Factory Capped		3 - 0	4	5	
93.7 ft.	Tap Factory		9 - 0	4	5	
97.7 ft.	Tap Factory		3 - 0	4	5	
107.1 ft. 3	Fracture Longitudinal		12 - 0		5	
109.1 ft. 4	Fracture Multiple		7 - 11		5	
113.1 ft. 3	Fracture Longitudinal		3 - 0		5	
132.5 ft.	Tap Factory		9 - 0	4	5	
136.3 ft.	Tap Factory Lateral connection for R68_00380 to Non existant R68_11375		9 - 0	6	5	
178.4 ft.	Tap Break-in		9 - 0	4	5	
178.4 ft. 3	Fracture Longitudinal		12 - 0		5	

Ted Berry Company
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Defect Listing Plot Left

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Highland st	20170830	08:04
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Quick Struct. Rating	4133	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-11385-R68-11170		
Quick Overall Rating	4133	Upstream MH	Downstream MH	
		R68-11385	R68-11170	
Length surveyed	Material	Shape	Height	Width
250.5	Vitrified Clay Pipe	Circular	8	8
Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	
Remarks				

215.1 ft.	Tap Factory Active		9 - 0	4	5	
245.3 ft.	Water Level		0 - 0		15	
250.5 ft.	Manhole		0 - 0		0	
	R68-11170					

R68-11170

Ted Berry Company
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Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 0.0 ft. Grade: 0
Condition: Manhole
Remarks: R68-11385

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 5.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 51.0 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A

Ted Berry Company
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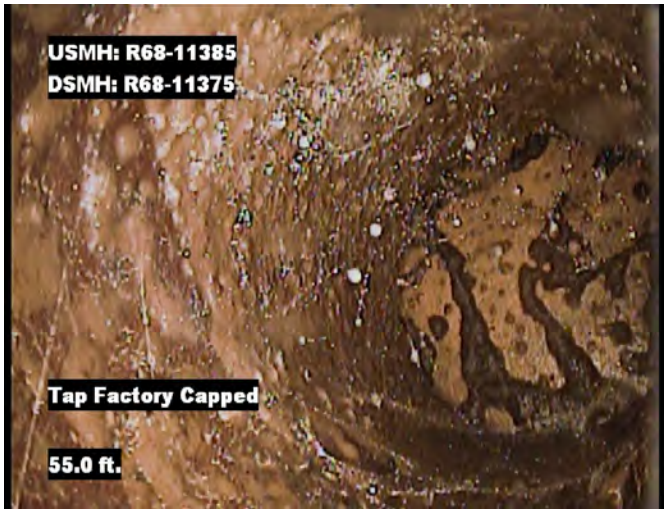
Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

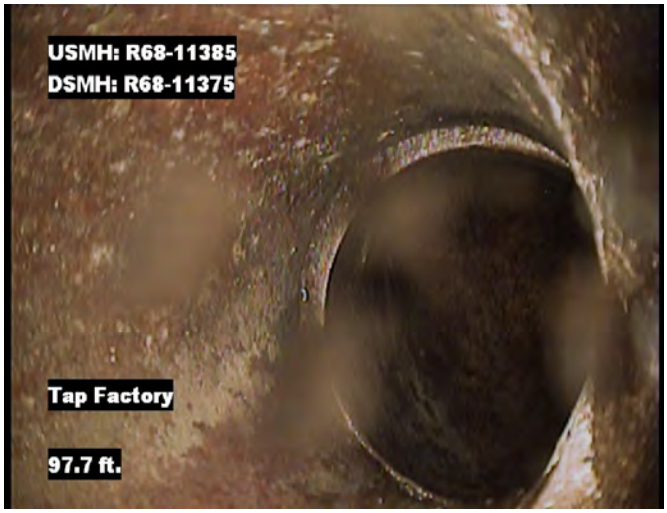
Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance: 55.0 ft. Grade: 0
Condition: Tap Factory Capped
Remarks: N/A

Distance: 93.7 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A



Distance: 97.7 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

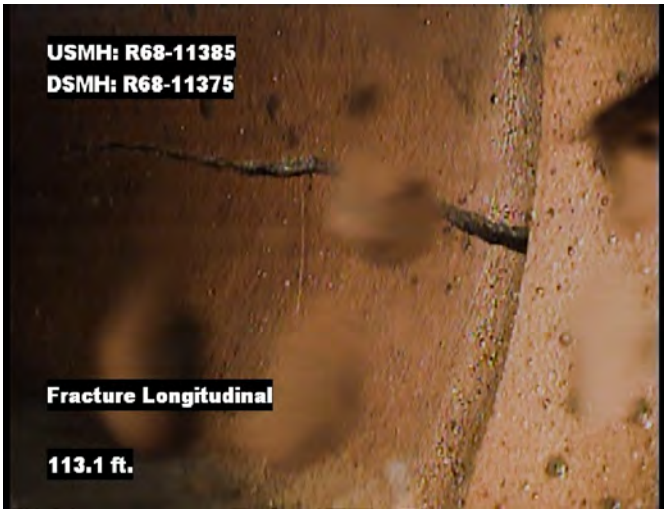
Distance: 107.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Ted Berry Company
521 Federal Rd
Livermore Maine 04253
207-897-3348

Image Report 4/Page

Customer		City	Street	Date	Time
Wright-Pierce		Waltham MA	Highland st	20170830	08:04
Surveyed By	**Certificate Number**	**Work Order**	**Location Code**	**Weather**	
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry	
Purpose of Survey			**Project Name**		
Routine Assessment			1314B Bear Hill Valley and West End		

Distance: 109.1 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A



Distance: 113.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 132.5 ft. Grade: 0
Condition: Tap Factory
Remarks: N/A

Distance: 136.3 ft. Grade: 0
Condition: Tap Factory
Remarks: Lateral connection for R68_00380 to Non existant R68_11375

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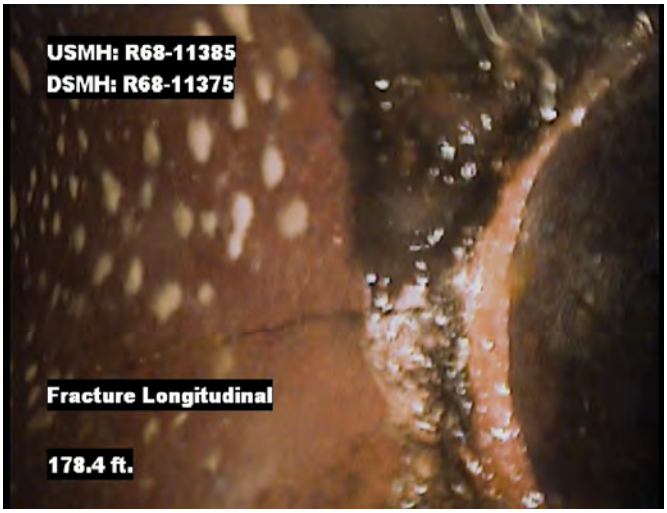
Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

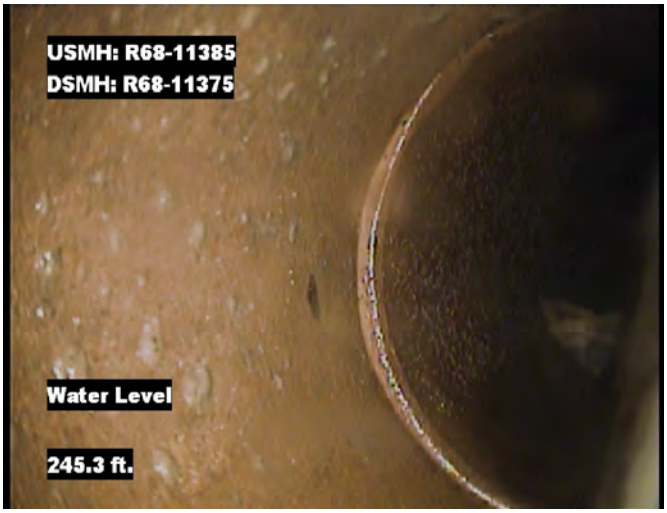
Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Distance: 178.4 ft. Grade: 0
Condition: Tap Break-in
Remarks: N/A



Distance: 178.4 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 215.1 ft. Grade: 0
Condition: Tap Factory Active
Remarks: N/A



Distance: 245.3 ft. Grade: 0
Condition: Water Level
Remarks: N/A

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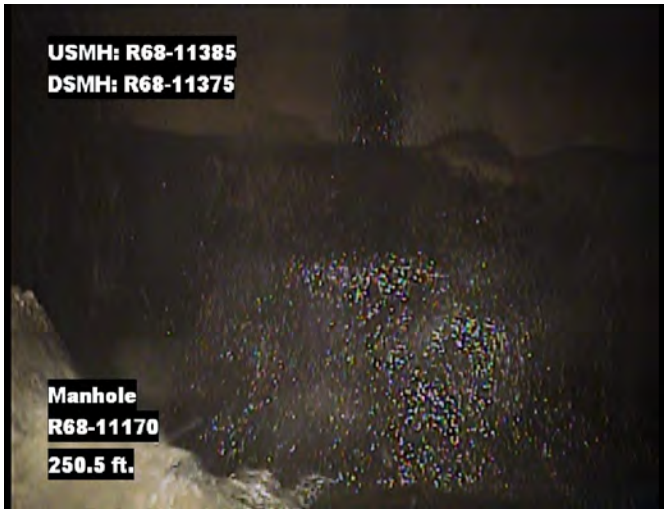
207-897-3348

Image Report 4/Page

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End



Distance:	250.5 ft.	Grade:	0
Condition:	Manhole		
Remarks:	R68-11170		

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207-897-3348

PACP Conditions

Customer	City	Street	Date	Time
Wright-Pierce	Waltham MA	Highland st	20170830	08:04

Surveyed By	Certificate Number	Work Order	Location Code	Weather
Brian_Turcotte	U-214-06020390	M-16-00212	Light Highway	Dry

Purpose of Survey	Project Name
Routine Assessment	1314B Bear Hill Valley and West End

Quick Struct. Rating	4133	Pipe Segment Reference		
Quick Maint. Rating	N/A	R68-11385-R68-11170		
Quick Overall Rating	4133	Upstream MH	Downstream MH	
		R68-11385	R68-11170	

Length surveyed	Material	Shape	Height	Width
250.5	Vitrified Clay Pipe	Circular	8	8

Direction	Sewer Use	Flow Control	Pre-Cleaning	Lining Method
Downstream	Sanitary	Not Controlled	No Pre-Cleaning	

Remarks

Normal Defects	Structural Ratings			O & M Ratings			Combined Ratings		
	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating	Grade Rating	No. Occur.	Rating
	1	0	0	1	0	0	1	0	0
	2	0	0	2	0	0	2	0	0
	3	3	9	3	0	0	3	3	9
	4	1	4	4	0	0	4	1	4
	5	0	0	5	0	0	5	0	0
Continuous Defects									
Code / ID / Length									
	Subtotals	4		Subtotals	0		Subtotals	4	
SUMMARY	Pipe Rating		13	Pipe Rating		0	Overall Pipe Rating		13
	Structural Index		3.3	O&M Index		0	Overall Index		3.3
	Str. Quick Rating		4133	O&M Quick Rating		0000	Ovrl. Quick Rating		4133

APPENDIX D.2
Manhole Inspection Reports

MACP7 Survey of R48_03775

Sheet No 25 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 11:47 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** bear hill road **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 14.0 ft. **Grade to Invert** 14.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 7.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Conical centered **Material** Concrete (precast) **Depth** 8.1 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 13.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R48_03775

Sheet No	25	**Date**	2017/04/26	**P.O. No**	
Street	bear hill road			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	14.0 ft.	Out	CP	C	22 in.		S	S	GR	
	Comments										
2	9	8.2 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										
3	12	14.0 ft.	In	CP	C	22 in.		S	S	GR	
	Comments										
4	3	4.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.7 ft.		CMI	MMS							3	12	
	Remarks											
7.3 ft.		COI	SRI							12	12	
	Remarks											
8.4 ft.		WI	IR							9		
	Remarks											
8.4 ft.		WI	SRI							12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
O&M:	**Pipe Rating** 11	**Pipe Ratings Index** 1.4	**Quick Rating** 4117
Overall:	**Pipe Rating** 19	**Pipe Ratings Index** 2.5	**Quick Rating** 4121

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MACP7 Survey of R48_06515

Sheet No 44 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 10:53 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bear Hill Rd **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 8.8 ft. **Grade to Invert** 8.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 4.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 8.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

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MACP7 Survey of R48_06515

Sheet No	44	**Date**	2017/04/26	**P.O. No**	
Street	Bear Hill Rd			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.8 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	8.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							7		
	Remarks											
1.7 ft.		CMI	IW							6		
	Remarks											
8.2 ft.		WI	IWJ		J					11		
	Remarks											
8.2 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	2315
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4123

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MACP7 Survey of R48_06525

Sheet No 42 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 09:53 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bear Hill Rd **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.1 ft. **Grade to Invert** 5.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Flattop **Material** Concrete (precast) **Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type**
Channel Exposure **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R48_06525

Sheet No	42	**Date**	2017/04/26	**P.O. No**	
Street	Bear Hill Rd			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.1 ft.	Out	VCP	C	10 in.		S	S	GR	
	Comments										
2	9	4.0 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										
3	5	3.8 ft.	In	VCP	C	6 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							5	9	
	Remarks											
0.8 ft.		CMI	IS							4	6	
	Remarks											
4.9 ft.		B	DSGV				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of R48_06530

Sheet No 24 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 11:23 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** bear hill road **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 4.9 ft. **Grade to Invert** 4.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 21.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 1.8 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R48_06530

Sheet No	24	**Date**	2017/04/26	**P.O. No**	
Street	bear hill road			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	4.9 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	4.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.7 ft.		CMI	IWJ		J					12	12	
	Remarks											
2.0 ft.		COI	MB							2		
	Remarks											
4.1 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 11	**Pipe Ratings Index** 1.6	**Quick Rating** 3122
Overall:	**Pipe Rating** 19	**Pipe Ratings Index** 3.2	**Quick Rating** 4131

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MACP7 Survey of R48_06550

Sheet No 23 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 10:58 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** bear hill road **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 21.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.1 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition** Not Known

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Other

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MACP7 Survey of R48_06550

Sheet No	23	**Date**	2017/04/26	**P.O. No**	
Street	bear hill road			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	10	6.8 ft.	In	PVC	C	8 in.		S	S	LB	
	Comments										
3	11	7.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	1	6.3 ft.	In	PVC	C	6 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	IWJ		J					12	12	
	Remarks											
2.2 ft.		CMI	MB							9		
	Remarks											
6.5 ft.		B	DSF				85			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	13	**Pipe Ratings Index**	1.4	**Quick Rating**	3122
Overall:	**Pipe Rating**	21	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of r48_06555

Sheet No 22 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 10:25 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** bear hill road **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.8 ft. **Grade to Invert** 8.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 21.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.4 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 8.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining Not Known **Bench Condition** Sound

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Other

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MACP7 Survey of r48_06555

Sheet No	22	**Date**	2017/04/26	**P.O. No**	
Street	bear hill road			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	8.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.7 ft.		CMI	IWJ		J					12	12	
	Remarks											
1.2 ft.		CMI	MB							10		
	Remarks											
8.0 ft.		B	DSZ				50			12	12	
	Remarks	large stone on bench										

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.6	**Quick Rating**	3122
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3.2	**Quick Rating**	4131

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MACP7 Survey of R48-06565

Sheet No 7 **Surveyed By** RLT **Certificate #** ## **Reviewed By**
Owner Waltham **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/22 **Time** 22:27 **Weather** Dry **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Tower Road **City** Waltham
Location Code Local Rural Streets **Inflow Potential from Runoff**
Manhole Surface Types Grass/Dirt
Location Details Southwest Corner of Market Basket
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 15.2 ft. **Grade to Invert** 14.5 ft. **Rim to Grade** 0.7 ft. **Rim to Grade Exposed** 0.7 ft.
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 32.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 32.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 2.0 in.
Clear Opening Diameter 30.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 30 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth** 0.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 13.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 11 **Step Material** Metal

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MACP7 Survey of R48-06565

Sheet No	7	**Date** 2017/04/22	**P.O. No**
Street	Tower Road		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	15.2 ft.	Out	DIP	C	36 in.		S	S	GR	
	Comments										
2	12	15.2 ft.	In	DIP	C	36 in.		S	S	GR	
	Comments										

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	2	**Quick Rating**	5113
O&M:	**Pipe Rating**	5	**Pipe Ratings Index**	1	**Quick Rating**	1500
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	3	**Quick Rating**	5118

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MACP7 Survey of R48-06580

Sheet No 1 **Surveyed By** RLT **Certificate #** ## **Reviewed By**
Owner Waltham **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/19 **Time** 09:11 **Weather** Dry **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Tower Road **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Grass/Dirt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 23.2 ft. **Grade to Invert** 23.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth** 6.0 in.

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition** Sound

Cone

Type Not Present **Material** Concrete (precast) **Depth** 0.0 ft.
Lining Interior None **Lining Exterior** None **Cone Condition** Sound

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.8 ft. **Lining Interior** None **Lining Exterior** None
Wall Condition Sound

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition** Sound

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition** Sound
 # Steps 0 **Step Material** Brick

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MACP7 Survey of R48-06580

Sheet No	1	**Date** 2017/04/19	**P.O. No**
Street	Tower Road		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	23.2 ft.	Out	DIP	C	36 in.		S	S		
	Comments										
2	12	23.0 ft.	In	DIP	C	36 in.		S	S	GR	
	Comments										
3	3	23.0 ft.	In	DIP	C	24 in.		S	S	GR	
	Comments										

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 6	**Pipe Ratings Index** 1	**Quick Rating** 1600
Overall:	**Pipe Rating** 10	**Pipe Ratings Index** 2	**Quick Rating** 1A00

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MACP7 Survey of R49_06615

Sheet No 131 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/02 **Time** 12:00 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Lunda St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.6 ft. **Grade to Invert** 8.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 8.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

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MACP7 Survey of R48_06615

Sheet No	131	**Date**	2017/06/02	**P.O. No**	
Street	Lunda St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	3.0 ft.	In	PVC	C	4 in.		S	S	IU	
	Comments										
3	11	8.0 ft.	In	PVC	C	4 in.		S	S	IL	
	Comments										
4	2	8.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.5 ft.		CMI	MB							9	1	
	Remarks											
3.9 ft.		WI	IS							5		
	Remarks											
8.0 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1	**Quick Rating**	1900
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	2.6	**Quick Rating**	411A

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MACP7 Survey of R57-03650

Sheet No 18 **Surveyed By** RLT **Certificate #** ## **Reviewed By**
Owner Waltham **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/24 **Time** 13:46 **Weather** Dry **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** 159 Overland **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details Northern Parallel Run
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 17.1 ft. **Grade to Invert** 0.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Ductile Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** **Frame Depth** 6.5 in.

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition** Defective

Cone
Type Conical centered **Material** Concrete (precast) **Depth** 4.0 ft.
Lining Interior **Lining Exterior** **Cone Condition** Sound

Wall
Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 15.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 11 **Step Material** Metal

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MACP7 Survey of R57-03650

Sheet No	18	**Date** 2017/04/24	**P.O. No**
Street	159 Overland		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	17.1 ft.	Out	DIP	C	24 in.		S	S	GR	
	Comments										
2	1	14.7 ft.	In	DIP	C	24 in.		S	D	GR	
	Comments										
3	3	12.8 ft.	In	PVC	C	6 in.		S	D	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.5 ft.		CMI	MB							3	5	
	Remarks											
15.8 ft.		WI	IW							9		
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 7	**Pipe Ratings Index** 1.2	**Quick Rating** 2115
Overall:	**Pipe Rating** 15	**Pipe Ratings Index** 2.8	**Quick Rating** 4121

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MACP7 Survey of R58_03025

Sheet No 89 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 14:10 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Vernon St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.3 ft. **Grade to Invert** 10.3 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Metal

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MACP7 Survey of R58_03025

Sheet No	89	**Date** 2017/05/09	**P.O. No**
Street	Vernon St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.3 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	12	10.4 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										
3	5	8.3 ft.	In	CP	C	10 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.0 ft.		WI	RPP							2		
	Remarks	RPP										
7.2 ft.		WI	ISJ		J					12	12	
	Remarks											
9.1 ft.		WI	CL							3		
	Remarks											
9.1 ft.		WI	IR							3		
	Remarks	IR coming from CL										
9.2 ft.		WI	IW							9		
	Remarks											
9.3 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.4	**Quick Rating** 4121
Overall:	**Pipe Rating** 20	**Pipe Ratings Index** 2.6	**Quick Rating** 4122

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MACP7 Survey of R58_03030

Sheet No 63 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 14:34 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Vernon st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.5 ft. **Grade to Invert** 10.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.9 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 8.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (cast in place)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R58_03030

Sheet No	63	**Date**	2017/05/02	**P.O. No**	
Street	Vernon st			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.5 ft.	Out	CP	C	24 in.		S	S	GR	
	Comments										
2	1	10.4 ft.	In	CSB	C	24 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.5 ft.		COI	IWJ		J					12	12	
	Remarks											
4.9 ft.		WI	ISJ		J					6	12	
	Remarks											
8.0 ft.		WI	RPPD							1		
	Remarks	patch defective										

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.1	**Quick Rating**	2116
Overall:	**Pipe Rating**	16	**Pipe Ratings Index**	2.7	**Quick Rating**	4121

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MACP7 Survey of R58_03065

Sheet No 169 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/07 **Time** 13:01 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Nathan St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.2 ft. **Grade to Invert** 8.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Concrete (precast) **Depth** 4.2 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 6.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Metal

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MACP7 Survey of R58_03065

Sheet No	169	**Date**	2017/06/07	**P.O. No**	
Street	Nathan St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.2 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	9	7.6 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	11	7.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	1	6.8 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.3	**Quick Rating**	311A

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MACP7 Survey of R58_03070

Sheet No 170 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/07 **Time** 13:21 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Main St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.7 ft. **Grade to Invert** 7.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_03070

Sheet No	170	**Date** 2017/06/07	**P.O. No**
Street	Main St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.7 ft.	Out	VCP	C	10 in.		S	S	GR	
	Comments										
2	11	6.8 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										
3	5	5.9 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments	pipe is fluch with the bench must be used incase if surcharge									

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.3	**Quick Rating** 3115
Overall:	**Pipe Rating** 12	**Pipe Ratings Index** 2.3	**Quick Rating** 3119

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MACP7 Survey of R58_03075

Sheet No 171 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/07 **Time** 13:44 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Main St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.4 ft. **Grade to Invert** 7.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_03075

Sheet No	171	**Date**	2017/06/07	**P.O. No**	
Street	Main St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	5.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments	upper pipe coming in at 12									
3	12	7.4 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments	lower pipe coming in at 12									

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB							1	4	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.3	**Quick Rating**	3115
Overall:	**Pipe Rating**	16	**Pipe Ratings Index**	2.9	**Quick Rating**	4131

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MACP7 Survey of R_058_03620

Sheet No 180 **Surveyed By** RLT **Certificate #** U-616-07004543 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/20 **Time** 13:52 **Weather** **Pre-Cleaning** Not Known **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Overland **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed** 0.0 ft.
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Concrete (precast) **Depth** 4.8 ft.
Lining Interior **Lining Exterior** **Cone Condition** Sound

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 6.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition Sound

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R_058_03620

Sheet No	180	**Date** 2017/04/20	**P.O. No**
Street	Overland		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	DIP	C	24 in.		S	S	GR	
	Comments										
2	9	8.0 ft.	In	DIP	C	24 in.		S	S	GR	
	Comments										
3	12	4.8 ft.	In	RCP	C	12 in.		S	S	GR	
	Comments										

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	6	**Pipe Ratings Index**	1	**Quick Rating**	1600
Overall:	**Pipe Rating**	10	**Pipe Ratings Index**	2	**Quick Rating**	1A00

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MACP7 Survey of R58_06590

Sheet No 20 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 09:02 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Surface Inspection **CoF**
Drainage Area **Street** Lunda St **City** waltham
Location Code Woods **Inflow Potential from Runoff**
Manhole Surface Types Grass/Dirt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.6 ft. **Grade to Invert** 6.2 ft. **Rim to Grade** 3.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 23.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 2 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.8 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition** Not Known

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Other

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MACP7 Survey of R58_06590

Sheet No	20	**Date**	2017/04/26	**P.O. No**	
Street	Lunda St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Surface Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.3 ft.	In	VCP	C	8 in.		S	D	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB							12	12	
	Remarks											
1.3 ft.		CMI	RFJ		J					2	4	
	Remarks											
6.0 ft.		B	DSGV		J		100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	2	**Quick Rating**	4131
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.1	**Quick Rating**	2116
Overall:	**Pipe Rating**	18	**Pipe Ratings Index**	3.1	**Quick Rating**	4131

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MACP7 Survey of R58_06600

Sheet No 129 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/02 **Time** 11:15 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Lunda St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R58_06600

Sheet No	129	**Date**	2017/06/02	**P.O. No**	
Street	Lunda St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	8	2.0 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										
3	9	2.0 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										
4	10	2.0 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										
5	11	3.0 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										
6	12	7.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB							12	12	
	Remarks											
1.8 ft.		CMI	MMS							12	12	
	Remarks											
7.1 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	1.7	**Quick Rating**	4121
O&M:	**Pipe Rating**	13	**Pipe Ratings Index**	1.3	**Quick Rating**	3121
Overall:	**Pipe Rating**	23	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of R58_06610

Sheet No 130 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/02 **Time** 11:38 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Lunda St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.0 ft. **Grade to Invert** 7.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R58_06610

Sheet No	130	**Date**	2017/06/02	**P.O. No**	
Street	Lunda St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	7.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	2	5.3 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							12		
	Remarks											
0.8 ft.		CMI	MMS							12	12	
	Remarks											
1.5 ft.		CMI	MMS							12	12	
	Remarks											
6.7 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 12	**Pipe Ratings Index** 1.7	**Quick Rating** 4122
O&M:	**Pipe Rating** 10	**Pipe Ratings Index** 1.4	**Quick Rating** 3121
Overall:	**Pipe Rating** 22	**Pipe Ratings Index** 3.1	**Quick Rating** 4131

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MACP7 Survey of R58_06620

Sheet No 66 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 15:09 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Nathan Rd **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.0 ft. **Grade to Invert** 6.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_06620

Sheet No	66	**Date**	2017/05/02	**P.O. No**	
Street	Nathan Rd			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	9	4.0 ft.	In	VCP	C	8 in.		S	S	LB	
	Comments										
3	11	5.8 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.6 ft.		CMI	MB							3		
	Remarks											
1.8 ft.		CMI	MB							5		
	Remarks											
4.6 ft.		WI	OBP				20			7		
	Remarks											
4.6 ft.		WI	OBP				20			11		
	Remarks											
5.8 ft.		B	DSF				40			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	12	**Pipe Ratings Index**	2	**Quick Rating**	4214
O&M:	**Pipe Rating**	12	**Pipe Ratings Index**	1.3	**Quick Rating**	3121
Overall:	**Pipe Rating**	24	**Pipe Ratings Index**	3.3	**Quick Rating**	4231

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MACP7 Survey of R58_07615

Sheet No 90 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 14:35 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Vernon St **City** waltham
Location Code Sidewalk **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.6 ft. **Grade to Invert** 7.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_07615

Sheet No	90	**Date** 2017/05/09	**P.O. No**
Street	Vernon St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.6 ft.	Out	CP	C	10 in.		S	S	GR	
	Comments										
2	12	5.7 ft.	In	PVC	C	10 in.		S	S	GR	
	Comments										
3	12	7.6 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.5 ft.		CMI	MMS							12	12	
	Remarks											
4.5 ft.		WI	MB							12		
	Remarks											
6.7 ft.		B	DSGV				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 10	**Pipe Ratings Index** 1.7	**Quick Rating** 4121
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.8	**Quick Rating** 4122

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MACP7 Survey of R58_07630

Sheet No 2 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 08:56 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Winthrop St **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Cracked, Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R58_07630

Sheet No	2	**Date**	2017/11/14	**P.O. No**	
Street	Winthrop St			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	12.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.7 ft.		B	DSZ				40			12	12	
	Remarks	construction Debris										

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R58_07635

Sheet No 60 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 14:10 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Winthrop **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.1 ft. **Grade to Invert** 10.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Vented
Cover Shape Circular **Cover Size** 25.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** > 1 inch (25mm) <= 1 1/ **# Vent Holes** 1
Bearing Surface Diamter 25.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 23.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 5.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 10.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Brick

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MACP7 Survey of R58_07635

Sheet No	60	**Date**	2017/05/02	**P.O. No**	
Street	Winthrop			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	9	10.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	10.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
10.9 ft.		B	DSF				15			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.3	**Quick Rating**	311A

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MACP7 Survey of R58_07645

Sheet No 33 **Surveyed By** BOP **Certificate #** XXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/03 **Time** 13:12 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Pearl **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.1 ft. **Grade to Invert** 6.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 23.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_07645

Sheet No	33	**Date** 2017/05/03	**P.O. No**
Street	Pearl		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	6.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	1	5.8 ft.	In	VCP	C	8 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.2 ft.		WI	OBP				5			3		
	Remarks											
5.8 ft.		B	DSC				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 9	**Pipe Ratings Index** 1.1	**Quick Rating** 2117
Overall:	**Pipe Rating** 13	**Pipe Ratings Index** 2.1	**Quick Rating** 211A

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MACP7 Survey of R-58_07950

Sheet No 173 **Surveyed By** RLT **Certificate #** U-616-07004543 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/20 **Time** 13:46 **Weather** **Pre-Cleaning** Not Known **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** 130 Overland **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 11.2 ft. **Grade to Invert** 11.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 24.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 1.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition** Defective

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 10.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining Cementitious **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R-58_07950

Sheet No	173	**Date**	2017/04/20	**P.O. No**	
Street	130 Overland			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.2 ft.	Out	DIP	C	24 in.		S	S	GR	
	Comments										
2	12	11.2 ft.	In	DIP	C	24 in.		S	S	GR	
	Comments										
3	11	6.0 ft.	In	DIP	C	24 in.		S	S	GR	
	Comments										
4	11	4.5 ft.	In	DIP	C	4 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.7 ft.		CMI	MB							12	3	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1	**Quick Rating**	1700
Overall:	**Pipe Rating**	15	**Pipe Ratings Index**	2.6	**Quick Rating**	411A

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MACP7 Survey of R58_09960

Sheet No 167 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/07 **Time** 11:09 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Everett St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_09960

Sheet No	167	**Date**	2017/06/07	**P.O. No**	
Street	Everett St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	10	7.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	7.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	4	7.5 ft.	In	PVC	C	8 in.		S	S	LB	
	Comments										

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 9	**Pipe Ratings Index** 1.3	**Quick Rating** 3116
Overall:	**Pipe Rating** 13	**Pipe Ratings Index** 2.3	**Quick Rating** 311A

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MACP7 Survey of R58_09975

Sheet No 162 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/16 **Time** 12:54 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Eddy St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_09975

Sheet No	162	**Date**	2017/05/16	**P.O. No**	
Street	Eddy St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.1 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	7.4 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										
3	3	5.9 ft.	In	VCP	C	6 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
6.1 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.1	**Quick Rating**	2116
Overall:	**Pipe Rating**	12	**Pipe Ratings Index**	2.1	**Quick Rating**	211A

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MACP7 Survey of R58_09980

Sheet No 161 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/17 **Time** 12:50 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Eddy St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 5.0 ft. **Grade to Invert** 5.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Clay Tile **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_09980

Sheet No	161	**Date**	2017/05/17	**P.O. No**	
Street	Eddy St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.0 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	4.9 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
5.4 ft.		B	IWJ		J					1		
	Remarks											
5.4 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	2215
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.3	**Quick Rating**	2219

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MACP7 Survey of R58_09985

Sheet No 64 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 14:53 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Everett st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 5.2 ft. **Grade to Invert** 5.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 2.9 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Not Known
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Not Known **Channel Type** None
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_09985

Sheet No	64	**Date** 2017/05/02	**P.O. No**
Street	Everett st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.2 ft.	Out	CP	C	8 in.		S	S	GR	
	Comments										
2	12	5.2 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										
3	5	4.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							6		
	Remarks											
4.8 ft.		B	DSZ				100			12	12	
	Remarks	Deposits other										

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 10	**Pipe Ratings Index** 1.4	**Quick Rating** 3121
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 3	**Quick Rating** 4131

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MACP7 Survey of R58_09990

Sheet No 35 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/01 **Time** 08:06 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Nathan Rd **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Not Known **Channel Type** None
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_09990

Sheet No	35	**Date**	2017/05/01	**P.O. No**	
Street	Nathan Rd			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	8	4.5 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MMS							12	12	
	Remarks											
4.5 ft.		WI	OBP				10			3	6	
	Remarks											
7.3 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 14	**Pipe Ratings Index** 2.3	**Quick Rating** 221A

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MACP7 Survey of R58_09995

Sheet No 160 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/16 **Time** 12:46 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Everett St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.6 ft. **Grade to Invert** 5.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 5.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R58_09995

Sheet No	160	**Date** 2017/05/16	**P.O. No**
Street	Everett St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	5.3 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
2.8 ft.		CMI	ISJ		J					12	12	
	Remarks											
3.1 ft.		WI	ISJ		J					12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.3	**Quick Rating**	311A

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MACP7 Survey of R58_10005

Sheet No 37 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/01 **Time** 08:28 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Nathan Rd **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt, Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.7 ft. **Grade to Invert** 6.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_10005

Sheet No	37	**Date**	2017/05/01	**P.O. No**	
Street	Nathan Rd			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							12	12	
	Remarks											
5.0 ft.		WI	OBP				30			7		
	Remarks											
5.0 ft.		WI	OBP				30			11		
	Remarks											
6.0 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	2315
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4123

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MACP7 Survey of R58_10010

Sheet No 36 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/01 **Time** 08:19 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Nathan Rd **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.4 ft. **Grade to Invert** 7.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R58_10010

Sheet No	36	**Date** 2017/05/01	**P.O. No**
Street	Nathan Rd		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	5.3 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										
3	12	7.2 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MMS							1		
	Remarks											
1.0 ft.		CMI	MB							4		
	Remarks											

Scores

Structural:	**Pipe Rating** 10	**Pipe Ratings Index** 1.7	**Quick Rating** 4121
O&M:	**Pipe Rating** 6	**Pipe Ratings Index** 1	**Quick Rating** 1600
Overall:	**Pipe Rating** 16	**Pipe Ratings Index** 2.7	**Quick Rating** 4121

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MACP7 Survey of R58_11565

Sheet No 2 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/08/17 **Time** 08:42 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** weston st **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.1 ft. **Grade to Invert** 6.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_11565

Sheet No	2	**Date**	2017/08/17	**P.O. No**	
Street	weston st			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.1 ft.	Out	VCP	C	10 in.		S	s	GR	
	Comments										
2	2	6.2 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										
3	3	6.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
5.0 ft.		WI	OBP				20			4		
	Remarks											
5.6 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.1	**Quick Rating**	2117
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.1	**Quick Rating**	211A

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MACP7 Survey of R58_11610

Sheet No 92 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 15:29 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Vernon St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.5 ft. **Grade to Invert** 10.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 0.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.1 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R58_11610

Sheet No	92	**Date** 2017/05/09	**P.O. No**
Street	Vernon St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.5 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	8	10.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	10.5 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	IWJ		J					12	12	
	Remarks											
4.1 ft.		COI	IWJ		J					12	12	
	Remarks											
7.0 ft.		WI	IWJ		J					12	12	
	Remarks											
9.3 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 16	**Pipe Ratings Index** 1.6	**Quick Rating** 3124
Overall:	**Pipe Rating** 20	**Pipe Ratings Index** 2.6	**Quick Rating** 3124

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MACP7 Survey of R58_11615

Sheet No 8 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 10:57 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Auburn St **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_11615

Sheet No	8	**Date**	2017/11/14	**P.O. No**	
Street	Auburn St			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	7.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.2 ft.		CMI	MB							12	4	
	Remarks											
6.7 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	3.1	**Quick Rating**	4131

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MACP7 Survey of R58_11645

Sheet No 1 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/08/17 **Time** 08:29 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Cabot st **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.0 ft. **Grade to Invert** 11.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Conical off centered **Material** Concrete (precast) **Depth** 5.9 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Plastic

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MACP7 Survey of R58_11645

Sheet No	1	**Date** 2017/08/17	**P.O. No**
Street	Cabot st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.0 ft.	Out	CP	C	30 in.		S	S	gr	
	Comments										
2	9	7.5 ft.	In	VCP	C	10 in.		S	S	gr	
	Comments										
3	12	9.4 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										
4	2	11.1 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB							2		
	Remarks											
2.3 ft.		WI	SRI							12	12	
	Remarks											
9.9 ft.		WI	SRI							12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	1.4	**Quick Rating**	4116
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1	**Quick Rating**	1700
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	2.4	**Quick Rating**	411A

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MACP7 Survey of R58_11650

Sheet No 30 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/03 **Time** 11:30 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Cabot **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 4.4 ft. **Grade to Invert** 4.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Vented
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** > 1/2 inch (10mm) <= 1 **# Vent Holes** 1
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Not Known
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R58_11650

Sheet No	30	**Date**	2017/05/03	**P.O. No**	
Street	Cabot			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	4.4 ft.	Out	CP	C	8 in.		S	S	GR	
	Comments										
2	12	4.4 ft.	In	CP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.1 ft.		B	DSC				100			12	12	
	Remarks											
4.4 ft.		C	DSZ				90			12	12	
	Remarks	Toilet paper										

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.6	**Quick Rating**	4121
Overall:	**Pipe Rating**	15	**Pipe Ratings Index**	2.6	**Quick Rating**	4121

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MACP7 Survey of R58_11675

Sheet No 87 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 13:15 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Cabot St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.6 ft. **Grade to Invert** 6.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_11675

Sheet No	87	**Date**	2017/05/09	**P.O. No**	
Street	Cabot St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.6 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	IS							12	12	
	Remarks											
1.2 ft.		CMI	MB							7		
	Remarks											
2.2 ft.		WI	MB							9		
	Remarks											
4.8 ft.		WI	OBP				10			12	6	
	Remarks											
6.1 ft.		B	DSF				80			12	12	
	Remarks											
6.1 ft.		B	MB							5		
	Remarks											

Scores

Structural:	**Pipe Rating**	16	**Pipe Ratings Index**	2.3	**Quick Rating**	4314
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.1	**Quick Rating**	2117
Overall:	**Pipe Rating**	25	**Pipe Ratings Index**	3.4	**Quick Rating**	4321

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MACP7 Survey of R58_11700

Sheet No 59 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 14:01 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Winthrop **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.3 ft. **Grade to Invert** 7.3 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R58_11700

Sheet No	59	**Date**	2017/05/02	**P.O. No**	
Street	Winthrop			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.3 ft.	Out	XXX	C	6 in.		S	S	GR	
	Comments										
2	8	7.3 ft.	In	XXX	C	8 in.		S	S	GR	
	Comments										
3	12	7.3 ft.	In	XXX	C	8 in.		S	S	GR	
	Comments										
4	3	7.1 ft.	In	XXX	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.7 ft.		COI	IWJ		J					12	12	
	Remarks											
1.2 ft.		COI	MMS							12	12	
	Remarks											
5.8 ft.		WI	OBP				30			5	7	
	Remarks											
6.9 ft.		B	DSF				30			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	6	**Pipe Ratings Index**	1.2	**Quick Rating**	2114
O&M:	**Pipe Rating**	15	**Pipe Ratings Index**	1.5	**Quick Rating**	3123
Overall:	**Pipe Rating**	21	**Pipe Ratings Index**	2.7	**Quick Rating**	3124

MACP7 Survey of R59_02935

Sheet No 82 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 09:46 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.7 ft. **Grade to Invert** 10.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 21.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.5 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 8.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Metal

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MACP7 Survey of R68_02935

Sheet No	82	**Date**	2017/05/09	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.7 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	10	10.6 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
6.7 ft.		WI	IRJ		J					12	12	
	Remarks											
6.7 ft.		WI	JSM									
	Remarks	from 12 to 12										

Scores

Structural:	**Pipe Rating**	9	**Pipe Ratings Index**	1.8	**Quick Rating**	5114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	4115
Overall:	**Pipe Rating**	18	**Pipe Ratings Index**	3.3	**Quick Rating**	5141

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MACP7 Survey of R59_02970

Sheet No 120 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 08:46 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Charles st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 19.5 ft. **Grade to Invert** 19.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 1 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 5.8 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 17.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 15 **Step Material** Metal

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MACP7 Survey of R59_02970

Sheet No	120	**Date**	2017/05/31	**P.O. No**	
Street	Charles st			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	19.5 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	11	19.4 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										
3	1	10.5 ft.	In	VCP	C	8 in.		S	S	OU	
	Comments										
4	1	18.6 ft.	In	VCP	C	8 in.		S	S	OL	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.6 ft.		CMI	ISJ	S01	J					12	12	
	Remarks											
5.8 ft.		CMI	ISJ	F01	J					12	12	
	Remarks											
5.8 ft.		WI	ISJ	S02	J					12	12	
	Remarks											
17.9 ft.		WI	ISJ	F02	J					12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	12	**Pipe Ratings Index**	1.2	**Quick Rating**	3119
Overall:	**Pipe Rating**	16	**Pipe Ratings Index**	2.2	**Quick Rating**	311A

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MACP7 Survey of R59_02975

Sheet No 114 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/30 **Time** 10:57 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect street av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R59_02975

Sheet No	114	**Date**	2017/05/30	**P.O. No**	
Street	Prospect street av			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	8	6.5 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	5.2 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										
4	1	6.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.4 ft.		CMI	MB							5		
	Remarks											
6.5 ft.		B	DSF				75			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of R59_02985

Sheet No 122 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 09:44 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Charles steet Av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.5 ft. **Grade to Invert** 5.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Vented
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** > 1 inch (25mm) <= 1 1/ **# Vent Holes** 4
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R59_02985

Sheet No	122	**Date**	2017/05/31	**P.O. No**	
Street	Charles steet Av			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.5 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	5.6 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.5 ft.		CMI	MB							1		
	Remarks											
1.5 ft.		CMI	MMS							12	12	
	Remarks											
4.5 ft.		WI	MB							7		
	Remarks											
5.5 ft.		B	DSF				80			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	14	**Pipe Ratings Index**	2	**Quick Rating**	4221
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	23	**Pipe Ratings Index**	3.5	**Quick Rating**	4231

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MACP7 Survey of R59_02995

Sheet No 154 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/06 **Time** 12:17 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** South St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.5 ft. **Grade to Invert** 11.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 11.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 7 **Step Material** Brick

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MACP7 Survey of R59_02995

Sheet No	154	**Date** 2017/06/06	**P.O. No**
Street	South St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.5 ft.	Out	CP	C	15 in.		S	S	GR	
	Comments										
2	10	11.5 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	3	11.5 ft.	In	CP	C	15 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							10		
	Remarks											
11.3 ft.		B	DSF				15			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 9	**Pipe Ratings Index** 1.3	**Quick Rating** 3116
Overall:	**Pipe Rating** 17	**Pipe Ratings Index** 2.9	**Quick Rating** 4131

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MACP7 Survey of R59_11185

Sheet No 96 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/10 **Time** 10:22 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 15.8 ft. **Grade to Invert** 15.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 14.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 10 **Step Material** Brick

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MACP7 Survey of R59_11185

Sheet No	96	**Date**	2017/05/10	**P.O. No**	
Street	Prospect St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	15.8 ft.	Out	VCP	C	10 in.		S	S	GR	
	Comments										
2	9	15.8 ft.	In	VCP	C	10 in.		S	S	GR	
	Comments										
3	12	9.1 ft.	In	VCP	C	8 in.		S	S	IU	
	Comments										
4	12	15.8 ft.	In	VCP	C	8 in.		S	S	IL	
	Comments										
5	2	15.8 ft.	In	CP	C	10 in.		S	S	GR	
	Comments										
6	3	8.7 ft.	In	VCP	C	8 in.		S	S	IU	
	Comments										
7	3	15.8 ft.	In	VCP	C	8 in.		S	S	IL	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.4 ft.		CMI	IS	S01	J					12	12	
	Remarks											
4.5 ft.		CMI	IS	F01	J					12	12	
	Remarks											
14.9 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.2	**Quick Rating** 311A
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.2	**Quick Rating** 311B

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MACP7 Survey of R59_11190

Sheet No 95 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/10 **Time** 09:47 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect St AV **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.1 ft. **Grade to Invert** 11.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 10.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

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MACP7 Survey of R59_11190

Sheet No	95	**Date**	2017/05/10	**P.O. No**	
Street	Prospect St AV			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.1 ft.	Out	CP	C	12 in.		D	S	GR	
	Comments										
2	9	11.0 ft.	In	CP	C	12 in.		S	S	GR	
	Comments										
3	11	4.2 ft.	In	CP	C	12 in.		S	S	GR	
	Comments										
4	2	5.5 ft.	In	CP	C	12 in.		S	S	GR	
	Comments										
5	4	5.8 ft.	In	CP	C	15 in.		S	S	GR	
	Comments										
6	5	3.1 ft.	In	CP	C	6 in.		S	S	XX	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MMS							12	12	
	Remarks											
4.1 ft.		CMI	MMS							2		
	Remarks											
4.2 ft.		CMI	MB							11		
	Remarks											
10.2 ft.		B	DSF				25			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 12	**Pipe Ratings Index** 1.7	**Quick Rating** 4122
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.4	**Quick Rating** 3218
Overall:	**Pipe Rating** 26	**Pipe Ratings Index** 3.1	**Quick Rating** 4132

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MACP7 Survey of R59_11200

Sheet No 103 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/11 **Time** 08:23 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Propect St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.8 ft. **Grade to Invert** 10.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.3 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Metal

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MACP7 Survey of R59_11200

Sheet No	103	**Date**	2017/05/11	**P.O. No**	
Street	Propect St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.8 ft.	Out	CP	C	30 in.		S	D	GR	
	Comments										
2	10	10.8 ft.	In	CP	C	30 in.		S	D	GR	
	Comments										
3	12	8.5 ft.	In	CP	C	20 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.4 ft.		WI	IW							2		
	Remarks											
7.5 ft.		WI	HVV							7		
	Remarks											
7.5 ft.		WI	IR							7		
	Remarks											
8.4 ft.		WI	MGO									
	Remarks	Joint on 6 oclock pipe has bad seal. causing a IG										
8.4 ft.		WI	MGO									
	Remarks	Joint on 10 oclock pipe has bad seal. causing a IG										

Scores

Structural:	**Pipe Rating** 9	**Pipe Ratings Index** 1.8	**Quick Rating** 5114
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.8	**Quick Rating** 4131
Overall:	**Pipe Rating** 23	**Pipe Ratings Index** 3.6	**Quick Rating** 5141

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MACP7 Survey of R59_11215

Sheet No 113 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/30 **Time** 10:04 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect street av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.1 ft. **Grade to Invert** 6.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R59_11215

Sheet No	113	**Date** 2017/05/30	**P.O. No**
Street	Prospect street av		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	RFJ	S01	J					12	12	
	Remarks											
3.2 ft.		CMI	RFJ	F01	J					12	12	
	Remarks											
3.2 ft.		WI	RFJ	S02	J					12	12	
	Remarks											
5.7 ft.		WI	RFJ	F02	J					12	12	
	Remarks											
5.7 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 10	**Pipe Ratings Index** 1.3	**Quick Rating** 3117
Overall:	**Pipe Rating** 14	**Pipe Ratings Index** 2.3	**Quick Rating** 311A

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MACP7 Survey of R59_11370

Sheet No 121 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 09:17 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Charles st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 14.6 ft. **Grade to Invert** 14.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 7.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 14.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present None **Bench Material**
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 11 **Step Material** Brick

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MACP7 Survey of R59_11370

Sheet No	121	**Date**	2017/05/31	**P.O. No**	
Street	Charles st			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	14.6 ft.	Out	XXX	C	15 in.		S	S	GR	
	Comments										
2	9	7.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.2 ft.		CMI	MB							12		
	Remarks											
14.6 ft.		B	DSGV				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	3.1	**Quick Rating**	4131

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MACP7 Survey of R59_11495

Sheet No 107 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/11 **Time** 12:38 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Propect St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 15.9 ft. **Grade to Invert** 15.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Conical off centered **Material** Concrete (precast) **Depth** 5.4 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 14.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 8 **Step Material** Metal

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MACP7 Survey of R59_11495

Sheet No	107	**Date** 2017/05/11	**P.O. No**
Street	Propect St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	15.9 ft.	Out	CP	C	20 in.		S	S	GR	
	Comments										
2	11	16.0 ft.	In	CP	C	20 in.		S	S	GR	
	Comments										
3	4	4.4 ft.	In	PVC	C	8 in.		S	S	IU	
	Comments										
4	4	14.3 ft.	In	PVC	C	8 in.		S	S	IL	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							6		
	Remarks											
1.4 ft.		COE	SRI	S01						12	12	
	Remarks											
5.4 ft.		COE	SRI	F01						12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	4115
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1	**Quick Rating**	1700
Overall:	**Pipe Rating**	16	**Pipe Ratings Index**	2.5	**Quick Rating**	411A

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MACP7 Survey of R59_11545

Sheet No 149 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/16 **Time** 11:25 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Russel St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.1 ft. **Grade to Invert** 7.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R59_11545

Sheet No	149	**Date**	2017/05/16	**P.O. No**	
Street	Russel St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.1 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	7	5.4 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										
3	12	7.1 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MMS							5		
	Remarks											
5.4 ft.		WI	MB							7		
	Remarks											
7.1 ft.		B	DSF				30			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	1.7	**Quick Rating**	4121
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.1	**Quick Rating**	2116
Overall:	**Pipe Rating**	18	**Pipe Ratings Index**	2.8	**Quick Rating**	4122

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MACP7 Survey of R67_07655

Sheet No 83 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 10:15 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 12.4 ft. **Grade to Invert** 12.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 5.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 11.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 8 **Step Material** Brick

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MACP7 Survey of R68_07655

Sheet No	83	**Date**	2017/05/09	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	12.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	10	6.8 ft.	In	XXX	C	4 in.		S	S	LB	
	Comments										
3	12	12.5 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.2 ft.		CMI	MB							7		
	Remarks											
10.5 ft.		WI	RML				10			9		
	Remarks											
11.2 ft.		WI	RFB							7		
	Remarks											
11.2 ft.		WI	RFL							1		
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 11	**Pipe Ratings Index** 1.2	**Quick Rating** 3118
Overall:	**Pipe Rating** 19	**Pipe Ratings Index** 2.8	**Quick Rating** 4131

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MACP7 Survey of R67_07660

Sheet No 84 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 10:49 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.5 ft. **Grade to Invert** 11.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 11.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R67_07660

Sheet No	84	**Date**	2017/05/09	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.5 ft.	Out	XXX	C	8 in.		S	S	GR	
	Comments										
2	2	11.5 ft.	In	XXX	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
11.5 ft.		B	DSZ				100			12	12	
	Remarks	Filled with water and deposits over the pipe connections.										

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	11	**Pipe Ratings Index**	2.2	**Quick Rating**	2119

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MACP7 Survey of R67_07665

Sheet No 1 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 08:31 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford ST **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.4 ft. **Grade to Invert** 5.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Not Known
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R67_07665

Sheet No	1	**Date**	2017/11/14	**P.O. No**	
Street	Bedford ST			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.0 ft.		WI	OBP				25			12	6	
	Remarks											
5.4 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R67_07670

Sheet No 147 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/17 **Time** 11:11 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.1 ft. **Grade to Invert** 8.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 2 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R67_07670

Sheet No	147	**Date** 2017/05/17	**P.O. No**
Street	south St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.1 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	8.1 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										
3	3	8.0 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
3.5 ft.		WI	MGO									
	Remarks	Filled Pipe										
7.5 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.5	**Quick Rating** 3113
O&M:	**Pipe Rating** 10	**Pipe Ratings Index** 1.4	**Quick Rating** 3121
Overall:	**Pipe Rating** 16	**Pipe Ratings Index** 2.9	**Quick Rating** 3221

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MACP7 Survey of R67_07735

Sheet No 145 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/17 **Time** 11:01 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.2 ft. **Grade to Invert** 6.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_07735

Sheet No	145	**Date** 2017/05/17	**P.O. No**
Street	south St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.2 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	6.2 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										
3	3	5.8 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.2 ft.		CMI	MB							12		
	Remarks											
5.0 ft.		WI	MMS							3		
	Remarks											
5.9 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 10	**Pipe Ratings Index** 1.7	**Quick Rating** 4121
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.8	**Quick Rating** 4122

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MACP7 Survey of R67_07750

Sheet No 54 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 13:18 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south st **City** waltham
Location Code Sidewalk **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.4 ft. **Grade to Invert** 6.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.5 in. **Center Cover Size** **Size Width**
Cover Material Concrete (non-reinforced) **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.5 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 4.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R67_07750

Sheet No	54	**Date** 2017/04/27	**P.O. No**
Street	south st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.1 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.0 ft.		WI	MGO									
	Remarks	mud on wall										
6.0 ft.		B	MB							10		
	Remarks											
6.0 ft.		B	DSF				75			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	15	**Pipe Ratings Index**	2.8	**Quick Rating**	4121

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MACP7 Survey of R67_07751

Sheet No 144 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/06 **Time** 10:55 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.1 ft. **Grade to Invert** 6.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_07751

Sheet No	144	**Date**	2017/06/06	**P.O. No**	
Street	south St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.1 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	6.1 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.5 ft.		CMI	DB							6		
	Remarks											
1.9 ft.		CMI	MB							9		
	Remarks											
5.8 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	11	**Pipe Ratings Index**	1.8	**Quick Rating**	4131
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	20	**Pipe Ratings Index**	3.3	**Quick Rating**	4132

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MACP7 Survey of R67_07770

Sheet No 141 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/06 **Time** 10:33 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.1 ft. **Grade to Invert** 5.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R67_07770

Sheet No	141	**Date**	2017/06/06	**P.O. No**	
Street	south St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.1 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	5.2 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										
3	3	5.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.0 ft.		WI	CL							6		
	Remarks											
4.6 ft.		B	MMS							9		
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.3	**Quick Rating**	2214
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.3	**Quick Rating**	3115
Overall:	**Pipe Rating**	16	**Pipe Ratings Index**	2.6	**Quick Rating**	3122

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MACP7 Survey of R67_07780

Sheet No 46 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 11:36 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Shakespeare Rd **City** waltham
Location Code Local Rural Streets **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.1 ft. **Grade to Invert** 5.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material** Concrete (precast)
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 4.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Plastic

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MACP7 Survey of R67_07780

Sheet No	46	**Date** 2017/04/27	**P.O. No**
Street	Shakespeare Rd		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.1 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	10	5.1 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							12	12	
	Remarks											
1.0 ft.		CMI	IS							12	12	
	Remarks											
2.0 ft.		WI	MGO									
	Remarks	water or gas pipe										
4.2 ft.		WI	RFJ		J					6	7	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	2.9	**Quick Rating**	4131

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MACP7 Survey of R67_07800

Sheet No 26 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/01 **Time** 09:53 **Weather** Light Rain **Pre-Cleaning** Not Known **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Wheelock Rd **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.9 ft. **Grade to Invert** 7.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Concrete (precast) **Depth** 3.7 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Polyethylene
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Partially Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R67_07800

Sheet No	26	**Date**	2017/05/01	**P.O. No**	
Street	Wheelock Rd			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.9 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	3	6.7 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.6 ft.		CMI	MB							10		
	Remarks											
6.7 ft.		B	DSF				20			6	3	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	6	**Pipe Ratings Index**	1	**Quick Rating**	1600
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.6	**Quick Rating**	411A

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MACP7 Survey of R67_07815

Sheet No 48 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 11:57 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south st **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.0 ft. **Grade to Invert** 6.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 4 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Brick **Depth** 3.3 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R67_07815

Sheet No	48	**Date** 2017/04/27	**P.O. No**
Street	south st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	3	3.9 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										
3	9	6.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	12	5.3 ft.	In	PVC	C	8 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB							7	10	
	Remarks											
4.3 ft.		WI	MB							9		
	Remarks											
6.0 ft.		C	CC							3	9	
	Remarks											

Scores

Structural:	**Pipe Rating**	16	**Pipe Ratings Index**	2.3	**Quick Rating**	4231
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	25	**Pipe Ratings Index**	3.6	**Quick Rating**	4232

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MACP7 Survey of R67_07820

Sheet No 49 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 12:10 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south st **City** waltham
Location Code Sidewalk **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.2 ft. **Grade to Invert** 10.1 ft. **Rim to Grade** 1.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.5 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.4 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 3 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 9.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

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MACP7 Survey of R67_07820

Sheet No	49	**Date**	2017/04/27	**P.O. No**	
Street	south st			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.2 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	10.2 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							6	8	
	Remarks											
1.2 ft.		CMI	MMS							5		
	Remarks											
9.4 ft.		B	OBN				50			6	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	12	**Pipe Ratings Index**	2	**Quick Rating**	4131
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3.2	**Quick Rating**	4131

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MACP7 Survey of R67_07825

Sheet No 143 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/06 **Time** 10:48 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 6.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Brick

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MACP7 Survey of R67_07825

Sheet No	143	**Date**	2017/06/06	**P.O. No**	
Street	south St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	7	3.4 ft.	In	PVC	C	4 in.		S	S	LB	
	Comments										
3	12	7.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	3	8.0 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	CL							3		
	Remarks											
7.5 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	6	**Pipe Ratings Index**	1.2	**Quick Rating**	2114
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1	**Quick Rating**	1800
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.2	**Quick Rating**	211A

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MACP7 Survey of R67_07860

Sheet No 53 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 13:11 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south st **City** waltham
Location Code Sidewalk **Inflow Potential from Runoff**
Manhole Surface Types Grass/Dirt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.9 ft. **Grade to Invert** 8.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.5 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.5 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 5.3 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 8.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Brick

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MACP7 Survey of R67_07860

Sheet No	53	**Date** 2017/04/27	**P.O. No**
Street	south st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.9 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	6.9 ft.	In	DIP	C	8 in.		S	S	LB	
	Comments										
3	12	8.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.1 ft.		CMI	RFJ		J					6		
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1	**Quick Rating**	1700
Overall:	**Pipe Rating**	11	**Pipe Ratings Index**	2	**Quick Rating**	1A00

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MACP7 Survey of R67_07865

Sheet No 76 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 14:30 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 5.1 ft. **Grade to Invert** 5.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information DSC covering pipes. cant see bench or pipe connections

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 6 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present None **Bench Material**
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_07865

Sheet No	76	**Date**	2017/05/08	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.1 ft.	Out	XXX	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
3.3 ft.		CMI	MMS							12	12	
	Remarks											
4.5 ft.		WI	OBP				25			3		
	Remarks	gas line										
5.1 ft.		B	DSC				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	2	**Quick Rating**	5121
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	3.2	**Quick Rating**	5122

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MACP7 Survey of R67_07895

Sheet No 74 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 13:33 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Dartmouth st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 4.7 ft. **Grade to Invert** 4.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present None **Bench Material**
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_07895

Sheet No	74	**Date** 2017/05/08	**P.O. No**
Street	Dartmouth st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	4.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MMS							12	12	
	Remarks											
2.2 ft.		CMI	SAV	S01						12	12	
	Remarks											
4.9 ft.		CMI	SAV	F01						12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.3	**Quick Rating**	2214
O&M:	**Pipe Rating**	6	**Pipe Ratings Index**	1.5	**Quick Rating**	3113
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.8	**Quick Rating**	3122

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MACP7 Survey of R67_11680

Sheet No 61 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 14:20 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Cabot st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.9 ft. **Grade to Invert** 6.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R67_11680

Sheet No	61	**Date** 2017/05/02	**P.O. No**
Street	Cabot st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.9 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.4 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	6.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
5.5 ft.		WI	MMS							6		
	Remarks											
6.4 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 14	**Pipe Ratings Index** 2.3	**Quick Rating** 221A

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MACP7 Survey of R67_11710

Sheet No 86 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 12:55 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.5 ft. **Grade to Invert** 5.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R67_11710

Sheet No	86	**Date** 2017/05/09	**P.O. No**
Street	Boynton St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.5 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	12	5.4 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										
3	2	4.8 ft.	In	CP	C	8 in.		S	S	XX	
	Comments										
4	3	4.9 ft.	In	CP	C	8 in.		S	S	XX	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.5 ft.		CMI	MB							9		
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	3116
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	2.9	**Quick Rating**	4131

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MACP7 Survey of R67_11715

Sheet No 128 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 13:04 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.1 ft. **Grade to Invert** 6.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_11715

Sheet No	128	**Date**	2017/05/31	**P.O. No**	
Street	Boynton St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.3 ft.		WI	SRI							6	8	
	Remarks											
5.7 ft.		B	DSF				90			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	5	**Pipe Ratings Index**	1	**Quick Rating**	1500
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R67_11720

Sheet No 132 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/02 **Time** 12:22 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.7 ft. **Grade to Invert** 6.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Pipe
Channel Exposure Partially Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R67_11720

Sheet No	132	**Date**	2017/06/02	**P.O. No**	
Street	Boynton St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	9	4.4 ft.	In	PVC	C	8 in.		S	S	LB	
	Comments										
3	12	6.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MB	S01						12	12	
	Remarks											
0.9 ft.		CMI	MMS	S02						12	12	
	Remarks											
2.0 ft.		CMI	MB	F01						12	12	
	Remarks											
2.0 ft.		CMI	MMS	F02						12	12	
	Remarks											
6.1 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 10	**Pipe Ratings Index** 1.7	**Quick Rating** 4121
O&M:	**Pipe Rating** 10	**Pipe Ratings Index** 1.4	**Quick Rating** 3121
Overall:	**Pipe Rating** 20	**Pipe Ratings Index** 3.1	**Quick Rating** 4131

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MACP7 Survey of R67_11725

Sheet No 133 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/02 **Time** 13:29 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.8 ft. **Grade to Invert** 7.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Brick

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MACP7 Survey of R67_11725

Sheet No 133	**Date** 2017/06/02	**P.O. No**	
Street Boynton St		**Inspection Level** Level 2	
City waltham		**Inspection Status** Remote Inspection	

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.8 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	1	7.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
2.5 ft.		WI	IS							8	1	
	Remarks											
3.2 ft.		WI	MB							5		
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 1.6	**Quick Rating** 4114
O&M:	**Pipe Rating** 6	**Pipe Ratings Index** 1	**Quick Rating** 1600
Overall:	**Pipe Rating** 14	**Pipe Ratings Index** 2.6	**Quick Rating** 411A

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MACP7 Survey of R67_11740

Sheet No 165 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/06/07 **Time** 09:38 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Andrea St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 8.2 ft. **Grade to Invert** 8.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_11740

Sheet No	165	**Date** 2017/06/07	**P.O. No**
Street	Andrea St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.3 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	8	4.3 ft.	In	PVC	C	4 in.		S	S	IU	
	Comments										
3	8	7.9 ft.	In	PVC	C	4 in.		S	S	IL	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.5 ft.		CMI	MMS							12	12	
	Remarks											
3.2 ft.		WI	OBP				50			11		
	Remarks											
3.9 ft.		WI	OBP				50			3		
	Remarks											
7.9 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.6	**Quick Rating** 3123
Overall:	**Pipe Rating** 20	**Pipe Ratings Index** 2.8	**Quick Rating** 3124

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MACP7 Survey of R68_02945

Sheet No 80 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 08:34 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 13.7 ft. **Grade to Invert** 13.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material** Concrete (precast)
Chimney I/I **Clear Opening** **Chimney Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 5.1 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 12.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Partially Open **Channel Condition**
 # Steps 7 **Step Material** Metal

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MACP7 Survey of R68_02945

Sheet No	80	**Date**	2017/05/09	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	13.7 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	12	12.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	1	8.1 ft.	In	CP	C	10 in.		S	S	XX	
	Comments										
4	2	13.4 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.5 ft.		WI	FL							1		
	Remarks											
9.0 ft.		WI	FL							6		
	Remarks											
12.4 ft.		WI	IR							5		
	Remarks											

Scores

Structural:	**Pipe Rating**	10	**Pipe Ratings Index**	1.7	**Quick Rating**	3214
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	4117
Overall:	**Pipe Rating**	21	**Pipe Ratings Index**	3.1	**Quick Rating**	4132

MACP7 Survey of R68_07685

Sheet No 69 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 10:19 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Higland St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.5 ft. **Grade to Invert** 6.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 6 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.9 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R68_07685

Sheet No	69	**Date** 2017/05/08	**P.O. No**
Street	Higland St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.4 ft.	Out	CP	C	8 in.		S	S	GR	
	Comments										
2	9	4.2 ft.	In	CP	C	8 in.		S	S	LB	
	Comments										
3	12	6.7 ft.	In	CP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
3.8 ft.		WI	RFB							9		
	Remarks											
5.7 ft.		B	DSGV				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 8	**Pipe Ratings Index** 2	**Quick Rating** 5113
O&M:	**Pipe Rating** 9	**Pipe Ratings Index** 1.1	**Quick Rating** 2117
Overall:	**Pipe Rating** 17	**Pipe Ratings Index** 3.1	**Quick Rating** 5121

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MACP7 Survey of R68_07700

Sheet No 70 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 10:40 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Higland St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.6 ft. **Grade to Invert** 7.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R68_07700

Sheet No	70	**Date**	2017/05/08	**P.O. No**	
Street	Higland St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	7.8 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							12		
	Remarks											
7.2 ft.		B	DSF				100			12	12	
	Remarks											
7.2 ft.		WI	IWJ		J					12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	2215
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	2.9	**Quick Rating**	4122

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MACP7 Survey of R68_07710

Sheet No 125 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 10:53 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Hope Av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.9 ft. **Grade to Invert** 6.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R68_07710

Sheet No	125	**Date**	2017/05/31	**P.O. No**	
Street	Hope Av			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.9 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	8	6.7 ft.	Out	BR	C	8 in.		S	S	GR	
	Comments										
3	12	6.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
4	3	3.7 ft.	In	VCP	C	8 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							9		
	Remarks											
6.9 ft.		B	DSF				95			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of R68_07870

Sheet No 77 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 14:58 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details MH ID R67_07870
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.8 ft. **Grade to Invert** 7.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information MH ID R67_07870

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 23.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R68_07870

Sheet No	77	**Date**	2017/05/08	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.8 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	7.9 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.7 ft.		CMI	MB							6		
	Remarks											
1.9 ft.		CMI	IWJ		J					12	12	
	Remarks											
2.7 ft.		WI	IWJ		J					12	12	
	Remarks											
7.5 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	11	**Pipe Ratings Index**	1.4	**Quick Rating**	2315
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3	**Quick Rating**	4123

MACP7 Survey of R68_07875

Sheet No 78 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 15:23 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bedford St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.3 ft. **Grade to Invert** 8.3 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material** Concrete (precast)
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 3.7 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 7.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Metal

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MACP7 Survey of R68_07875

Sheet No	78	**Date**	2017/05/08	**P.O. No**	
Street	Bedford St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.3 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	9	8.3 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										
3	12	8.3 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
3.7 ft.		COI	IWJ		J					12	12	
	Remarks											
6.4 ft.		WI	IWJ		J					12	12	
	Remarks											
7.0 ft.		WI	CL							5		
	Remarks											
7.8 ft.		B	IWJ		J					5		
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 12	**Pipe Ratings Index** 1.3	**Quick Rating** 2316
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.5	**Quick Rating** 241A

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MACP7 Survey of R68_07885

Sheet No 68 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/02 **Time** 15:28 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Curtis St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.2 ft. **Grade to Invert** 7.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Concrete (precast) **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.1 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 6.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R68_07885

Sheet No	68	**Date**	2017/05/02	**P.O. No**	
Street	Curtis St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.2 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	10	7.2 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										
3	12	7.0 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.4 ft.		CMI	IWJ		J					12	12	
	Remarks											
4.1 ft.		WI	IWJ		J					10	12	
	Remarks											
4.1 ft.		WI	ISJ		J					6	7	
	Remarks											
6.6 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 4	**Pipe Ratings Index** 1	**Quick Rating** 1400
O&M:	**Pipe Rating** 14	**Pipe Ratings Index** 1.4	**Quick Rating** 3122
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.4	**Quick Rating** 3122

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MACP7 Survey of R68_11170

Sheet No 98 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/10 **Time** 11:29 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.8 ft. **Grade to Invert** 11.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material** Concrete (precast)
Chimney I/I **Clear Opening** **Chimney Depth** 2.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 6.5 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Metal

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MACP7 Survey of R68_11170

Sheet No	98	**Date**	2017/05/10	**P.O. No**	
Street	Prospect St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.8 ft.	Out	CP	C	30 in.		S	D	GR	
	Comments										
2	9	11.0 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	11.8 ft.	In	CP	C	30 in.		S	D	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
6.5 ft.		WI	SAV	S01						12	12	
	Remarks											
6.5 ft.		WI	BVV							2		
	Remarks											
8.3 ft.		WI	IW							3		
	Remarks											
9.9 ft.		WI	SAV	F01						12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 11	**Pipe Ratings Index** 1.8	**Quick Rating** 5121
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 19	**Pipe Ratings Index** 2.9	**Quick Rating** 5122

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MACP7 Survey of R68_11380

Sheet No 123 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 10:02 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Pratt Av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 3.6 ft. **Grade to Invert** 3.6 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 3 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 3.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R68_11380

Sheet No	123	**Date**	2017/05/31	**P.O. No**	
Street	Pratt Av			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	3.6 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	3	3.6 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MMS							12	12	
	Remarks											
3.3 ft.		B	DSC				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	3121
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	17	**Pipe Ratings Index**	3.1	**Quick Rating**	3222

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MACP7 Survey of R68_11390

Sheet No 72 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 11:32 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Curtis St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 8.0 ft. **Grade to Invert** 8.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 1 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.3 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 3.5 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 7.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Metal

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MACP7 Survey of R68_11390

Sheet No	72	**Date**	2017/05/08	**P.O. No**	
Street	Curtis St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.0 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	12	8.0 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										
3	3	7.9 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MB							12		
	Remarks											
3.5 ft.		COI	IWJ		J					3	5	
	Remarks											
7.4 ft.		B	DSF				30			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	10	**Pipe Ratings Index**	1.3	**Quick Rating**	2216
Overall:	**Pipe Rating**	18	**Pipe Ratings Index**	2.9	**Quick Rating**	4122

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MACP7 Survey of R68_11395

Sheet No 124 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 10:25 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Brook Av **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 4.2 ft. **Grade to Invert** 4.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 1 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present None **Bench Material**
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R68_11395

Sheet No	124	**Date**	2017/05/31	**P.O. No**	
Street	Brook Av			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	4.2 ft.	Out	CAS	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	MMS							12	12	
	Remarks											
4.0 ft.		WI	OBI				20			5		
	Remarks	Gas Line										
4.2 ft.		B	DSC				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	6	**Pipe Ratings Index**	1.2	**Quick Rating**	2114
O&M:	**Pipe Rating**	13	**Pipe Ratings Index**	2.2	**Quick Rating**	5131
Overall:	**Pipe Rating**	19	**Pipe Ratings Index**	3.4	**Quick Rating**	5131

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MACP7 Survey of R68_11400

Sheet No 127 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 11:46 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Sharon St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.7 ft. **Grade to Invert** 7.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 6.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 7.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Metal

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MACP7 Survey of R68_11400

Sheet No	127	**Date**	2017/05/31	**P.O. No**	
Street	Sharon St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.7 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	12	7.9 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.8 ft.		CMI	MB							11	2	
	Remarks											
3.2 ft.		CMI	ISJ		J					6		
	Remarks											
7.2 ft.		B	DSF				35			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	4114
O&M:	**Pipe Rating**	10	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	18	**Pipe Ratings Index**	3	**Quick Rating**	4131

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MACP7 Survey of R68_11410

Sheet No 126 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/31 **Time** 11:25 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Sharon St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.0 ft. **Grade to Invert** 7.0 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 4.6 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 6.9 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 5 **Step Material** Metal

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MACP7 Survey of R68_11410

Sheet No	126	**Date**	2017/05/31	**P.O. No**	
Street	Sharon St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.0 ft.	Out	PVC	C	8 in.		S	S	GR	
	Comments										
2	10	5.5 ft.	In	PVC	C	8 in.		S	S	LB	
	Comments										
3	12	7.1 ft.	In	PVC	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.6 ft.		COI	ISJ		J					3		
	Remarks											
6.9 ft.		B	DSF				80			12	12	
	Remarks											
6.9 ft.		B	DB							10		
	Remarks											
6.9 ft.		B	MMS							10		
	Remarks											

Scores

Structural:	**Pipe Rating** 9	**Pipe Ratings Index** 1.5	**Quick Rating** 3121
O&M:	**Pipe Rating** 11	**Pipe Ratings Index** 1.4	**Quick Rating** 3121
Overall:	**Pipe Rating** 20	**Pipe Ratings Index** 2.9	**Quick Rating** 3222

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MACP7 Survey of R48_06520

Sheet No 43 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 10:46 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Bear Hill Rd **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.4 ft. **Grade to Invert** 7.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 4.3 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R48_06520

Sheet No	43	**Date** 2017/04/26	**P.O. No**
Street	Bear Hill Rd		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.4 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	7.3 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
2.0 ft.		CMI	IW							6		
	Remarks											
6.8 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.3	**Quick Rating**	2215
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.3	**Quick Rating**	2219

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MACP7 Survey of R48_06560

Sheet No 21 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/26 **Time** 09:35 **Weather** Light Rain **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** bear hill road **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 9.3 ft. **Grade to Invert** 0.0 ft. **Rim to Grade** 9.3 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.5 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 23.5 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.3 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.7 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 9.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Not Known
Bench Lining **Bench Condition** Sound

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 4 **Step Material** Other

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MACP7 Survey of R48_06560

Sheet No	21	**Date**	2017/04/26	**P.O. No**	
Street	bear hill road			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	9.3 ft.	Out	XXX	Z	8 in.	8 in.	S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.9 ft.		CMI	IW							6		
	Remarks											
9.3 ft.		B	DNGV				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.3	**Quick Rating**	2214
Overall:	**Pipe Rating**	12	**Pipe Ratings Index**	2.3	**Quick Rating**	2218

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MACP7 Survey of R58_03020

Sheet No 91 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/09 **Time** 14:53 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Vernon St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 11.2 ft. **Grade to Invert** 11.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical off centered **Material** Concrete (precast) **Depth** 5.5 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Concrete (precast)
Wall Depth 9.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Concrete (precast)
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Precast
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Metal

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MACP7 Survey of R58_03020

Sheet No	91	**Date** 2017/05/09	**P.O. No**
Street	Vernon St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	11.2 ft.	Out	CP	C	30 in.		S	S	GR	
	Comments										
2	12	11.3 ft.	In	CP	C	30 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
5.5 ft.		WI	ISJ		J					3	7	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	6	**Pipe Ratings Index**	1	**Quick Rating**	1600
Overall:	**Pipe Rating**	10	**Pipe Ratings Index**	2	**Quick Rating**	1A00

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MACP7 Survey of R58_11560

Sheet No 99 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/10 **Time** 13:17 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Weston St **City** waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.8 ft. **Grade to Invert** 8.8 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 23.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.8 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 8.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

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MACP7 Survey of R58_11560

Sheet No	99	**Date**	2017/05/10	**P.O. No**	
Street	Weston St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.8 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	8.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	3	8.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	DAZ	S01			100			12	12	
	Remarks	Mud on Walls										
1.2 ft.		CMI	MMS							12	12	
	Remarks											
4.8 ft.		CMI	DAZ	F01			100			12	12	
	Remarks	Mud on Walls										
4.8 ft.		WI	DAZ	S02			100			12	12	
	Remarks	Mud on walls										
8.4 ft.		WI	DAZ	F02			100			12	12	
	Remarks	Mud on walls										

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 12	**Pipe Ratings Index** 1.5	**Quick Rating** 3122
Overall:	**Pipe Rating** 18	**Pipe Ratings Index** 2.7	**Quick Rating** 3123

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MACP7 Survey of R58_11630

Sheet No 5 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 10:07 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Surcharged/Debris **CoF**
Drainage Area **Street** Auburn St **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge Yes
Rim to Invert 6.4 ft. **Grade to Invert** 6.4 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information Surcharged MH Couldnt see Inverts

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.4 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present None **Bench Material**
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R58_11630

Sheet No	5	**Date** 2017/11/14	**P.O. No**
Street	Auburn St		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Surcharged/Debris

Scores

Structural:	**Pipe Rating**	**Pipe Ratings Index**	**Quick Rating**
O&M:	**Pipe Rating**	**Pipe Ratings Index**	**Quick Rating**
Overall:	**Pipe Rating**	**Pipe Ratings Index**	**Quick Rating**

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MACP7 Survey of R58_11635

Sheet No 4 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 09:10 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Auburn St **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.7 ft. **Grade to Invert** 6.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.7 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.7 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** Brick **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R58_11635

Sheet No	4	**Date**	2017/11/14	**P.O. No**	
Street	Auburn St			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
6.7 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.6	**Quick Rating**	3121
Overall:	**Pipe Rating**	12	**Pipe Ratings Index**	2.6	**Quick Rating**	3121

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MACP7 Survey of R58_11655

Sheet No 29 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/03 **Time** 11:08 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Cabot **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.5 ft. **Grade to Invert** 5.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** Not Known **Depth** 0.0 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.8 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Concrete (precast) **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 1 **Step Material** Brick

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MACP7 Survey of R58_11655

Sheet No	29	**Date**	2017/05/03	**P.O. No**	
Street	Cabot			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.5 ft.	Out	CP	C	8 in.		S	S	GR	
	Comments										
2	12	5.4 ft.	In	CP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.9 ft.		B	DSF				80			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	11	**Pipe Ratings Index**	2.2	**Quick Rating**	2119

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MACP7 Survey of R58_11690

Sheet No 31 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/03 **Time** 12:09 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.3 ft. **Grade to Invert** 5.3 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.5 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 0.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 4.8 ft. **Lining Interior** Cementitious **Lining Exterior**
Wall Condition Sound

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition** Sound

Channel/Step

Channel Installed Yes **Channel Material** Vitrified Clay **Channel Type** Pipe
Channel Exposure Fully Open **Channel Condition**
 # Steps 0 **Step Material**

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MACP7 Survey of R58_11690

Sheet No	31	**Date**	2017/05/03	**P.O. No**	
Street	Boynton			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.3 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	5.2 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	1	4.7 ft.	In	VCP	C	4 in.		S	S	LB	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
4.9 ft.		B	DSF				60			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	8	**Pipe Ratings Index**	1.1	**Quick Rating**	2116
Overall:	**Pipe Rating**	12	**Pipe Ratings Index**	2.1	**Quick Rating**	211A

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MACP7 Survey of R58_11695

Sheet No 3 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/14 **Time** 09:04 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Boynton St **City** Waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.7 ft. **Grade to Invert** 6.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 2 **Step Material** Brick

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MACP7 Survey of R58_11695

Sheet No	3	**Date**	2017/11/14	**P.O. No**	
Street	Boynton St			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
5.1 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R59_11180

Sheet No 12 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/17 **Time** 11:47 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect St **City** Waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.9 ft. **Grade to Invert** 7.9 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.1 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R59_11180

Sheet No	12	**Date**	2017/11/17	**P.O. No**	
Street	Prospect St			**Inspection Level**	Level 2
City	Waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.9 ft.	Out	VCP	C	12 in.		S	S	GR	
	Comments										
2	8	7.6 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	12	8.0 ft.	In	VCP	C	12 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.2 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	10	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.4	**Quick Rating**	3121

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MACP7 Survey of R59_11195

Sheet No 14 **Surveyed By** BOP **Certificate #** U-0417-07007808 **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/11/17 **Time** 12:00 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Prospect St **City** Waltham
Location Code Primary Major Arterial Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 8.3 ft. **Grade to Invert** 8.3 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.6 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.6 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R59_11195

Sheet No	14	**Date** 2017/11/17	**P.O. No**
Street	Prospect St		**Inspection Level** Level 2
City	Waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	8.3 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	8.3 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	4	7.4 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
7.6 ft.		B	DSF				100			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	10	**Pipe Ratings Index**	1.4	**Quick Rating**	3121
Overall:	**Pipe Rating**	14	**Pipe Ratings Index**	2.4	**Quick Rating**	3121

MACP7 Survey of R59_11550

Sheet No 148 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/16 **Time** 11:18 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Russel St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.2 ft. **Grade to Invert** 7.2 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover
Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert
Cover Insert Type None
Cover Insert Condition

Adj. Ring
Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame
Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney
Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.2 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone
Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall
Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.1 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench
Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step
Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R59_11550

Sheet No	148	**Date**	2017/05/16	**P.O. No**	
Street	Russel St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.2 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	7.3 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	DB							5		
	Remarks											
1.0 ft.		CMI	MMS							3		
	Remarks											
7.1 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
O&M:	**Pipe Rating**	6	**Pipe Ratings Index**	1	**Quick Rating**	1600
Overall:	**Pipe Rating**	15	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R67_07775

Sheet No 47 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/04/27 **Time** 11:45 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Shakespeare Rd **City** waltham
Location Code Local Rural Streets **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 5.7 ft. **Grade to Invert** 5.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 1.5 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Conical centered **Material** Brick **Depth** 3.8 ft.
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 5.3 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

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MACP7 Survey of R67_07775

Sheet No	47	**Date** 2017/04/27	**P.O. No**
Street	Shakespeare Rd		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	5.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	11	5.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.3 ft.		CMI	CL							3		
	Remarks											

Scores

Structural:	**Pipe Rating**	6	**Pipe Ratings Index**	1.2	**Quick Rating**	2114
O&M:	**Pipe Rating**	5	**Pipe Ratings Index**	1	**Quick Rating**	1500
Overall:	**Pipe Rating**	11	**Pipe Ratings Index**	2.2	**Quick Rating**	2119

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MACP7 Survey of R67_07810

Sheet No 142 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/17 **Time** 10:42 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** south St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Concrete Pavement
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.5 ft. **Grade to Invert** 6.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 26.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 26.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 24.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** Weeper **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 3.0 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed No **Channel Material** **Channel Type** None
Channel Exposure **Channel Condition**
 # Steps 3 **Step Material** Brick

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MACP7 Survey of R67_07810

Sheet No	142	**Date**	2017/05/17	**P.O. No**	
Street	south St			**Inspection Level**	Level 2
City	waltham			**Inspection Status**	Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.5 ft.	Out	VCP	C	6 in.		S	S	GR	
	Comments										
2	12	6.5 ft.	In	VCP	C	6 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.0 ft.		CMI	IWJ		J					12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	4	**Pipe Ratings Index**	1	**Quick Rating**	1400
O&M:	**Pipe Rating**	9	**Pipe Ratings Index**	1.5	**Quick Rating**	3121
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.5	**Quick Rating**	3121

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MACP7 Survey of R68_07705

Sheet No 71 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 11:05 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Higland St **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 7.7 ft. **Grade to Invert** 7.7 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.5 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 21.5 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.4 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 7.2 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

PipeLogix Inc.
Phone:866-299-3150
Fax:760-406-6023

MACP7 Survey of R68_07705

Sheet No	71	**Date** 2017/05/08	**P.O. No**
Street	Higland St		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	7.7 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	10	6.7 ft.	In	VCP	C	4 in.		S	S	GR	
	Comments										
3	12	7.7 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.3 ft.		CMI	MMS							6	3	
	Remarks											
7.2 ft.		B	DSF				50			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 8	**Pipe Ratings Index** 1.1	**Quick Rating** 2116
Overall:	**Pipe Rating** 14	**Pipe Ratings Index** 2.3	**Quick Rating** 221A

PIPELOGIX INC

PipeLogix Inc.
Phone:866-299-3150
Fax:760-406-6023

MACP7 Survey of R68_07890

Sheet No 75 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 14:09 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Dartmouth st **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 6.5 ft. **Grade to Invert** 6.5 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 2.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 6.0 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 4 **Step Material** Brick

PipeLogix Inc.
Phone:866-299-3150
Fax:760-406-6023

MACP7 Survey of R68_07890

Sheet No	75	**Date** 2017/05/08	**P.O. No**
Street	Dartmouth st		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	6.5 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	6.3 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
0.9 ft.		CMI	MMS							12	12	
	Remarks											
6.0 ft.		B	DSF				80			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating**	6	**Pipe Ratings Index**	1.2	**Quick Rating**	2114
O&M:	**Pipe Rating**	7	**Pipe Ratings Index**	1.2	**Quick Rating**	2115
Overall:	**Pipe Rating**	13	**Pipe Ratings Index**	2.4	**Quick Rating**	2219

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Phone:866-299-3150
Fax:760-406-6023

MACP7 Survey of R68_11385

Sheet No 73 **Surveyed By** BOP **Certificate #** XXXX **Reviewed By**
Owner **Customer** **Certificate #**
P.O. No **Work Order** **Media Label** **Project**
Date 2017/05/08 **Time** 12:59 **Weather** **Pre-Cleaning** No Pre-Cleaning **Date Cleaned**
Purpose Sewer System Evaluation Surv **Inspection Level** Level 2 **Inspection Status** Remote Inspection **CoF**
Drainage Area **Street** Brook Ave **City** waltham
Location Code Secondary Roads **Inflow Potential from Runoff**
Manhole Surface Types Asphalt
Location Details
MH Use Sanitary **Access Type** Manhole **Year Constructed** **Year Renewed**
Evidence of Surcharge No
Rim to Invert 10.1 ft. **Grade to Invert** 10.1 ft. **Rim to Grade** 0.0 ft. **Rim to Grade Exposed**
Northing **Easting** **Elevation** **Accuracy of GPS**
Coordinate System **Vertical Datum**
Additional Information

Cover

Cover Type Solid
Cover Shape Circular **Cover Size** 24.0 in. **Center Cover Size** **Size Width**
Cover Material Cast Iron **Vent Hole Diameter** **# Vent Holes**
Bearing Surface Diamter 24.0 in. **Bearing Surface Diamter Width** **Cover Frame Fit** Good
Cover Condition Sound

Cover Insert

Cover Insert Type None
Cover Insert Condition

Adj. Ring

Ring Type None **Ring Material** **Ring Height**
Ring Condition

Frame

Frame Material Cast Iron **Bearing Surface Width** 1.0 in. **Bearing Surface Depth** 1.0 in.
Clear Opening Diameter 22.0 in. **Clear Opening Width**
Frame Condition Sound
Seal Condition Sound
Offset Distance 0 in. **Frame Seal Inflow** None **Frame Depth**

Chimney

Chimney Present Yes **1st Material** Brick **2nd Material**
Chimney I/I **Clear Opening** **Chimney Depth** 4.9 ft.
Lining Interior **Lining Exterior** **Chimney Condition**

Cone

Type Not Present **Material** **Depth**
Lining Interior **Lining Exterior** **Cone Condition**

Wall

Wall Diameter **Wall By Size** **Wall Material** Brick
Wall Depth 9.5 ft. **Lining Interior** **Lining Exterior**
Wall Condition

Bench

Bench Present Yes **Bench Material** Brick
Bench Lining **Bench Condition**

Channel/Step

Channel Installed Yes **Channel Material** Brick **Channel Type** Formed
Channel Exposure Fully Open **Channel Condition**
 # Steps 6 **Step Material** Brick

PipeLogix Inc.
Phone:866-299-3150
Fax:760-406-6023

MACP7 Survey of R68_11385

Sheet No	73	**Date** 2017/05/08	**P.O. No**
Street	Brook Ave		**Inspection Level** Level 2
City	waltham		**Inspection Status** Remote Inspection

Pipe Connections

Num	Clk Pos	Rim to Invert	Direc	Material	Shape	Height	Width	Pipe Cond	Seal Cond	Pipe Type	PSR
1	6	10.1 ft.	Out	VCP	C	8 in.		S	S	GR	
	Comments										
2	12	10.2 ft.	In	VCP	C	8 in.		S	S	GR	
	Comments										
3	4	9.9 ft.	In	VCP	C	4 in.		S	S	GR	
	Comments										
4	11	6.3 ft.	In	XXX	C	5 in.		S	S	XX	
	Comments										

Observations

Distance	Vid Ref	Comp	Code	CD	Jnt	Stp	%	Val1	Val2	Fr	To	ImRef
1.5 ft.		CMI	MMS							12	12	
	Remarks											
1.9 ft.		CMI	IS							11		
	Remarks											
9.5 ft.		B	DSF				20			12	12	
	Remarks											

Scores

Structural:	**Pipe Rating** 6	**Pipe Ratings Index** 1.2	**Quick Rating** 2114
O&M:	**Pipe Rating** 9	**Pipe Ratings Index** 1	**Quick Rating** 1900
Overall:	**Pipe Rating** 15	**Pipe Ratings Index** 2.2	**Quick Rating** 211A

PIPELOGIX INC

PipeLogix Inc.
Phone:866-299-3150
Fax:760-406-6023

APPENDIX E
Mill and Overlay Locus Plan

CITY OF WALTHAM

ENGINEERING
DEPARTMENT

AREA 13/14-B-1
SEWER REHABILITATION
GROUP 1
STREET PAVING LIMITS

January 2019

Legend

- Building Footprint
- Deck
- Vegetated Area
- Water Bodies
- Group 1 Streets Mill & Overlay

1 inch = 350 feet

Andrea Road
Water & Sewer
1 - # 10

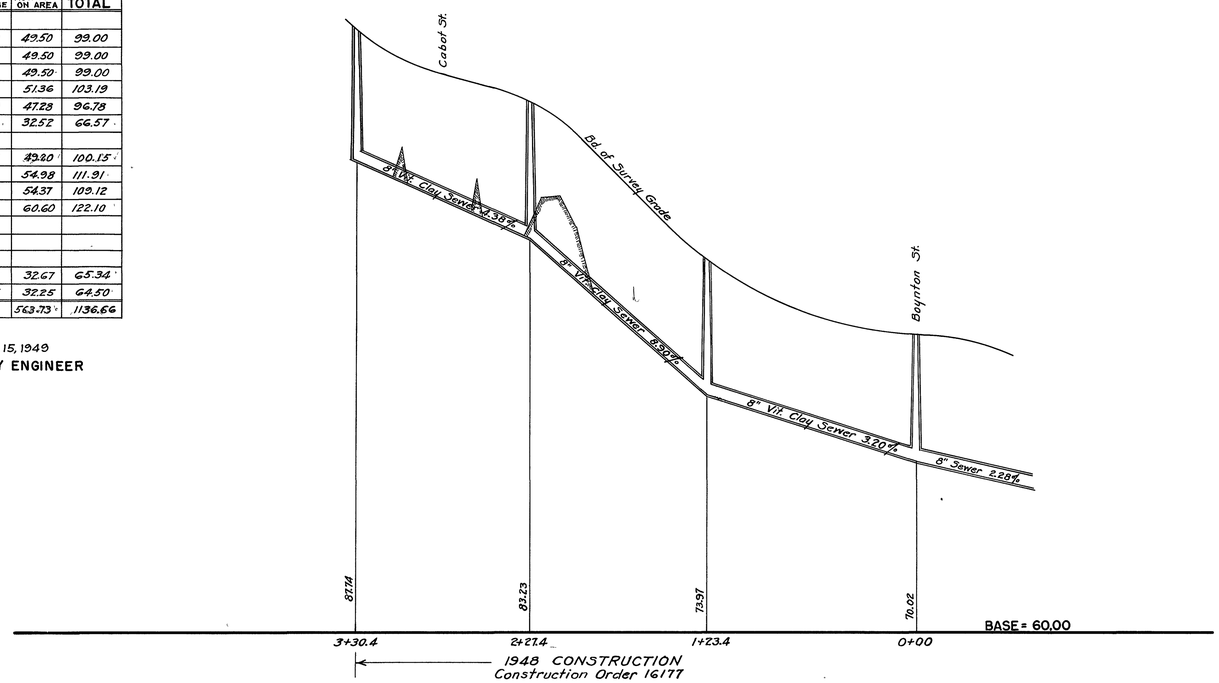
ANDREA ROAD SEWER
TABLE OF ASSESSMENT FOR 1948 CONSTRUCTION

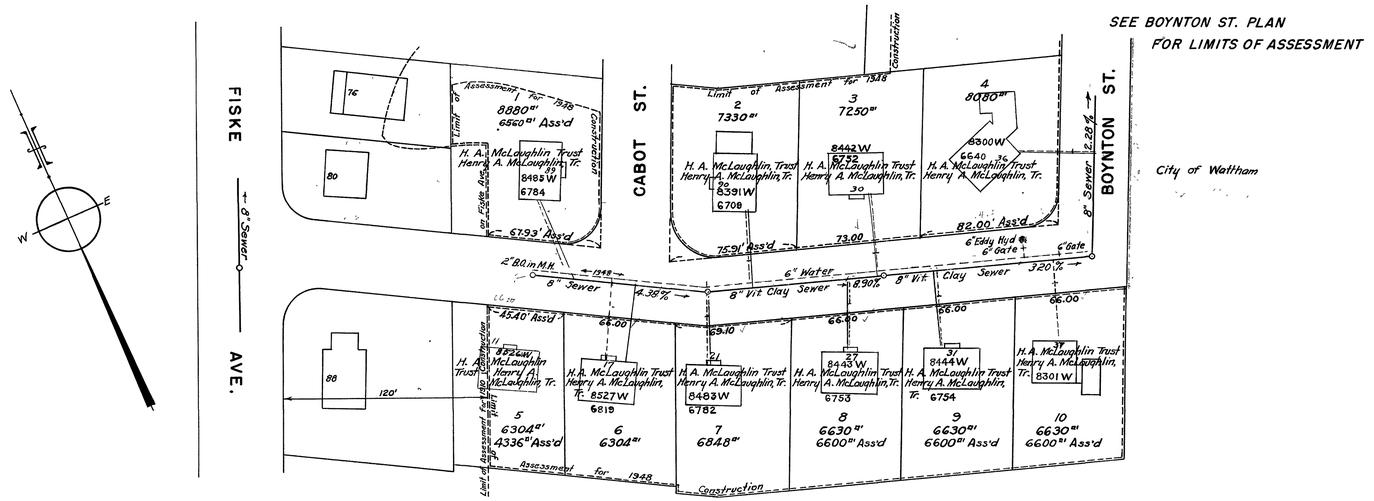
CONSTRUCTION ORDER 16177 DATE OF APPROVAL JULY 6, 1948
ASSESSMENT ORDER 16559 DATE OF APPROVAL DEC. 13, 1949
TOTAL COST $ 3298.25
AMOUNT ASSESSED $ 1136.66
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	NO.	LOT	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
ANDREA RD. SOUTH							
H.A. McLaughlin Trust, Henry A. McLaughlin, Tr.		10	66.00	6600	49.50	49.50	99.00
" "		9	66.00	6600	49.50	49.50	99.00
" "		8	66.00	6600	49.50	49.50	99.00
" "		7	69.10	6848	51.83	51.36	103.19
" "		6	66.00	6304	49.50	47.28	96.78
" "		5	45.40	4336	34.05	32.52	66.57
ANDREA RD. NORTH							
H.A. McLaughlin Trust, Henry A. McLaughlin, Tr.		1	67.93	6580	50.95	49.20	100.15
" "		2	75.91	7330	56.93	54.98	111.91
" "		3	73.00	7250	54.75	54.37	109.12
" "		4	82.00	8080	61.50	60.60	122.10
BOYNTON ST. WEST							
Jack R. Smith & Esther R. his ux		5	43.56	4356	32.67	32.67	65.34
" "		6	43.00	4300	32.25	32.25	64.50
TOTALS			763.90	75,164	572.93	563.73	1136.66

Herbert F. Howe NOV. 15, 1949
CITY ENGINEER

ANDREA ROAD
SCALES 40 FT. HOR. & 4 FT. VERT. PER INCH

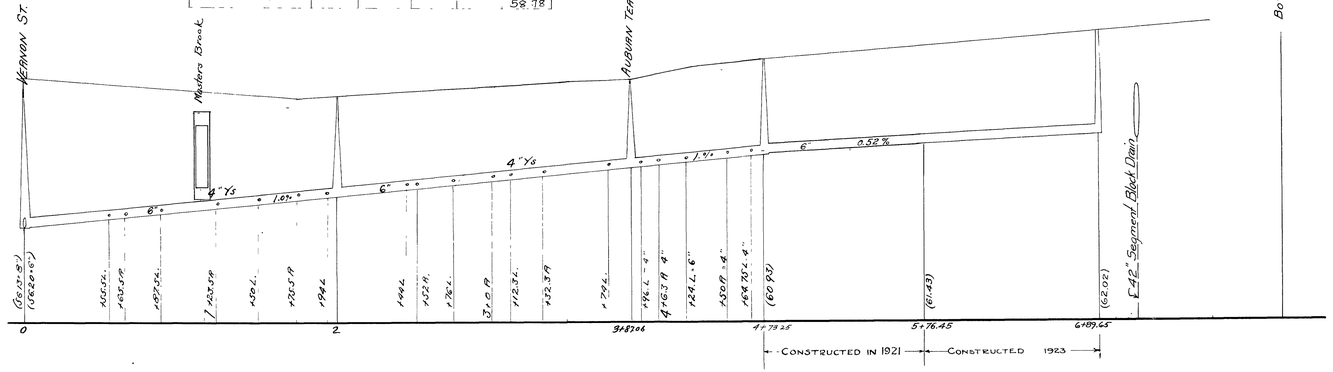




ANDREA RD.

Auburn St. & Terr.
Water & Sewer
Vernon St. – Boynton St.

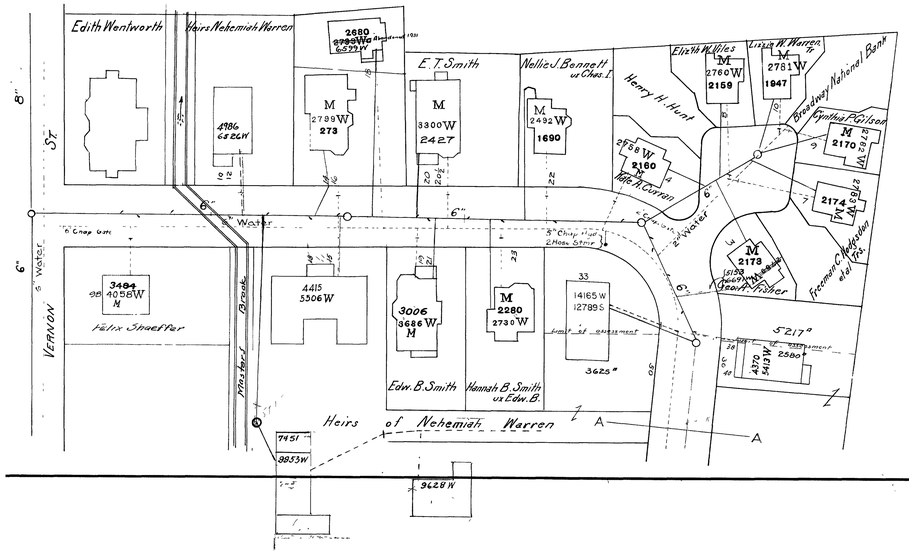
AUBURN TER. SEWER Dec. – 1896					
Cost $58.78 Assessed 100% 1/5 on Area 1/2 on Valuation		TABLE of ASSESSMENT			
Abutter	Area	Valuation	Assessed on Area	Assessed on Valuation	Total
Henry H. Hunt	2676	200	$4.18	$3.93	$8.11
Elizabeth W. Viles	2230	200	3.49	3.93	7.42
W. G. Childs, Tr.	2088	200	3.26	3.93	7.19
Harry F. Fadea	4785	300	7.47	5.87	13.34
Mary E. Savage	7022	600	10.96	11.76	22.72
					58.78



AUBURN ST. & AUBURN TER.

TABLE OF ASSESSMENT OF 1921 CONSTRUCTION CITY COUNCIL ORDER # 9410					
COST $ 181.25					
ASSESSED 99% = $ 179.44 DATE OF ASSESSMENT Oct. 11, 22					
3/5 ON FRONTAGE $ 107.66 at .4173 per ft.					
2/5 ON AREA $ 71.78 at .003445 " "					
ABUTTER	FRONT	AREA	ASSESSED ON FRONT.	ASSESSED ON AREA	TOTAL
Sherman T. Thomas	60	5100	$ 25.04	$ 17.57	$ 42.61
Raymond E. Smith	58	4563	24.20	15.72	39.92
Hrs. Nehemiah Warren	60	4965	25.04	17.10	42.14
" " "	50	3625	20.86	12.50	33.36
Sherman T. Thomas	30	2580	12.52	8.89	21.41
Totals	258	20833	107.66	71.78	179.44

TABLE OF ASSESSMENT OF 1923 CONSTRUCTION CITY COUNCIL ORDER # 9823					
COST $ 239.10					
ASSESSED 99% $ 236.71					
3/5 ON FRONTAGE $ 142.03 at .706.6169 per foot					
2/5 ON AREA $ 94.68 at .005666 per foot					
ABUTTER	FRONT	AREA	ASSESSED ON FRONT.	ASSESSED ON AREA	TOTAL
Allen R. & Mary L. Cook	49	4070	34.63	23.06	57.69
Earl L. Fisher	8	1390	5.65	7.88	13.53
Gertrude E. Gallagher	44	3550	31.09	20.11	51.20
Arthur A. Hansen	50	3725	35.33	21.11	56.44
Birten Dunphy	50	3975	35.33	22.52	57.85
Totals	201	16710	142.03	94.68	236.71



SEWER
ASSESSMENT PLAN
WALTHAM MASS
1896 Const
#9410 - 1921 Const.-Oct., 1922
#9823 - 1923 Const.-Sept. 1924
#10078 - 1924 Asm't-Dec. 1924
Frank C. Buchner City Eng.

Auburn St. & Terr.
Water & Sewer
Vernon St. – Boynton St.

AUBURN TER.. SEWER
Dec. – 1896

Cost $58.78
Assessed 100%
1/2 on Area
1/2 on Valuation

TABLE OF ASSESSMENT

Abutter	Area	Valuation	Assessed on Area	Assessed on Valuation	Total
Henry H. Hunt	2876	200	$4.18	$3.93	$8.11
Elizabeth W. Viles	2230	200	3.49	3.93	7.42
W. G. Childs, Tr.	2088	200	3.26	3.93	7.19
Harry F. Faden	4785	300	7.47	5.87	13.34
Mary E. Savage	7022	600	10.96	11.76	22.72
					58.78

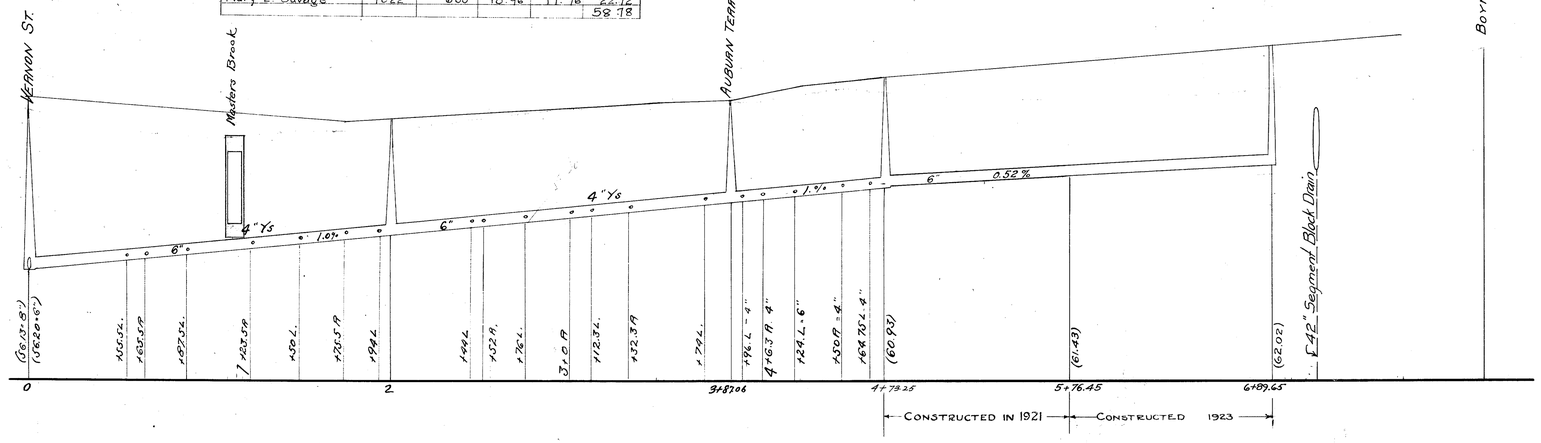


TABLE OF ASSESSMENT OF 1921 CONSTRUCTION
CITY COUNCIL ORDER # 9410

COST $ 181.25
ASSESSED 99% = $179.44 DATE OF ASSESSMENT Oct. 11, '22
3/5 ON FRONTAGE $ 107.66 at .4173 per ft.
2/5 ON AREA $ 71.78 at .003445 " "

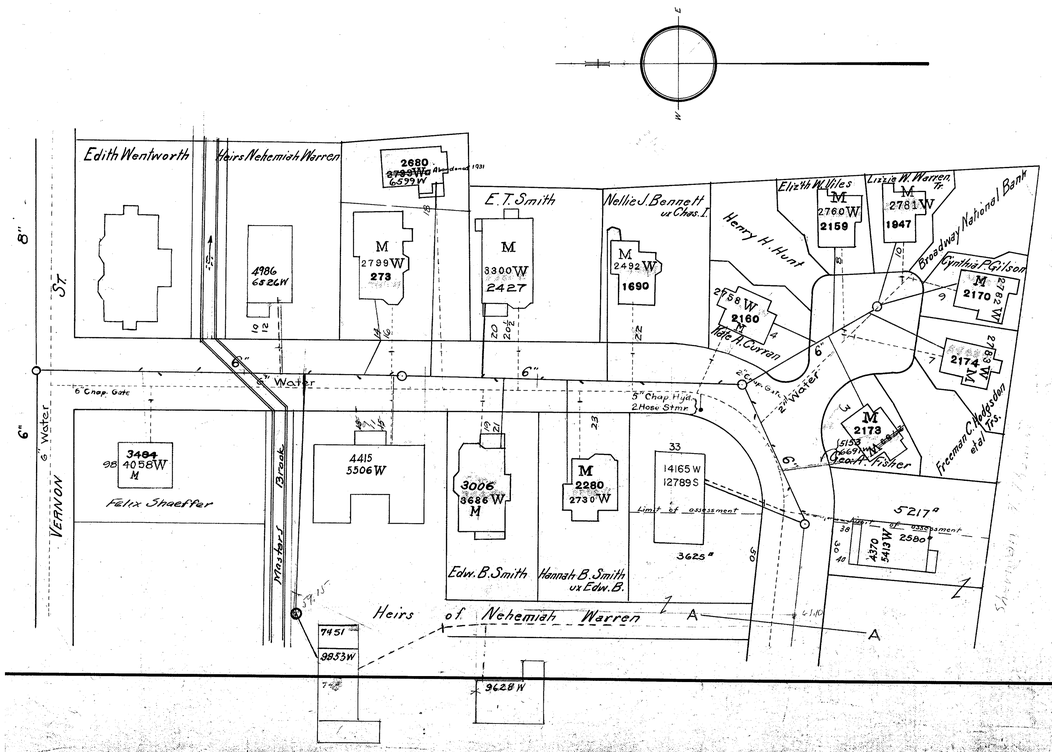
ABUTTER	FRONT	AREA	ASSESSED ON FRONT.	ASSESSED ON AREA.	TOTAL
Sherman T. Thomas	60	5100	$25.04	$17.57	$42.61
Raymond E. Smith	58	4563	24.20	15.72	39.92
Hrs. Nehemiah Warren	60	4965	25.04	17.10	42.14
" " "	50	3625	20.86	12.50	33.36
Sherman T. Thomas	30	2580	12.52	8.89	21.41
Totals	258	20833	107.66	71.78	179.44

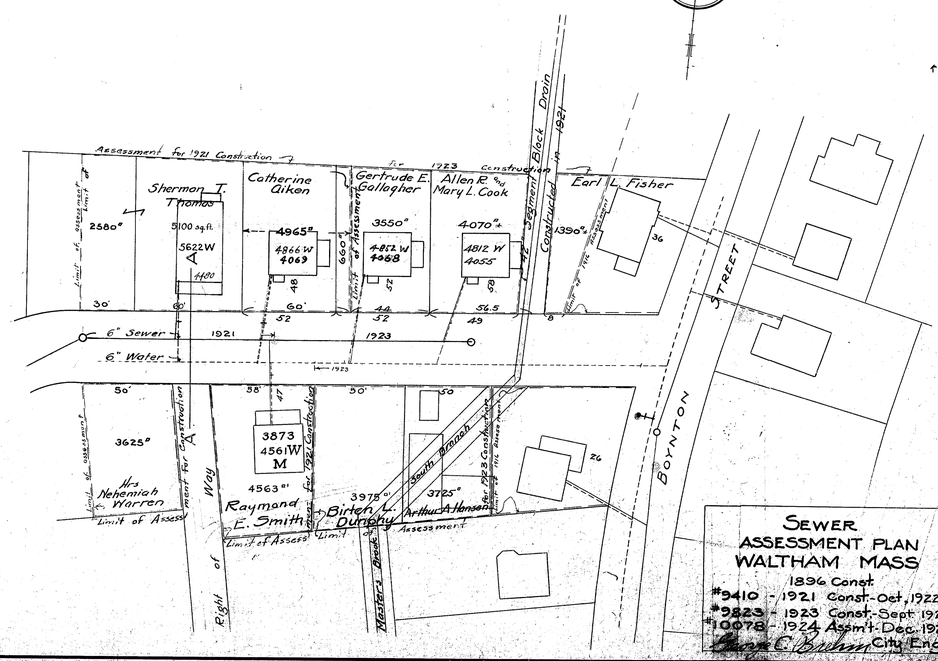
TABLE OF ASSESSMENT OF 1923 CONSTRUCTION
CITY COUNCIL ORDER # 9823

COST $ 239.10
ASSESSED 99% $ 236.71
3/5 ON FRONTAGE $ 142.03 at .7066169 per foot
2/5 ON AREA $ 94.68 at .005666 per foot

ABUTTER	FRONT.	AREA	ASSESSED ON FRONT.	ASSESSED ON AREA.	TOTAL
Allen R. & Mary L. Cook	49	4070	34.63	23.06	57.69
Earl L. Fisher	8	1390	5.65	7.88	13.53
Gertrude E. Gallegher	44	3550	31.09	20.11	51.20
Arthur A. Hansen	50	3725	35.33	21.11	56.44
Birten Dunphy	50	3975	35.33	22.52	57.85
Totals	201	16710	142.03	94.68	236.71

AUBURN ST. & AUBURN TER.





SEWER
ASSESSMENT PLAN
WALTHAM MASS
1896 Const.
#9410 - 1921 Const.-Oct, 1922
#9823 - 1923 Const.-Sept 1924
#10078 - 1924 Assm't-Dec. 1924.
Engr. C. Barker City Eng.

AUBURN TER.
AUBURN ST.

Bedford Street
Water & Sewer
87 # 134

BEDFORD ST.

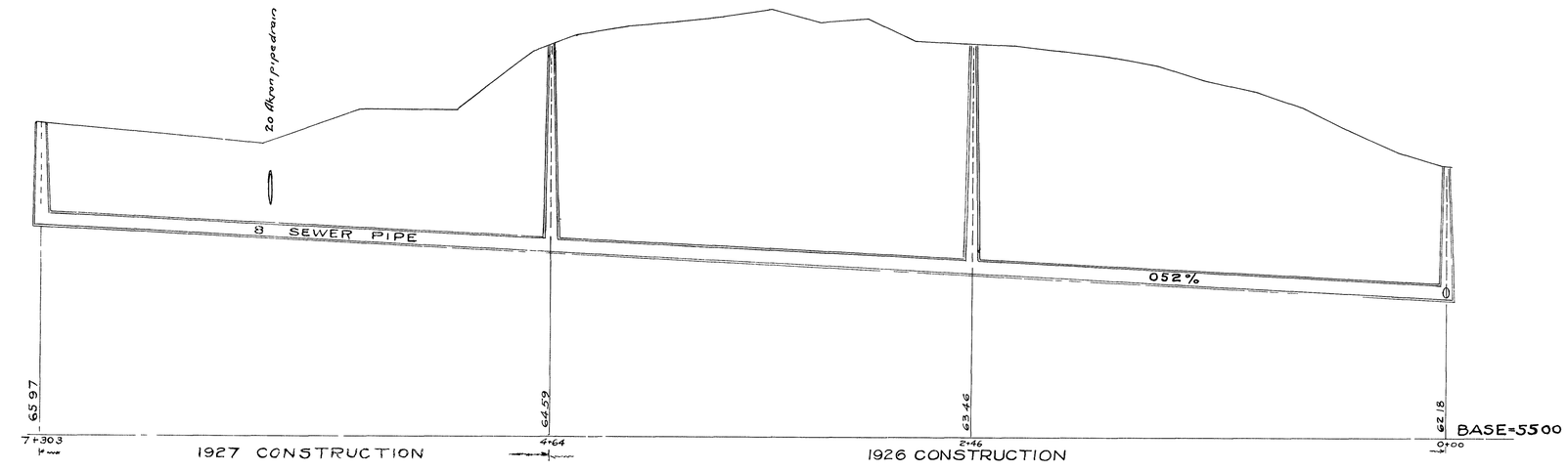
Scales: 40ft. Hor. & 4 ft. Ver. per inch

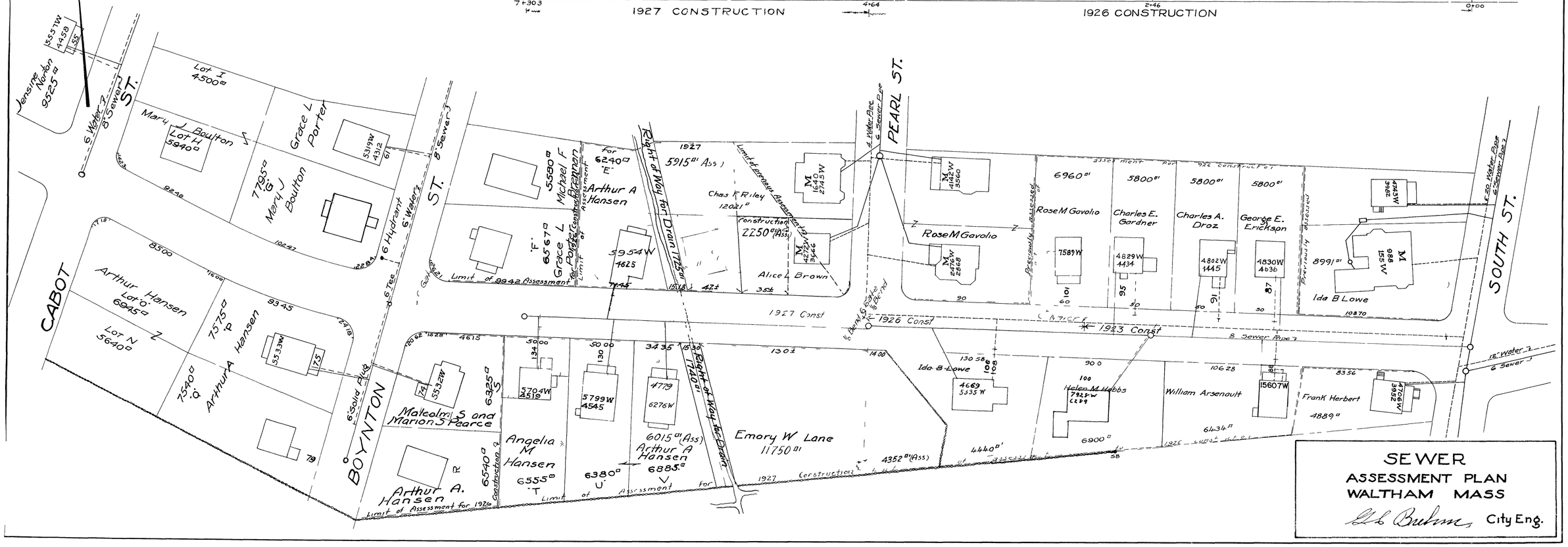
TABLE OF ASSESSMENT FOR 1926 CONSTRUCTION
ORDER NO. FOR CONSTRUCTION #10503
ORDER NO FOR ASSESSMENT #10750
DATE OF APPROVAL
TOTAL COST $ 3804.09
ASSESSED 50 % OF COST 1902 05
3/5 ON FRONTAGE #114123 at 2.071724 per ft.
2/5 ON AREA #760.82 at 0.16366 per sq. ft

OWNER	FRONTAGE	AREA			
Rose M Gavolio	60 00	6960	124 30	113 92	238 22
Chas E Gardner	50.00	5800	103 59	94 92	198 51
Chas A Droz	50 00	5800	103 59	94 92	198 51
Geo E Erickson	50.00	5800	103 59	94 92	198 51
William Arsenault	106 28	6434	220 18	105 30	325 48
Helen M Hobbs	90 00	6900	186 46	112 94	299 40
Ida B Lowe	130 58	4440	270 52	72 68	343 20
Emory W Lane	14 00	4352	29.00	71 22	100 22
Total	550 86	46486	1141 23	760 82	1902 05

TABLE OF ASSESSMENT FOR 1927 CONSTRUCTION
ORDER NO FOR CONSTRUCTION #10809
ORDER NO FOR ASSESSMENT #10929
DATE OF APPROVAL April 2, 1928
TOTAL COST $ 2102.56
ASSESSED 50 % OF COST $977 90
3/5 ON FRONTAGE # 587 40 at #1.422960 per ft.
2/5 ON AREA # 390 50 at #.008657 per sq. ft

OWNER		FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
Arthur A Hansen	E	71.45	6240	101 67	54 02	155.69
Open Rt of Way	C of W	15.18	1725	21.60	14 94	- - -
Chas F Riley		42±	5915	59 76	51 21	110.97
Alice L Brown		35±	2250	49.80	19 48	69.28
Angelia M Hansen	T	50.00	6555	71 15	56.75	127 90
Arthur A Hansen	U	50.00	6380	71. 15	55.24	126. 39
" "	V	34.35	6015	48 88	52.08	100. 96
Open Rt of Way	C of W	15.30	1740	24 77	15 07	- - -
Emory W Lane		130±	11750	184.99	101. 72	286 71
Totals		447.28	48570	$587 40	$390 50	$977 90





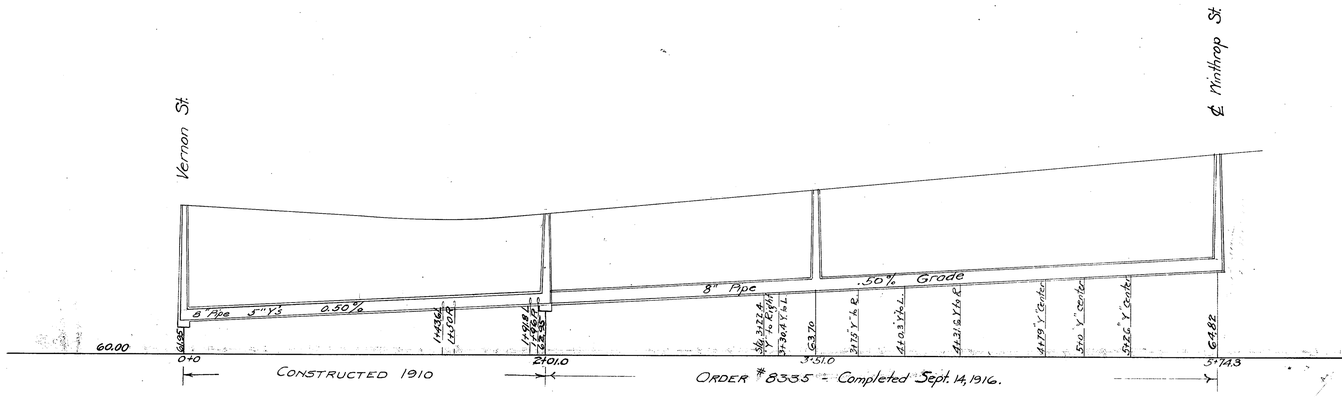
BEDFORD 5'

Bedford Street
Water & Sewer
11 - # 74

Boynton Street
Water & Sewer
10 - # 42

PLAN AND PROFILE
OF
BOYNTON STREET SEWER.
CONSTRUCTED IN 1910

Scales 40' Hor. & 4' Ver. Per. In. — Bertram Brewer, City Engineer.



BOYNTON STREET SEWER
COMMITTEE ON FINANCE 12/18/1910 ORDER #6641

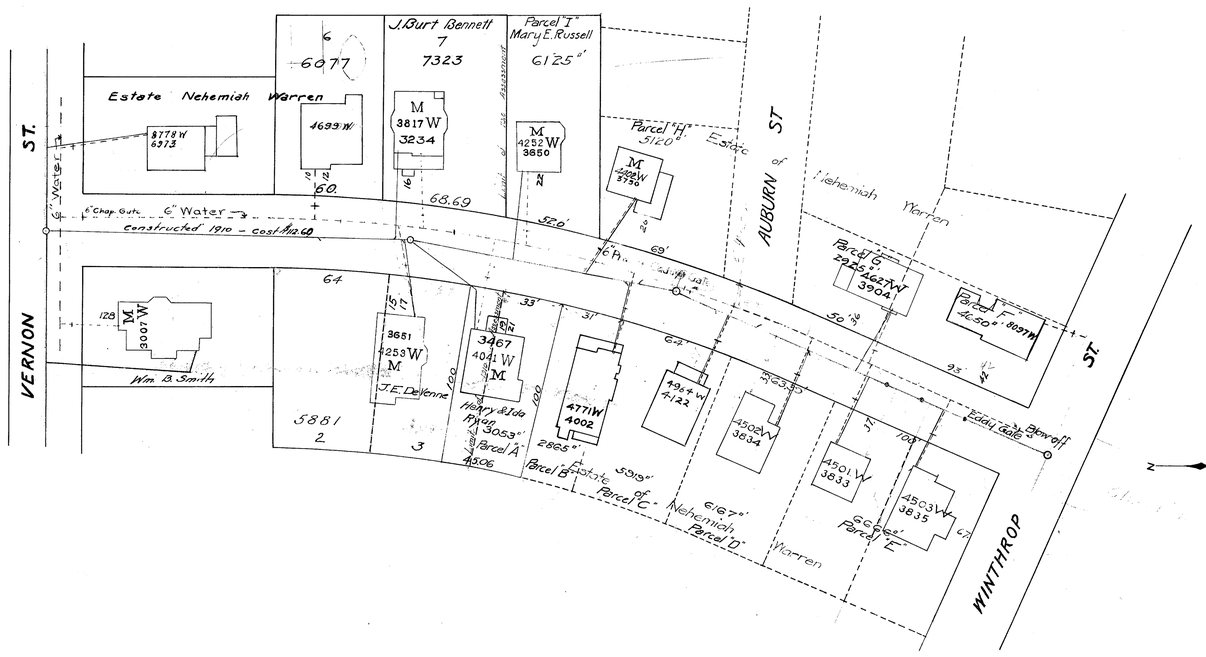
COST $112.60
Assessed 99% = $111.47
3/5 on Frontage = .26951
2/5 on Area = .001772

ABUTTER		FRONT	AREA	ASSESSED ON FRONT	ASSESSED ON AREA	TOTAL
Est. Nehemiah Warren	±2	64	5881	$16.68	$10.42	$27.10
" " "	±2	64	5881	16.68	10.42	27.10
" " "	±4	60	6077	15.63	10.77	26.40
J. Burt Bennett	±1	68.69	7323	17.89	12.98	30.87
		256.69	25,162	66.88	44.59	111.47

SEWER ASSESSMENT OF 1916 CONSTRUCTION
COMMITTEE ON FINANCE ORDER # 8335

COST 435.62
ASSESSED 99% = $431.26
3/5 ON FRONTAGE $0.465099
2/5 ON AREA $0.003966 52

ABUTTER.	PARCEL	FRONT	AREA	ASSESSED ON FRONT	ASSESSED ON AREA	TOTAL
Henry and Ida Ryan	"A"	33	3053	$15.37	$12.11	$27.48
Est. Nehemiah Warren	"B"	31	2865	14.41	11.36	25.80
" " "	"C"	64	5919	29.82	23.48	53.30
" " "	"D"	63.39	6167	29.53	24.46	53.99
" " "	"E"	100	6666	46.59	26.44	73.03
" " "	"F"	93	4650	43.33	18.44	61.77
" " "	"G"	50	2925	23.30	11.60	34.90
" " "	"H"	69	5120	32.15	20.31	52.46
Mary E. Russell	"I"	52	6125	24.23	24.30	48.53
Totals		555.39	43490	258.76	172.50	431.26

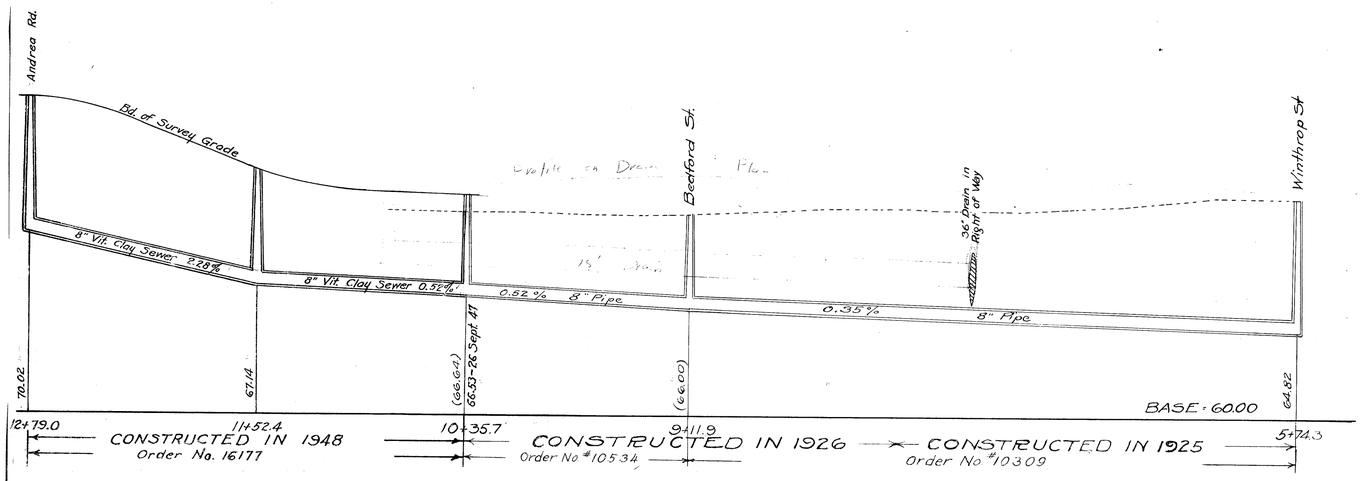


BOYNTON ST.

Boynton Street
Water & Sewer
56 - # 85

BOYNTON ST.

Scales: 40 ft. Hor. & 4 ft. Vert. per. in.



1948 CONSTRUCTION ASSESSED WITH ANDREA RD.

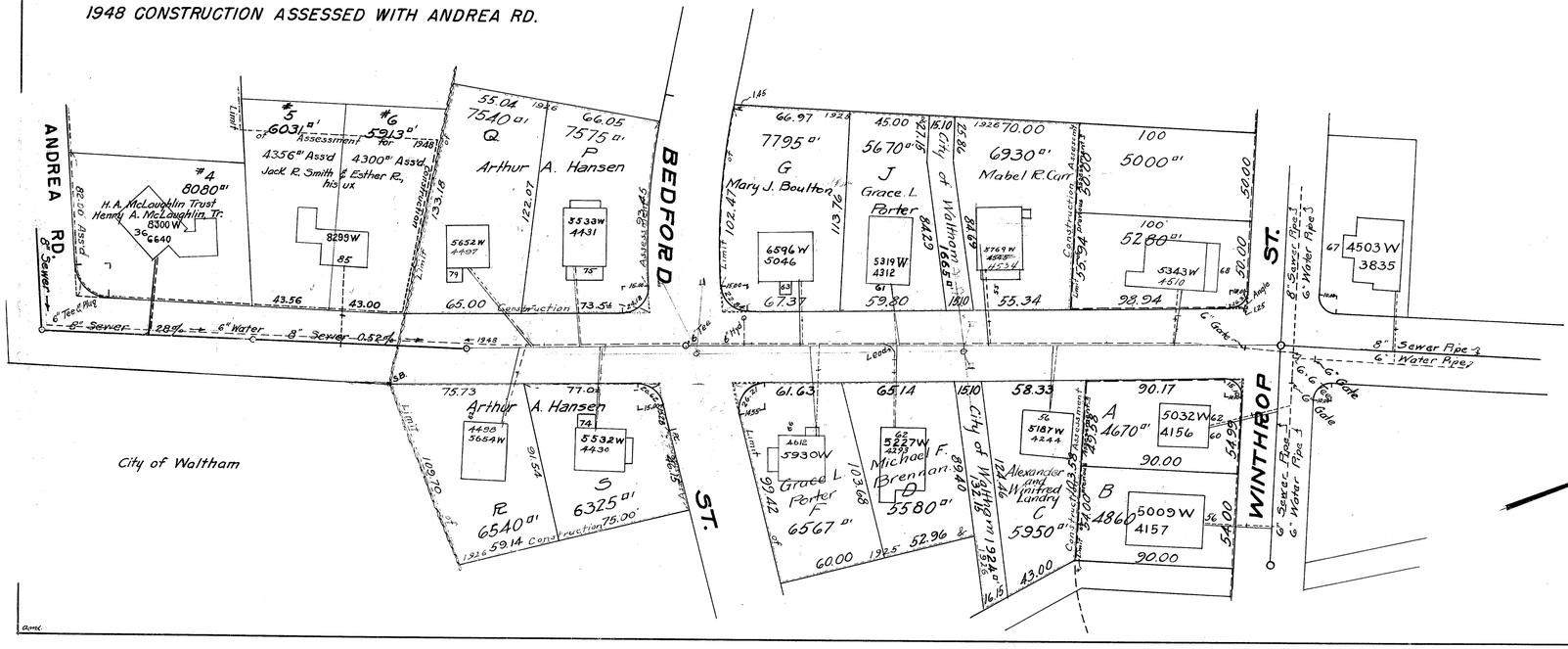


TABLE OF ASSESSMENT FOR 1925-26 CONSTRUCTION
ORDER NO FOR CONSTRUCTION # 10309
ORDER NO FOR ASSESSMENT # 10746
DATE OF APPROVAL JULY 1 1927
TOTAL COST $ 1195.10
ASSESSED 75 % OF COST # 896.33
3/5 ON FRONTAGE # 537.80 at 1.3519 per. ft.
2/5 ON AREA # 358.53 at .008519 per. sq. ft.

OWNER	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
Mabel R Carr	55.34	6930	74.81	59.04	133.85
Grace L. Porter J	59.80	5670	80.84	48.31	129.15
Mary J. Boulton G	67.37	7795	91.08	66.42	157.50
Grace L. Porter F	61.63	6567	83.32	55.94	139.26
Michael F. Brennan D	65.14	5580	88.06	47.54	135.60
Alexander and Winifred Landry C	58.33	5950	78.86	50.70	129.56
City of Waltham	15.10	1665	20.42	14.18	34.60
" "	13.10	1824	20.41	16.40	36.81
Totals	397.81	42081	537.80	358.53	896.33

TABLE OF ASSESSMENT FOR 1926 CONSTRUCTION
ORDER NO FOR CONSTRUCTION # 10309
ORDER NO FOR ASSESSMENT # 10747
DATE OF APPROVAL JULY 1, 1927
TOTAL COST $ 438.75
ASSESSED 75 % OF COST 328.69
3/5 ON FRONTAGE # 197.22 at .671196 per ft.
2/5 ON AREA # 131.47 at .0046987 per sq. ft.

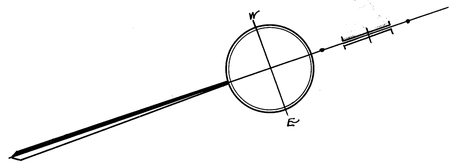
OWNER	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
Arthur A. Hansen P	73.5±	7575	49.78	35.60	85.38
" " " Q	65.00	7540	44.02	35.43	79.45
" " " R	75.73	6540	51.28	30.72	82.00
" " " S	77.0±	6325	52.14	29.72	81.86
Totals	291.23	27980	197.22	131.47	328.69

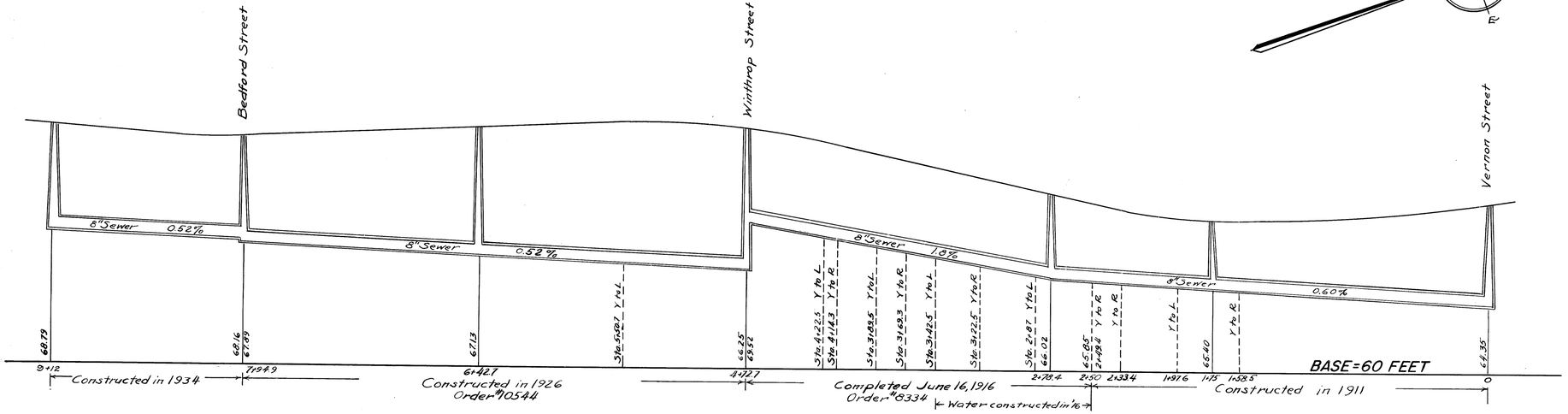
SEWER
ASSESSMENT PLAN
WALTHAM MASS
H. C. Buehm City Eng

BOYNTON ST.
SHEET B

CABOT STREET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH





NOTE: All information pertaining to sewer assessments will be found on plan #52-98

A.C.T.
J.E.S.

Cabot Street
Water & Sewer
59 - # 83

CABOT STREET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER IN.

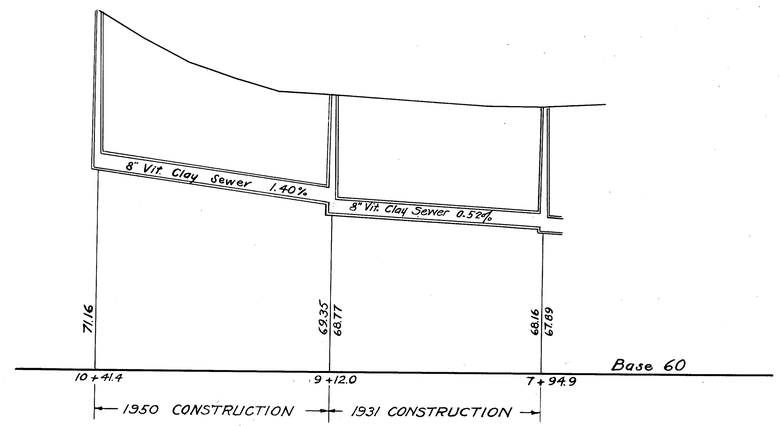
TABLE OF ASSESSMENT FOR 1950 CONSTRUCTION

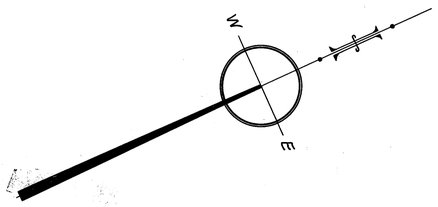
CONSTRUCTION ORDER 16737 DATE OF APPROVAL JULY 25, 1950
ASSESSMENT ORDER 17229 DATE OF APPROVAL APRIL 16, 1952
TOTAL COST $722.03
AMOUNT ASSESSED $416.11
ASSESSMENT ON FRONTAGE $0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

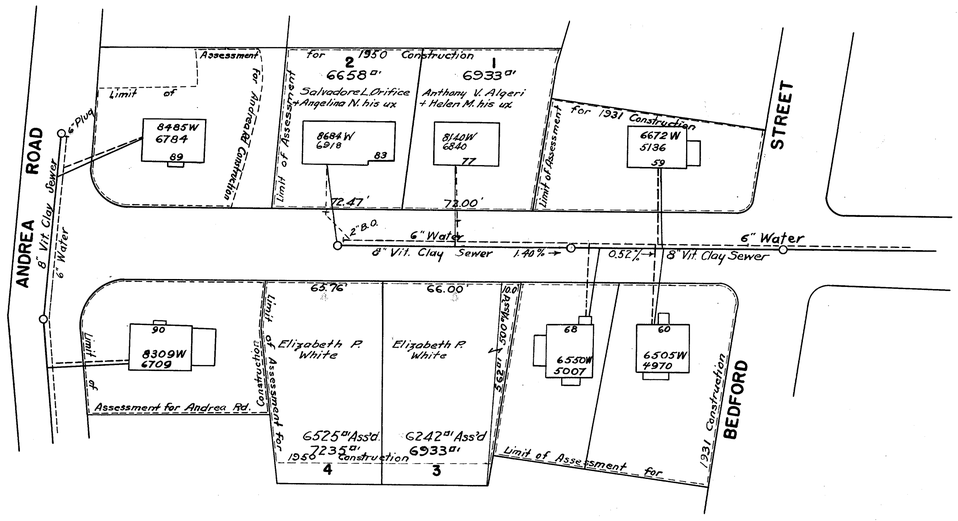
OWNER	LOT	FRONT'GE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
EAST SIDE						
Elizabeth P. White		10.00	500	7.50	3.75	11.25
" " "	3	66.00	6,242	49.50	46.81	96.31
" " "	4	65.76	6,525	49.32	48.94	98.26
WEST SIDE						
Salvatore L. Orifice + Angelina N. his ux	2	72.47	6,658	54.35	49.94	104.29
Anthony V. Algeri + Helen M. his ux	1	72.00	6,933	54.00	52.00	106.00
TOTALS		286.23	26,858	214.67	201.44	416.11

DATE ~ MARCH 1952

Herbert F. Howe CITY ENGINEER



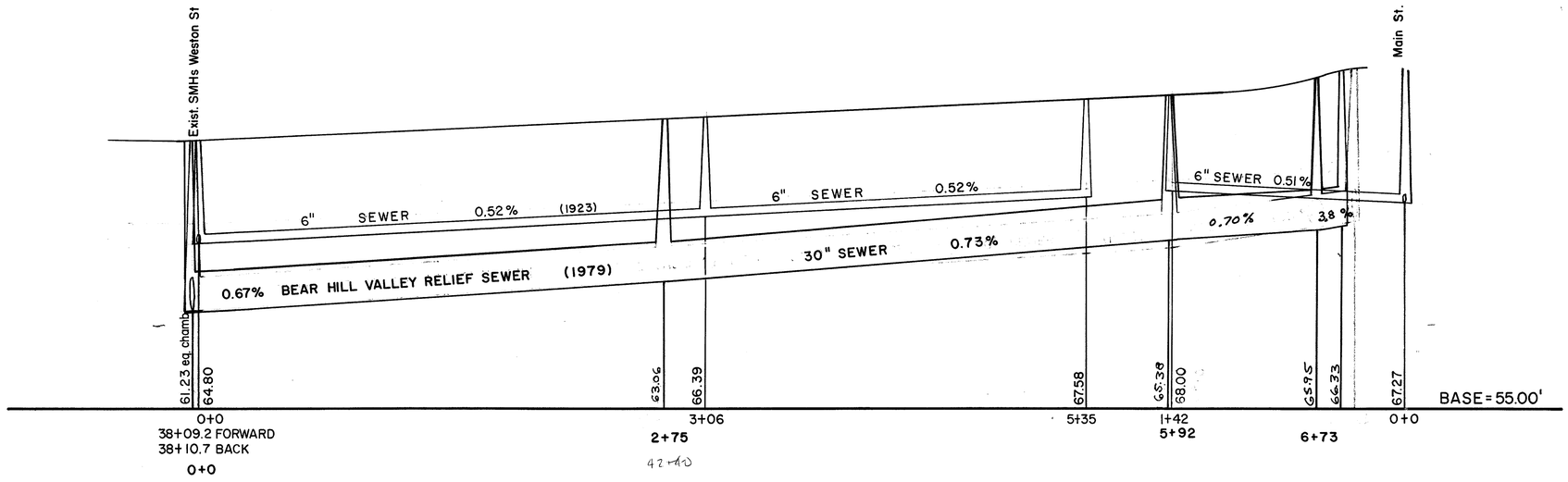


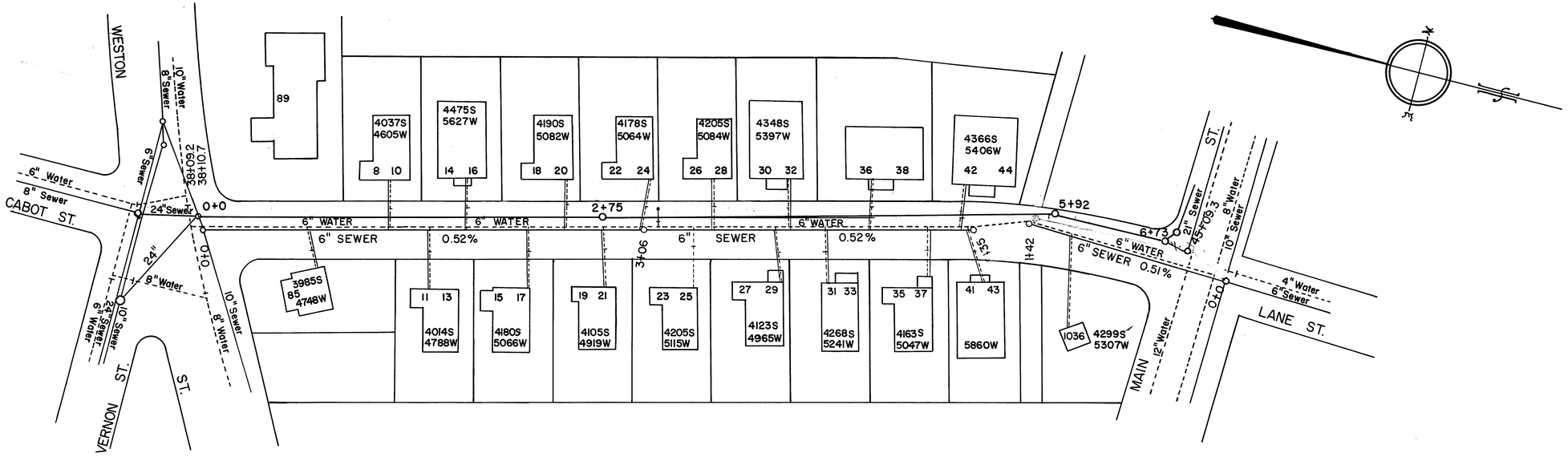


Eddy Street
Water & Sewer
8 - # 44

EDDY STREET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH





EDDY ST.

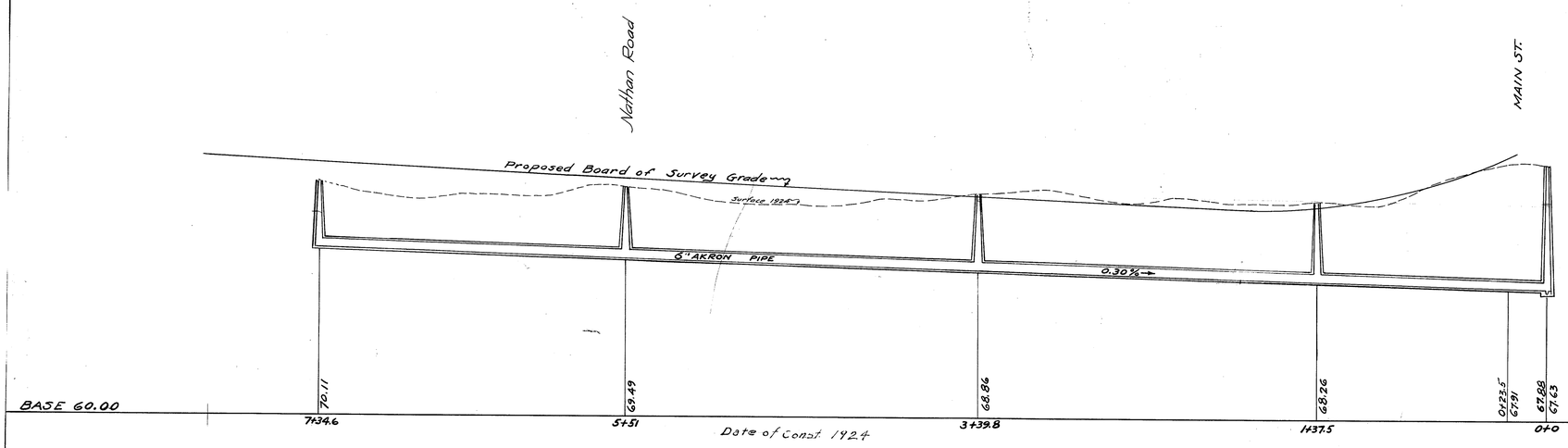
Everett Street
Water & Sewer
9 - # 50

EVERETT STREET

Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch.

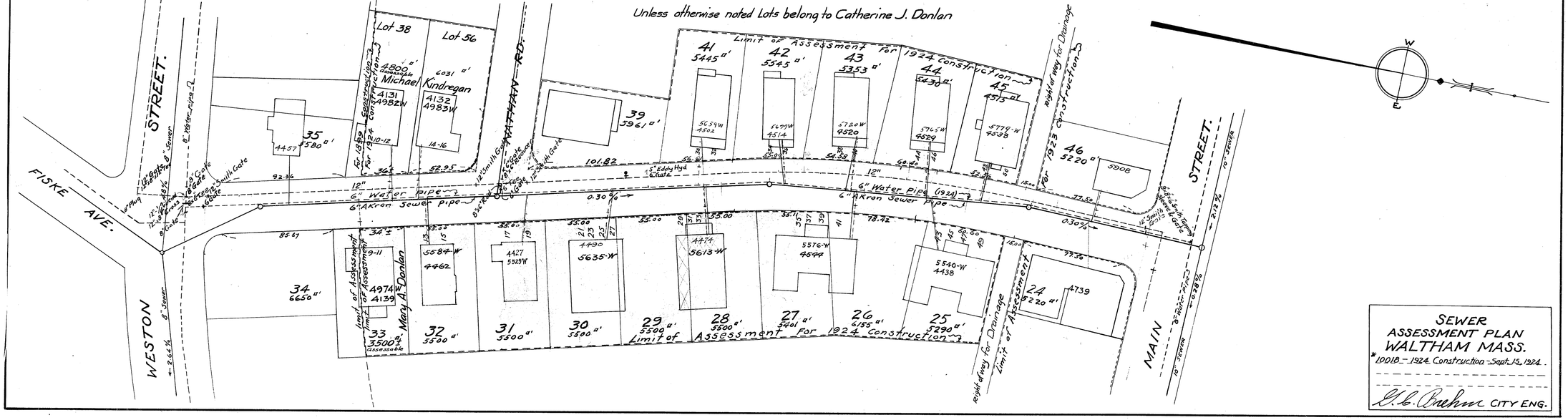
TABLE OF ASSESSMENT FOR 1924 CONSTRUCTION
ORDER NO. FOR CONSTRUCTION #10018
ORDER NO. FOR ASSESSMENT #10190
DATE OF APPROVAL – SEPT. 15 1924
TOTAL COST $1480.91
ASSESSED 99% OF COST = #1466.10
2/5 ON FRONTAGE #879.66 at #90402 per ft.
2/5 ON AREA #586.44 at #0064496 per sq. ft.

OWNER	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
Catherine J. Donlan Lot 25	60.60	5290	54.78	34.12	88.90
" " " 26	78.42	6155	70.89	39.70	110.59
" " " 27	55.11	5401	49.82	34.84	84.66
" " " 28	55.00	5500	49.72	35.47	85.19
" " " 29	55.00	5500	49.72	35.47	85.19
" " " 30	55.00	5500	49.72	35.47	85.19
" " " 31	55.00	5500	49.72	35.47	85.19
" " " 32	55.00	5500	49.72	35.47	85.19
Mary A. Donlan Lot 33	34 ±	3800	30.74	22.57	53.31
Michael Kindregan " 38	36 ±	4800	32.55	30.96	63.51
" " " 56	52.95	6031	47.87	38.90	86.77
Catherine J. Donlan " 39	101.82	5961	92.05	38.45	130.50
" " " 41	56.61	5445	51.18	35.12	86.30
" " " 42	55.00	5545	49.72	35.76	85.48
" " " 43	54.58	5353	49.34	34.53	83.87
" " " 44	60.40	5430	54.60	35.02	89.62
" " " 45	52.56	4515	47.52	29.12	76.64
Totals	973.05	90926	879.66	586.44	1466.10



Note :
12" Water main cleaned & cement lined in 1974.
(Weston St. to Main St.)

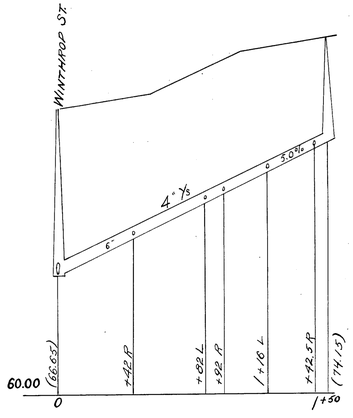
Unless otherwise noted Lots belong to Catherine J. Donlan



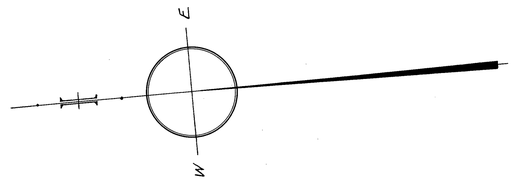
SEWER ASSESSMENT PLAN
WALTHAM MASS.
#10018 – 1924 Construction – Sept. 15, 1924.

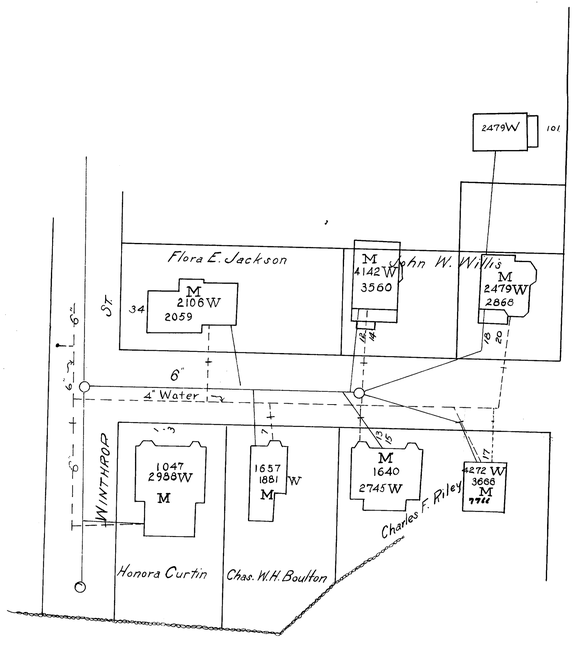
C. C. Dahm CITY ENG.

EVERETT ST.


WINTHROP ST.
4" W
3.0%
5'
60.00
(66.63)
0
+42 R
+82 L
+82 R
1+16 L
+42.5 R
(74.13)
1+50

PEARL ST.


E
W

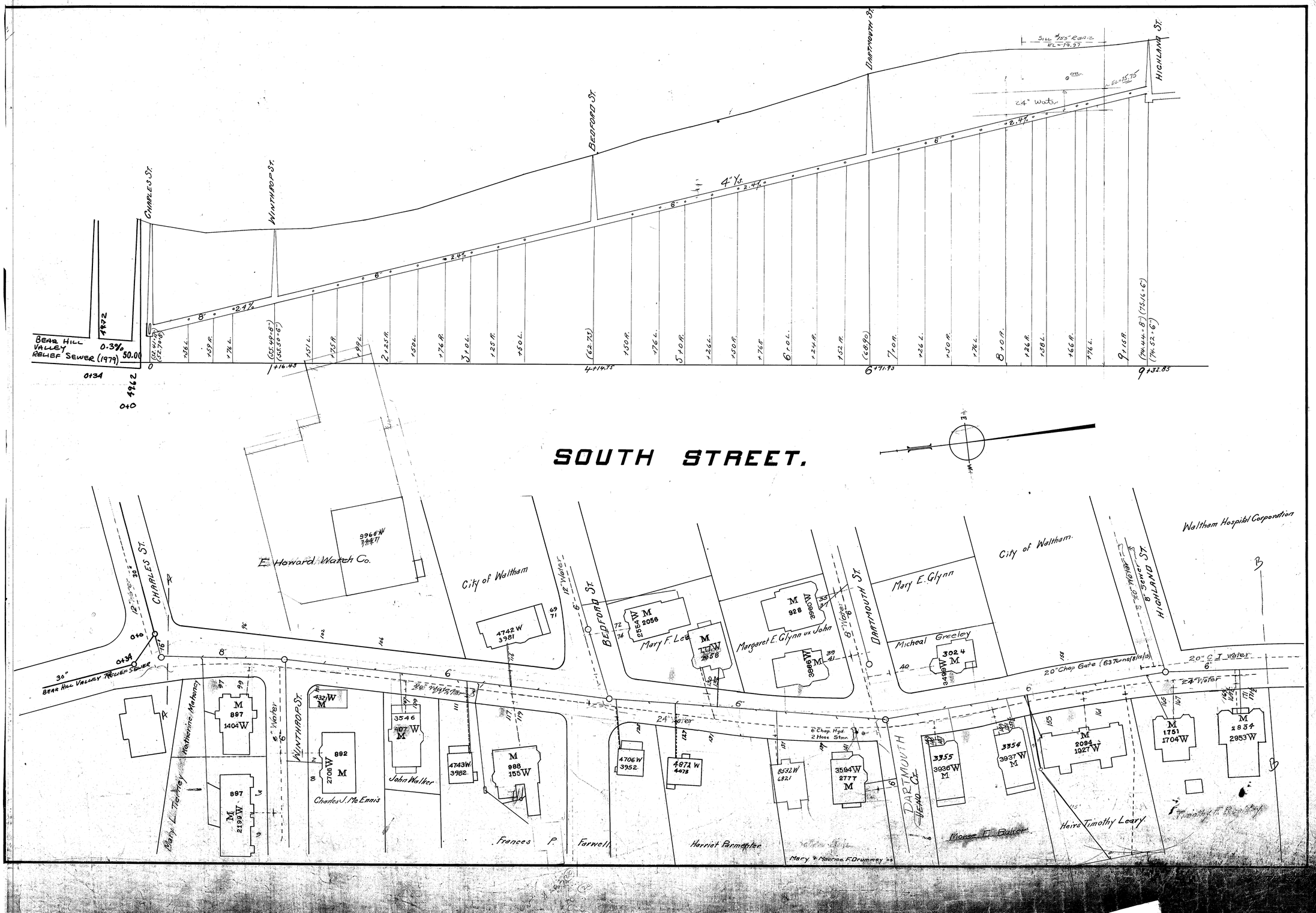

2479W
101
Flora E. Jackson
M
2106W
2059
34
ST
M
4142W
3560
John W. Willis
M
2479W
2866
6"
4" Water
WINTHROP
1047
2988W
M
1657
1881
W
M
1640
2745W
4272 W
3666
M
Charles F. Riley
Honora Curtin
Chas. W.H. Boulton

South Street
Water & Main
25 - # 93

SOUTH STREET.

SOUTH ST-A.

South Street
Water & Main
97 - # 171



South Street
Water & Main
175 - # 259

SOUTH STREET

SCALES : 40 FT. HOR & 4 FT. VERT. PER IN.

HIGHLAND ST
DREW ST.
MORRIS ST.
SHAKESPEARE RD.

6" Sewer 0.8%
6" Sewer 0.8%
4" Ys
6" Sewer 0.8%
6" Sewer 2.0%
6" 1.30%
8" Vit Clay Sewer 3.40%
8" Vit Clay Sewer 0.8%

9+32.85 | 10+00 | 10+26 | 10+50 | 10+76 | 11+04 | 11+26 | 11+45.11 | 11+76 | 12+26 | 12+74 | 13+24 | 13+32.47 | 13+74 | 13+982 | 14+42 | 14+80 | 15+29.98 | 15+42 | 15+98 | 16+16 | 16+62 | 17+03.8 | 17+28.6 | 17+62 | 17+72 | 17+75 | 19+04.0

79.30 | 82.90 | 84.40 | 84.73 | 85.43 | 86.00 | 92.97

BASE TO' — BASE 90'

← CONSTRUCTED IN 1930

← LEVELS IN MANHOLES & SURFACE PROFILE TAKEN FEB. 1949

CONSTRUCTED - 1978 24" Water
24" B'FLY VALVE
1/32° BEND
24"x16" REDUCERS

City of Waltham

Waltham Hospital

20" Water
6" Sewer 0.8%
24" Water
20" Water
6" Sewer 20%
24" Water
24" Gate
20" Gate
12" Gate to 16"x12"
8" Gate
20" Gate
6" Sewer 1.5%
8" Vit Clay Sewer 5.40%
20" Water
8" Sewer
24" Water
8" Sewer
CONSTRUCTED - 1978
CLEANED & CEMENT RELINED - 1978

DREW ST.
MORRIS ST.
SHAKESPEARE RD.

1425 W 1532
3071 W 1554
4780 6297 W
4166 5054 W
4290 5299 W
4183 5071 W
4284 5275 W
4240 5176 W
4708 6122 W
3536 2264 W
7794 10472 W
3009 1472 W
571 2243 W
7692 10366 W
7693 10367 W
5044 1464 W
7857 1421 W
2393 W 2646

Frank W. Browne
Edwin B. Harvey
Edwin B. Harvey
Charles E. Jennings
Caroline F. Bellis
Frances A. Winslow ux J. S.
William Shakespeare
Caroline F. Bellis
Grace I. Mallet & Eva Mallet Silman
Soren H.E. Bigham

12,860 a'
22,800 a'
12,280 a' Assessed
16,547 a'
9,650 a' Assessed
18,000 a'
11,960 a' Assessed

Limit of Previous Assessment
Limit of Assessment for 1930 Construction

NOTE: See Sheet "D" for Table of Assessments for 1930 Construction

SOUTH STREET C

South Street
Water & Main
Wheelock Rd

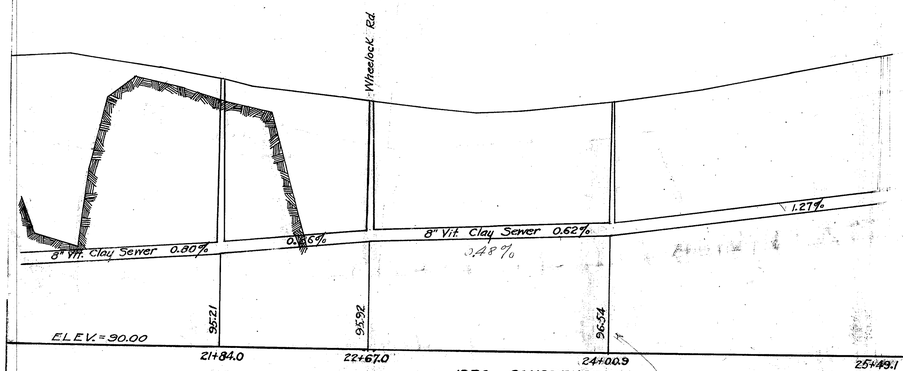
SOUTH ST.

Scales: 40 Ft. Hor. & 4 Ft. Ver. Per Inch.

TABLE OF ASSESSMENT FOR 1930 CONSTRUCTION

CONSTRUCTION ORDER # 11719 DATE OF APPROVAL JUNE 26, 1930
ASSESSMENT ORDER # 11941 DATE OF APPROVAL MAR. 27, 1931
TOTAL COST $
AMOUNT ASSESSED $ 1,034.18
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	Lot or Street No.	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
West ~~East~~ Side:						
Caroline F. Bellis		125.00	12,280	93.75	92.10	185.85
Grace I. Mallet & Eva Mallet Silman	#249 South St.	100.00	9,650	75.00	72.38	147.38
Soren H.E. Bigham	#251-253 South St.	100.00	11,940	75.00	89.70	164.70
Hazel C. Bigham		189.±	18,800	141.75	141.00	282.75
Middlesex College of Medicine and Surgery		171.±	16,700	128.25	125.25	253.50
Totals		685.00	69,390	513.75	520.43	1034.18



Levels in manholes & surface profile taken Feb. 1949

133.9 − 38.7 = 95.2
147.1 − 53.56 = 93.54
142.72

City of Waltham

M 4369 YY

276

C

C

20"x8" Tapping Sleeve & Valve

Blowoff

Vit. Clay Sewer 0.80% ← 8" Vit. Clay Sewer 0.86% ← 8" Vit. Clay Sewer 1.27%

24+00.9

89'± Scaled

171'± Scaled

54.34

8" Water
8" Sewer

WHEELOCK RD.

18,800 sq
Assessed
Hazel C. Bigham

Limit of Assessment

1930 Construction

Middlesex College of Medicine and Surgery
16,700 sq
Assessed

E
W

7088 W
Boiler House

20" Water Main

20" Force Main
12" Force Main

12"

To Reservoir

20" C.I. Force Main
6"
6" Chem. Feed & Hose Sta.

D

D

SOUTH ST. D.

South Street
Water & Main
269 – Baker Rd

SOUTH STREET

SCALES 40 FT. HOR. & 4 FT. VERT. PER INCH

SOUTH STREET SEWER
TABLE OF ASSESSMENT FOR 1951 CONSTRUCTION

CONSTRUCTION ORDER 17032 DATE OF APPROVAL AUG 16, 1951
ASSESSMENT ORDER 17254 DATE OF APPROVAL MAY 13, 1952
TOTAL COST $ 6878.64
AMOUNT ASSESSED $ 853.50
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

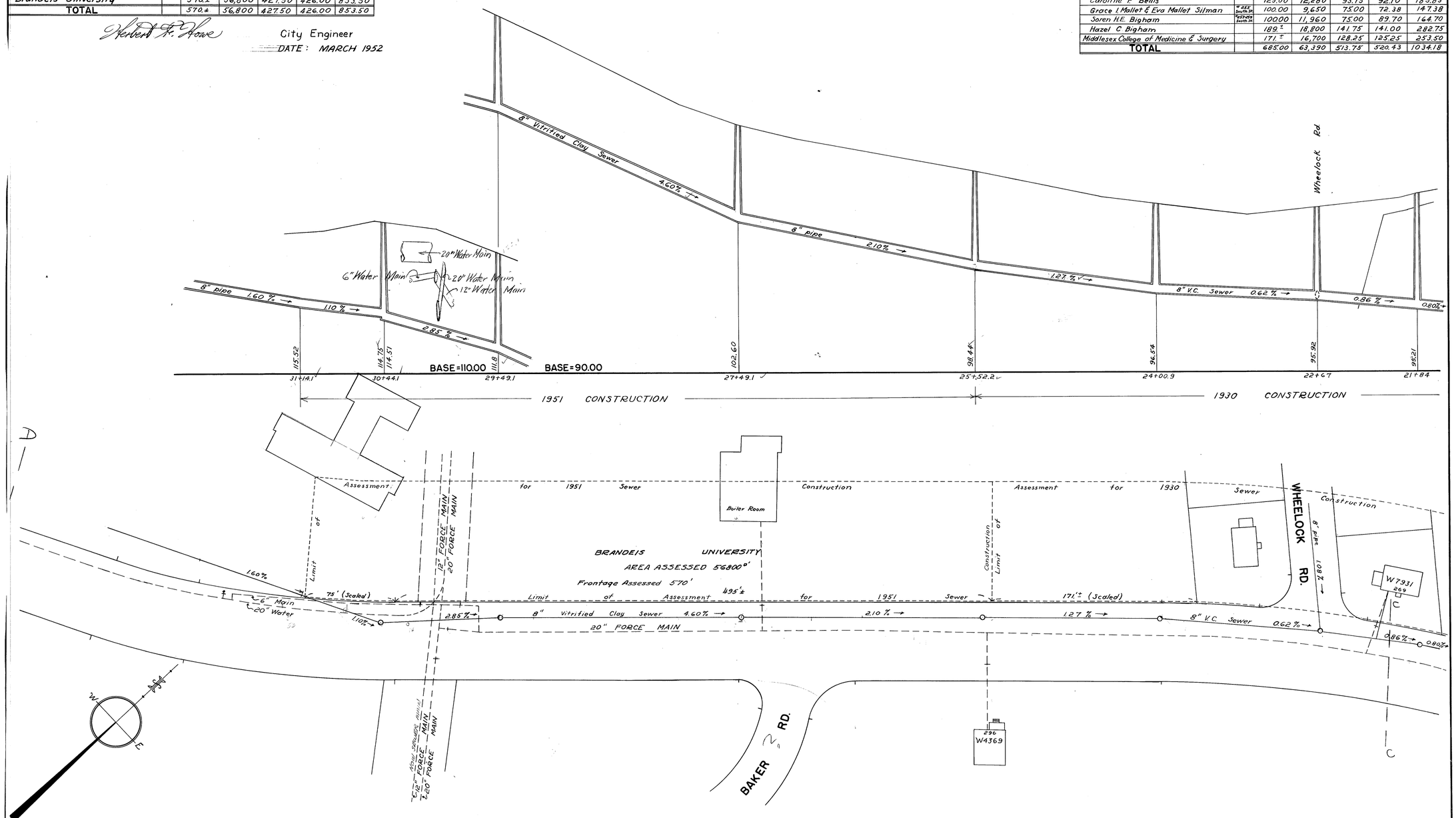
OWNER	LOT	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
WEST SIDE						
Brandeis University		570±	56,800	427.50	426.00	853.50
TOTAL		570±	56,800	427.50	426.00	853.50

Herbert K. Howe City Engineer
DATE: MARCH 1952

SOUTH STREET SEWER
TABLE OF ASSESSMENT FOR 1930 CONSTRUCTION

CONSTRUCTION ORDER 11719 DATE OF APPROVAL JUNE 26, 1930
ASSESSMENT ORDER 11941 DATE OF APPROVAL MARCH 27, 1931
TOTAL COST $
AMOUNT ASSESSED $ 1034.18
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	LOT OR NO. NO.	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
WEST SIDE						
Caroline F. Bellis		125.00	12,280	93.75	92.10	185.85
Grace I Mallet & Eva Mallet Silfman	W 225' South 38	100.00	9,650	75.00	72.38	147.38
Soren H.E. Bigham	W 325' South 38	100.00	11,960	75.00	89.70	164.70
Hazel C Bigham		189.±	18,800	141.75	141.00	282.75
Middlesex College of Medicine & Surgery		171.±	16,700	128.25	125.25	253.50
TOTAL		685.00	63,390	513.75	520.43	1034.18



Same Area D sheet Diagram inverted

SOUTH STREET D2

Vernon Street
Water & Sewer
6 - # 67

VERNON STREET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH

PROSPECT ST.

SOUTH ST.

30" CLASS I TRANSITE PIPE 0.18%

30" CLASS I TRANSITE PIPE 0.18%

30" CLASS I TRANSITE PIPE 0.18%

5.83 5.98 52.47 53.08 53.62 53.87

BASE = 50.00 FEET

0+00 0+58.1 3+33.5 6+61.7 9+68.7

See 51-102 Intersection

E W

PROSPECT STREET

℄ 30" Sewer

12" Water ℄

6" Sewer ℄

EPHRAIM STEARNS

FRANCIS W. STAPLES

CHARLES E. STEARNS

HEIRS OF JOHN LOGAN

ALEXANDER ROWELL

THOMAS FITZPATRICK

CHARLES C. SMITH

FRANCES A. BOND

ABBIE L. BUTLER

#17 CHARLES ST. CT.

BEAR HILL VALLEY RELIEF SEWER

SOUTH STREET

5402 W 4363 — 6 8

1284 W 802 — 16

4565 — 18-20

653 W 1377 — 24

3775 W 3186 — 28

1081 W 1254 — 32

417 W 2355 — 40

4935 W 4109

2358 W 1646 — 44 46

3079 W 1608

1129 W 231 — 48 50

4913 W 4103 — 56

5309 W 4306 — 60 62

5167 W 4236 — 64 66

2623 W 46 2128

15 2692 W 2457

6" Water ℄

℄ 30" Sewer

5" Chap Hyd. 2 Hose Stem

℄ 24" Sewer

24"

10" Sewer Overflow

10" Sewer ℄

15 — 263 407 W

17-19 — 1569 1051 W

21-23 — 1019 947 W

25-27 — 3083 3713 W

31-33 — 2353 426 W

39 — 282 1358 W

41-43 — 2870 1669 W

45 952 1395 W

47 49 — 470 2246 W

51-53 — 4803 W 4021

53-57 — 4894 4900 W

59 — 5035 6586 W

67 — 4230 5761 W

73 — 1635 1966 W

79-81 — 3630 4242 W

EPHRAIM STEARNS

PERSIS STEARNS UX EPHRAIM HENRY WETHERBEE

JOHN H. MULLEN & NORA E. FAY

HUGH MC DONALD

C. EDWIN MILES

C. EDWIN MILES & ADELAIDE E. CLARK

CYRUS L. WILLIS

LEMITT M. KNIGHT

FRANCES A. BOND

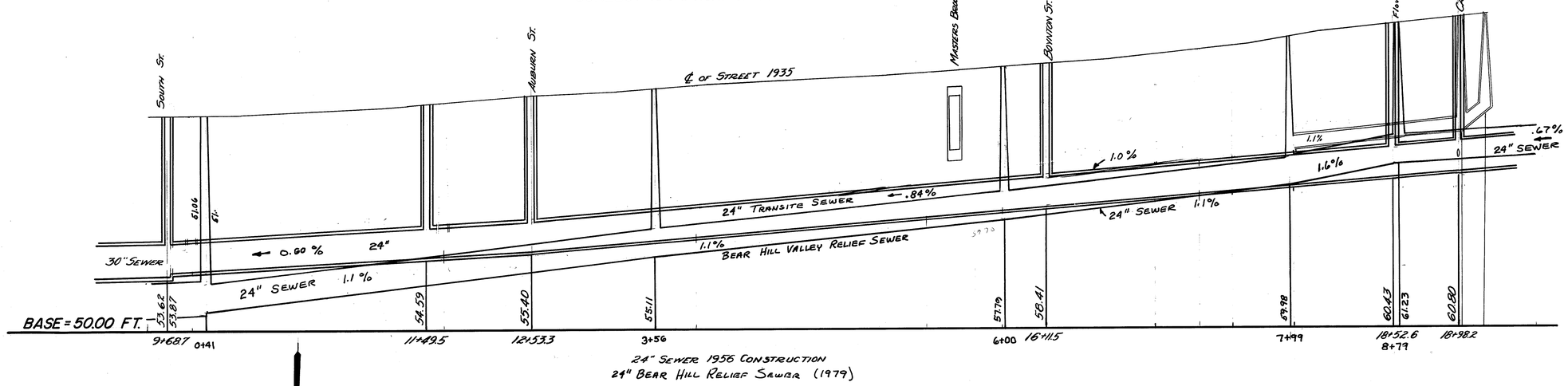
J.E.S.

VERNON STREET- A

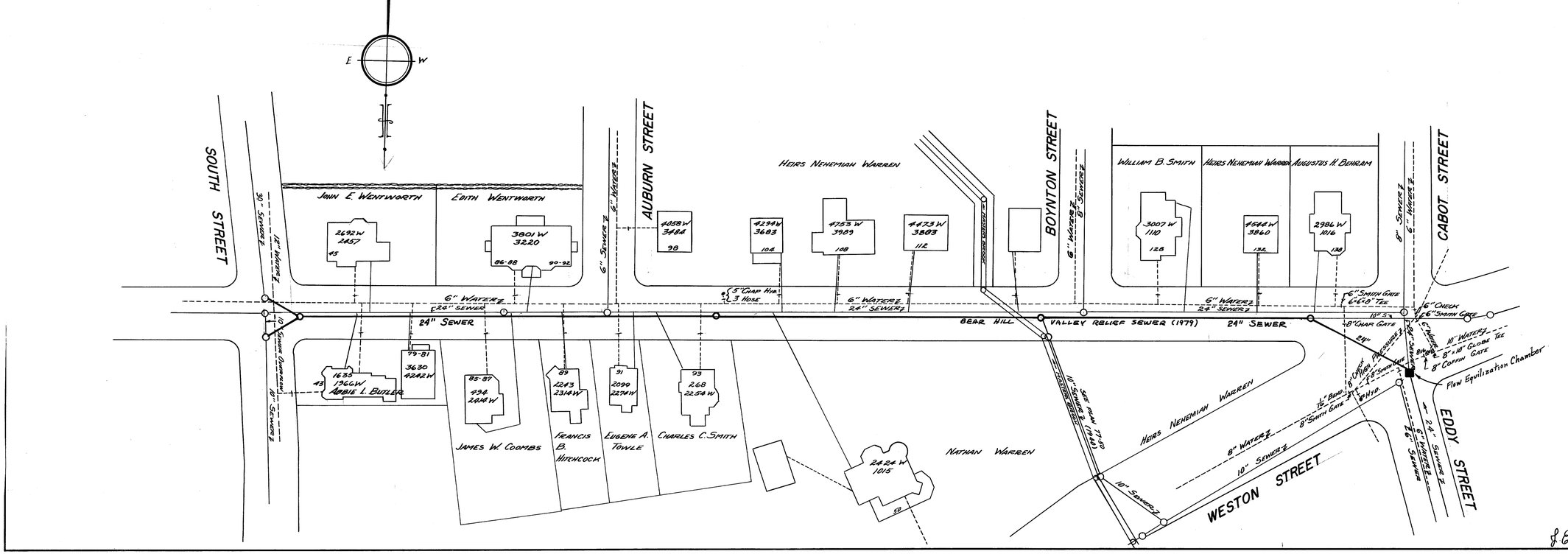
Vernon Street
Water & Sewer
45 - # 138

VERNON STREET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH



24" Sewer 1956 Construction
24" Bear Hill Relief Sewer (1979)



J.E.S.

VERNON STREET- B

Weston Street
Water & Sewer
#11-91

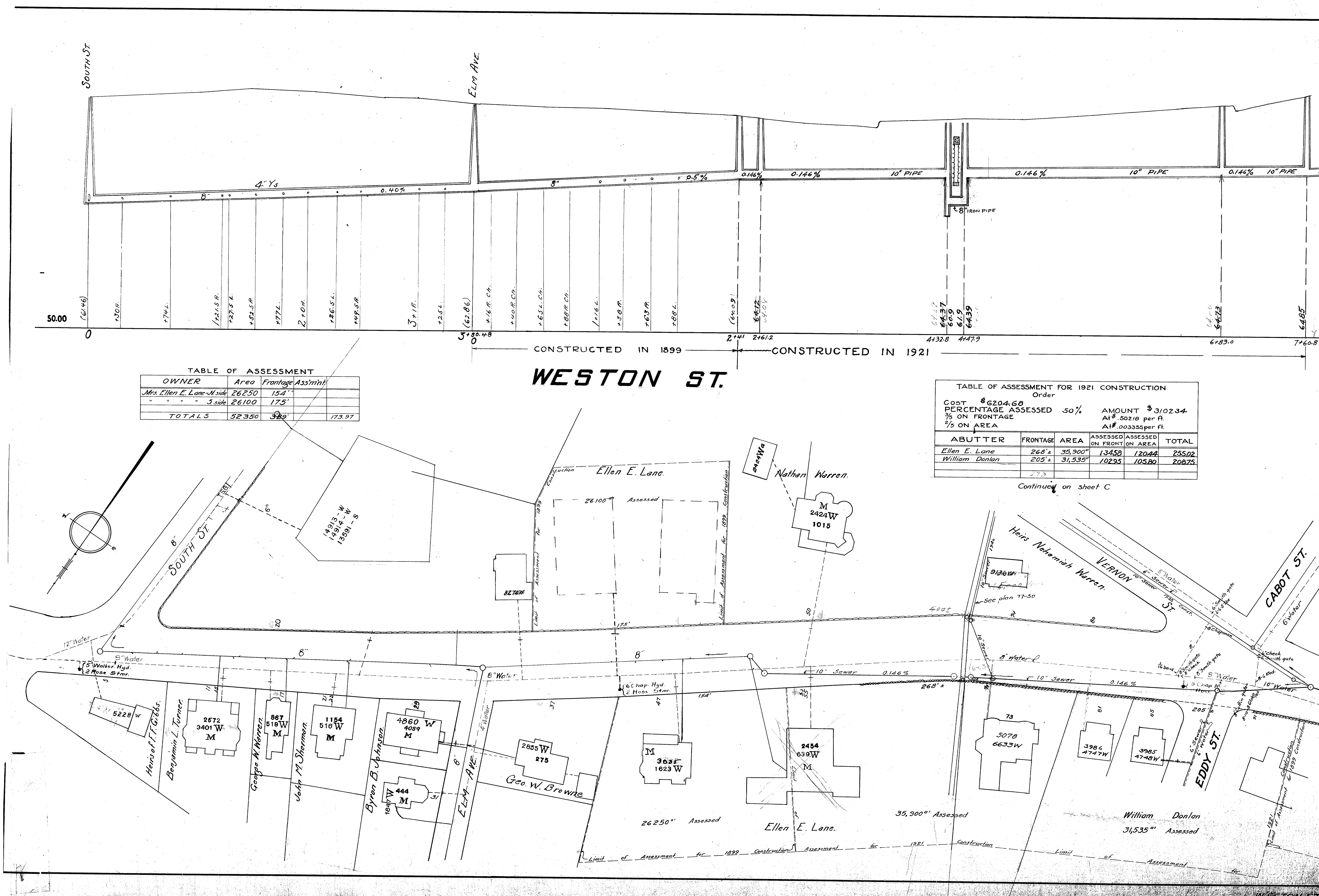


TABLE OF ASSESSMENT

OWNER	Area	Frontage	Ass'm'nt	
Mrs. Ellen E. Lane-N. side	26250	154'		
" " " S. side	26100	175'		
TOTALS	52350	329'		173.97

TABLE OF ASSESSMENT FOR 1921 CONSTRUCTION
Order

COST $6204.68
PERCENTAGE ASSESSED 50% — AMOUNT $3102.34
3/5 ON FRONTAGE — At $.50218 per ft.
2/5 ON AREA — At $.003355 per ft.

ABUTTER	FRONTAGE	AREA	ASSESSED ON FRONT	ASSESSED ON AREA	TOTAL
Ellen E. Lane	268' ±	35,900 □'	13458	12044	25502
William Donlan	205' ±	31,535 □'	10295	10580	20875
	273				

Continued on sheet C

Weston Street
Water & Sewer
98 - # 172

Winthrop Street
Water & Sewer
39 - # 88

WINTHROP ST.

Scales: 40 ft. Hor. & 4 ft. Vert. per in.

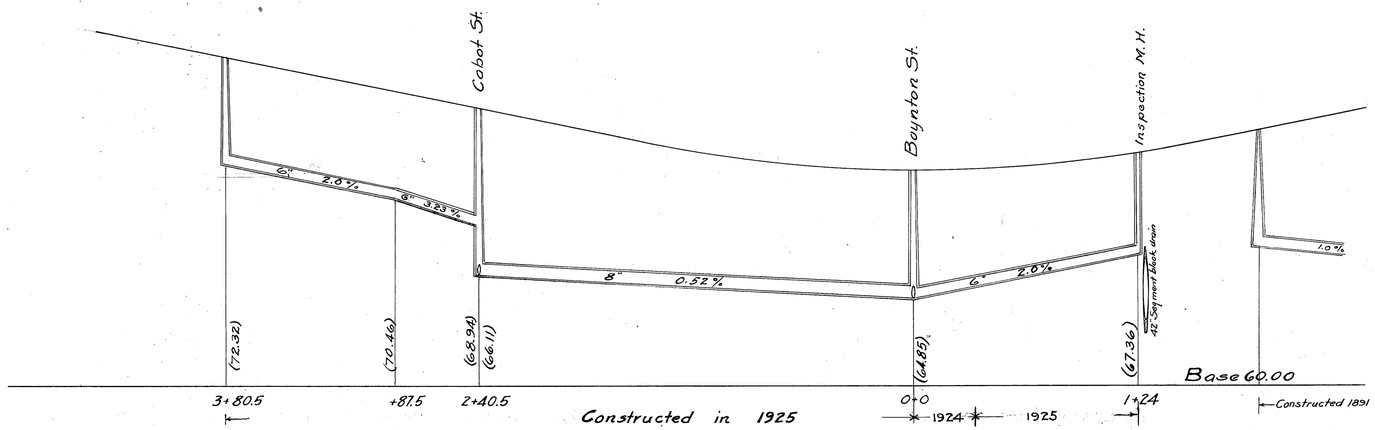
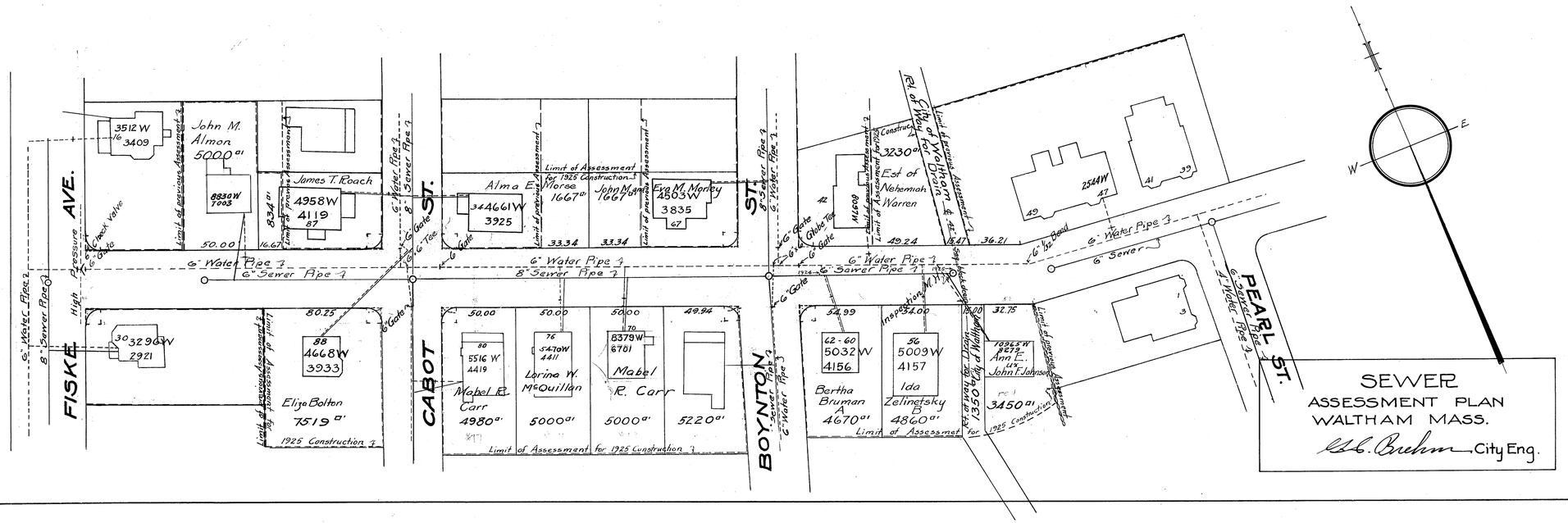


TABLE OF ASSESSMENT FOR 1925 CONSTRUCTION
ORDER NO FOR CONSTRUCTION # 10287
ORDER NO FOR ASSESSMENT # 10729
TOTAL COST $ 975.00
ASSESSED 99 % OF COST 965.25

3/5 ON FRONTAGE 579.15 at .934836 per ft.
2/5 ON AREA 386.10 at .007091 per sq. ft.

OWNER	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
John M. Almon	50.00	5000	46.74	35.46	82.20
James T. Roach	16.67	834	15.58	5.91	21.49
Alma E. Morse	33.34	1667	31.17	11.82	42.99
John M. & Eva M. Marley	33.34	1667	31.17	11.82	42.99
Est of Nehemiah Warren	49.24	3230	46.03	22.90	68.93
Ann E ux John Johnson	32.75	3450	30.62	24.46	55.08
City of Waltham	15.00	1350	14.02	9.57	23.59
Ida Zelinetsky	54.00	4860	50.48	34.46	84.94
Bertha Bruman	54.99	4670	51.41	33.12	84.53
Mabel R. Carr	49.94	5220	46.69	37.02	83.71
Mabel R. Carr	50.00	5000	46.74	35.46	82.20
Lorina W. McQuillan	50.00	5000	46.74	35.46	82.20
Mabel R. Carr	50.00	4980	46.74	35.32	82.06
Eliza Bolton	80.25	7519	75.02	53.32	128.34
Totals	619.52	54447	579.15	386.10	965.25



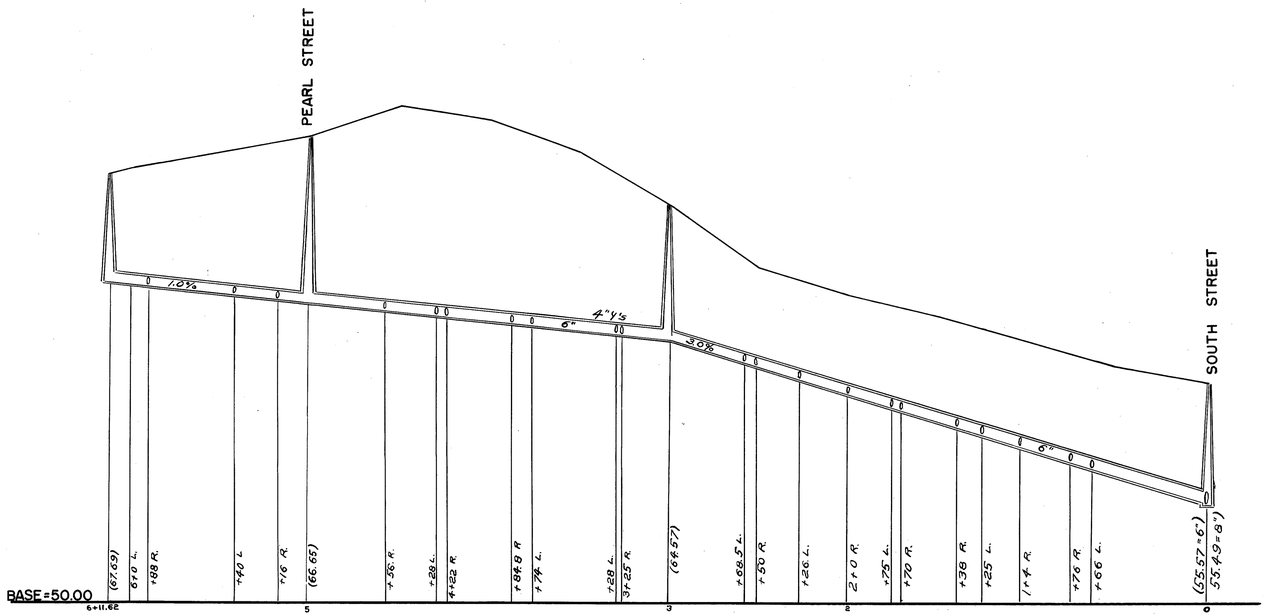
SEWER
ASSESSMENT PLAN
WALTHAM MASS.
C.C. Brehm City Eng.

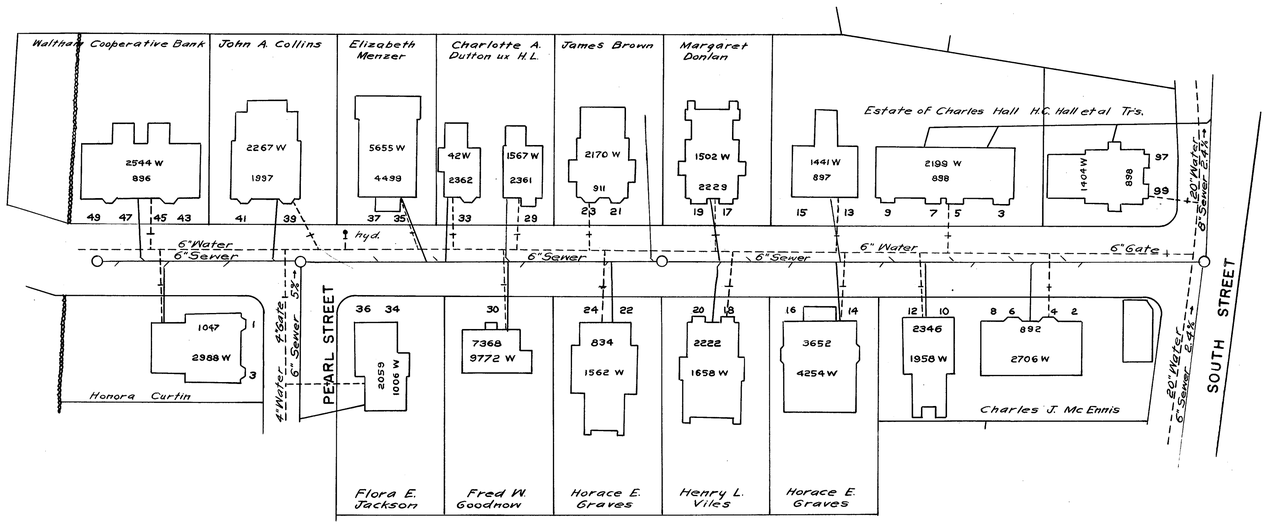
W.W.B.
CEM

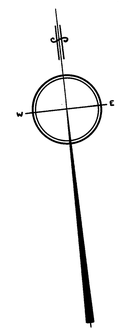
WINTHROP ST.

WINTHROP STREET

SCALES: 40 FEET HOR. & 4 FEET VERT. PER INCH



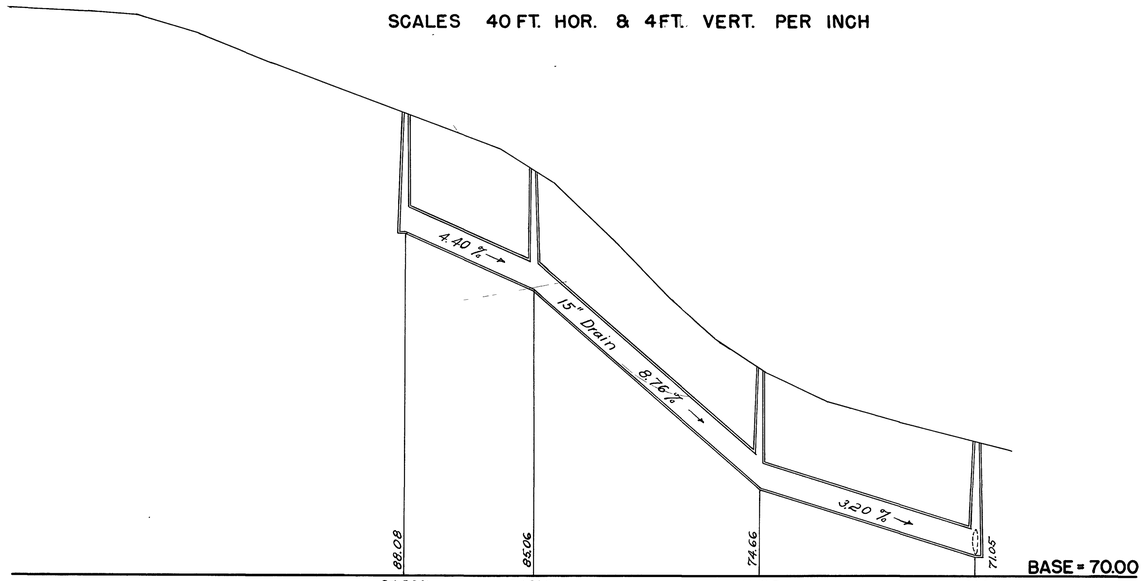


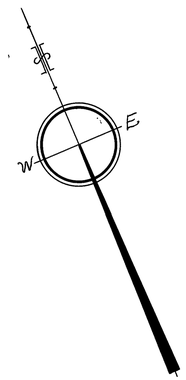


WINTHROP ST.

ANDREA ROAD DRAIN

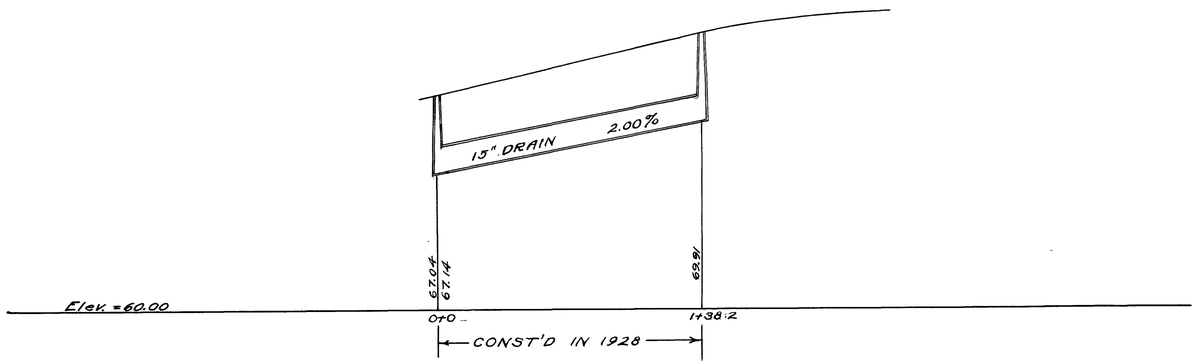
SCALES 40 FT. HOR. & 4 FT. VERT. PER INCH

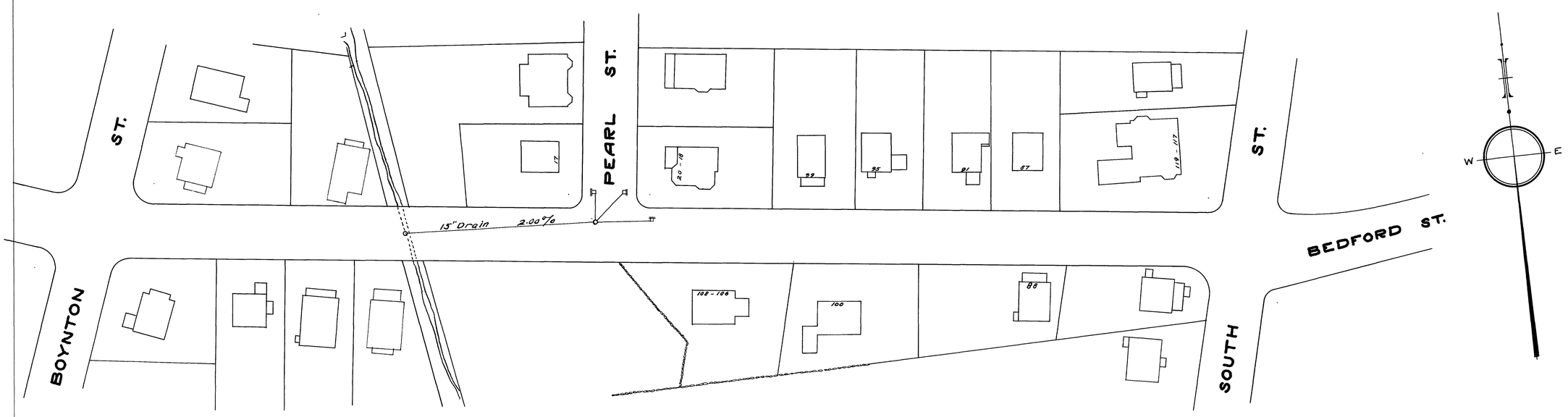




BEDFORD ST. DRAIN

Scale : 40 ft. = 1 in. Hor. & 4 ft. = 1 in. Vert.



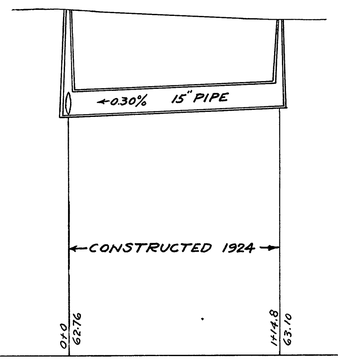


BEDFORD ST.

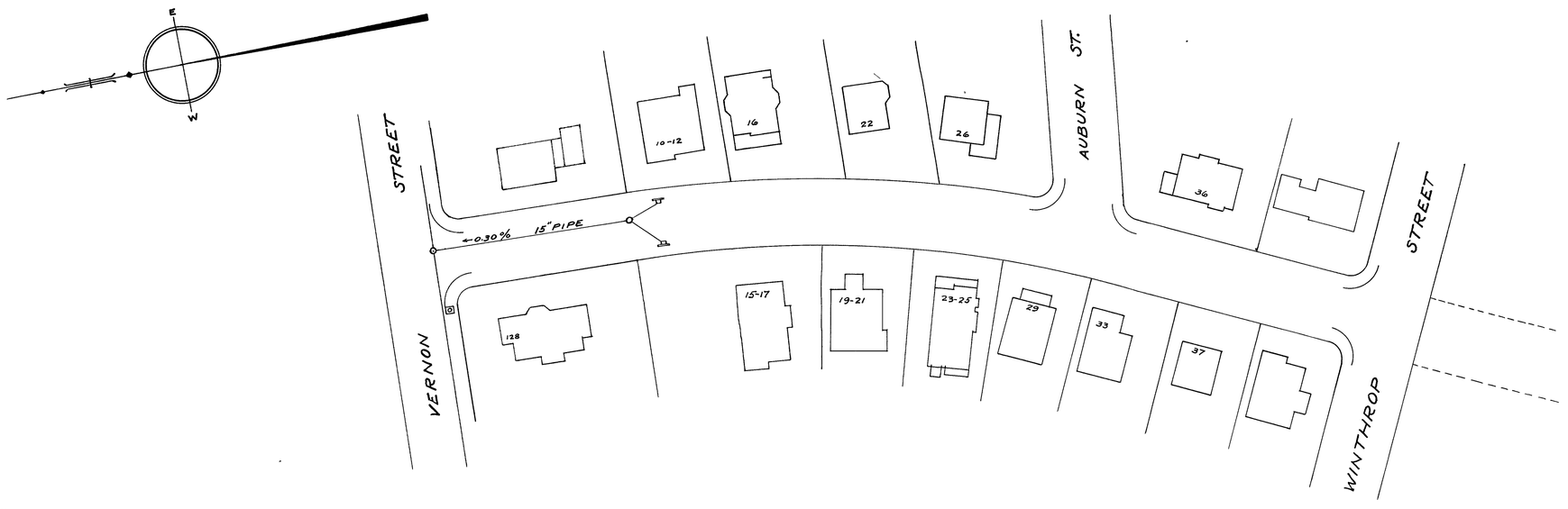
Boyton Street
Drain
10 - # 37

BOYNTON ST. DRAIN.

Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch.



ELEV. 50.00

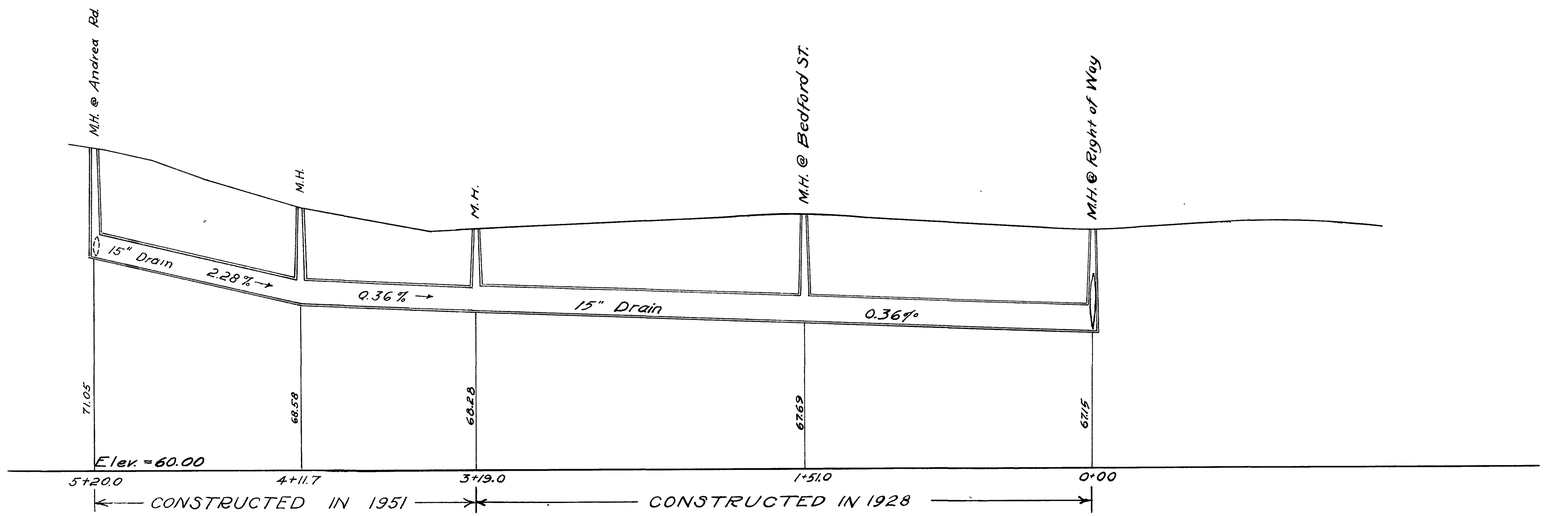


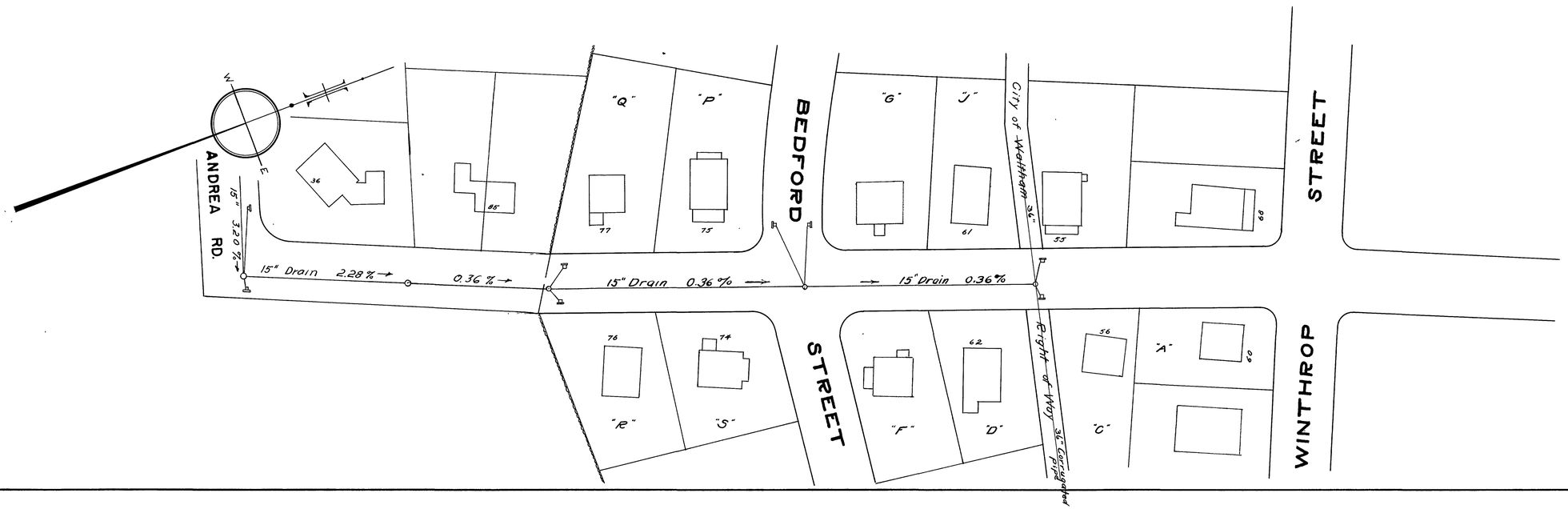
L.C.C.

BOYNTON ST.

BOYNTON ST. DRAIN

Scale: 40 ft. = 1 in. Hor. & 4 ft. = 1 in. Vert.



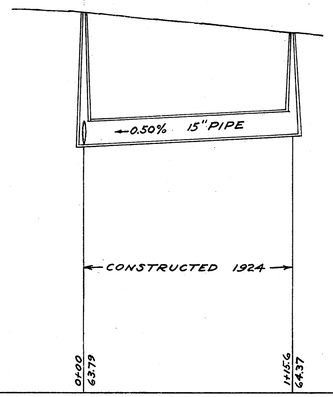


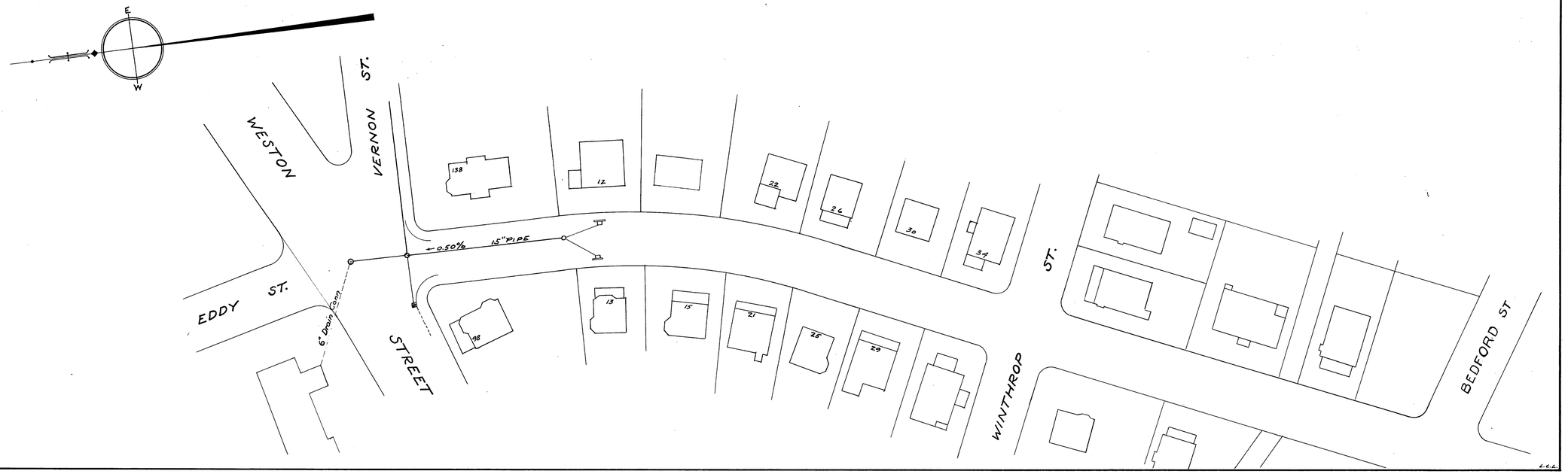
BOYNTON ST.-B

Cabot Street
Drain
Weston St – Bedford St

CABOT ST. DRAIN.

Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch.

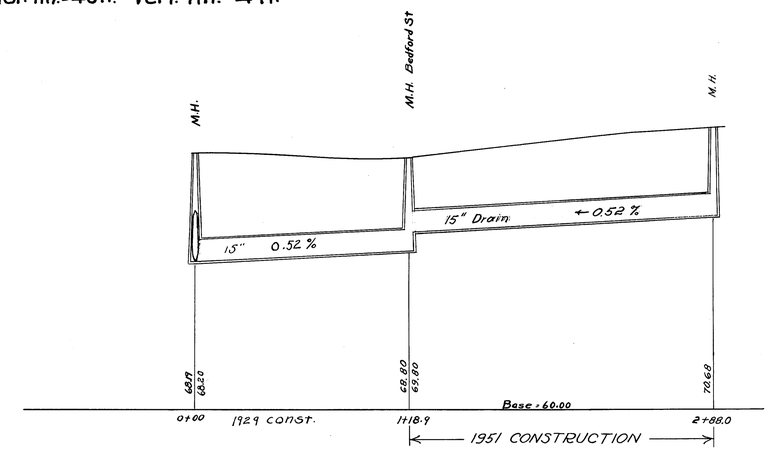


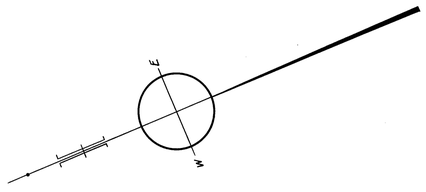


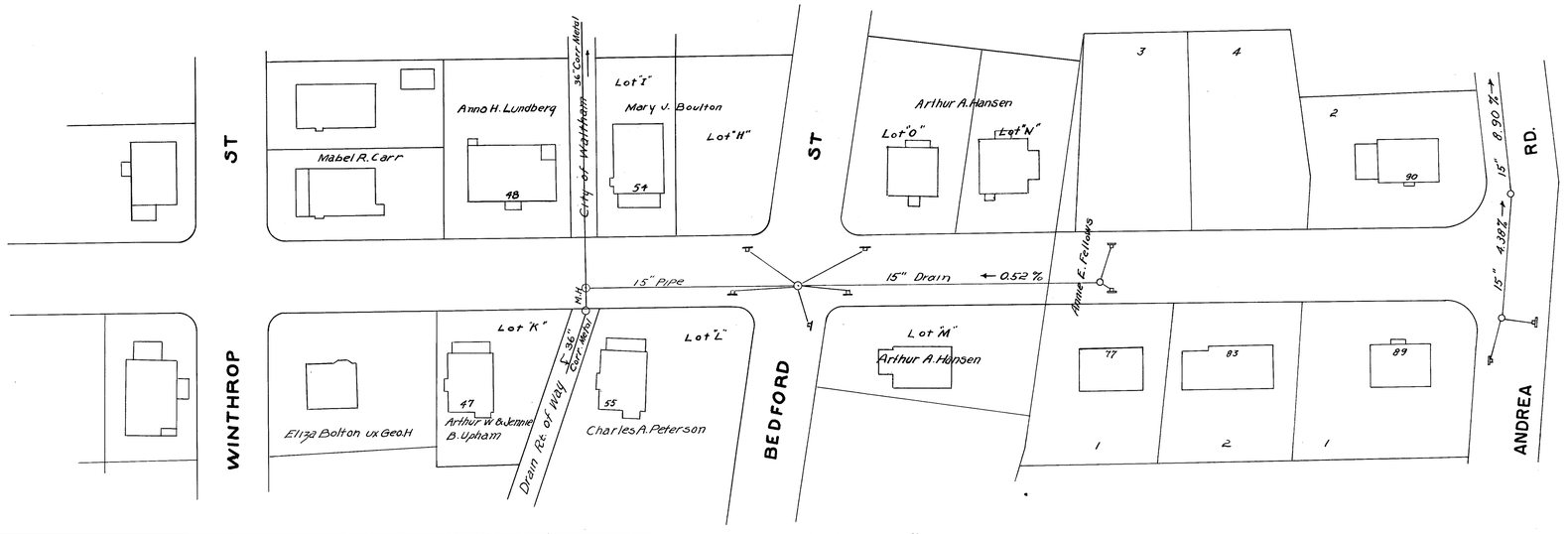
CABOT ST. A

CABOT STREET DRAIN

Scales: Hor: 1in.=40ft. Vert. 1in.= 4 ft.



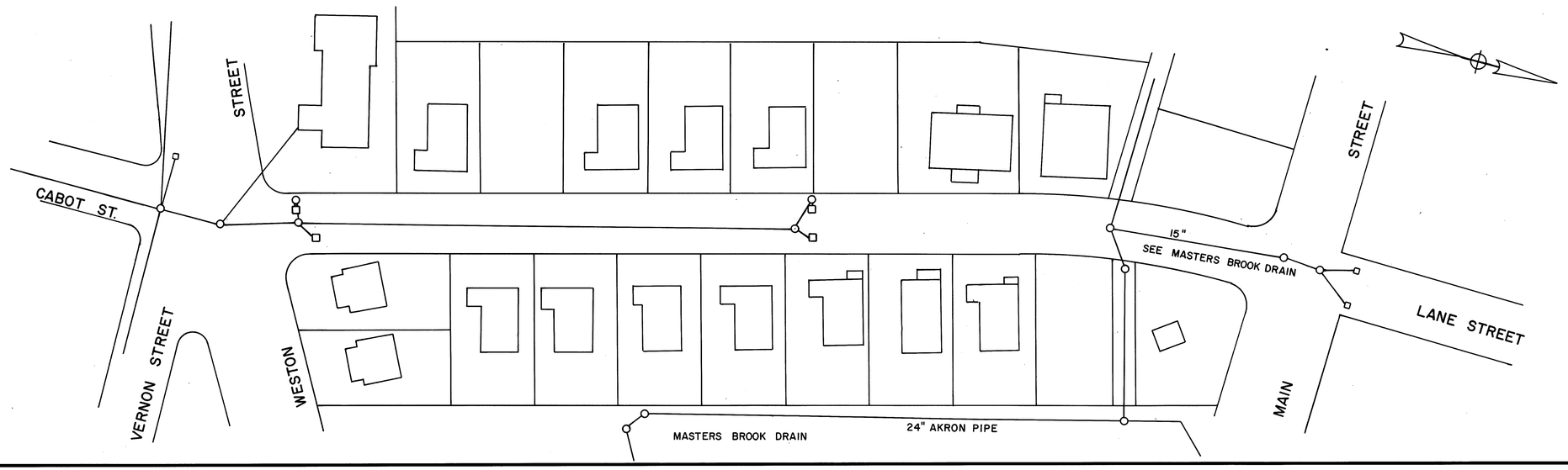




Eddy Street
Drain
Weston St – Main St

EDDY STREET DRAIN

SCALE: 1 INCH = 40 FEET HOR. & 4 FEET VERT.

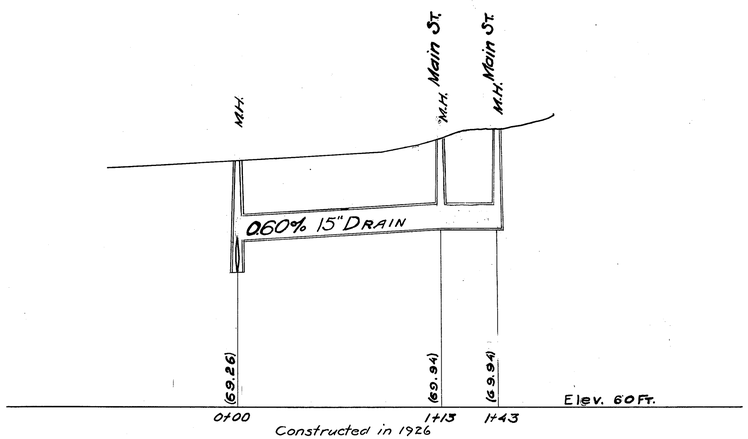


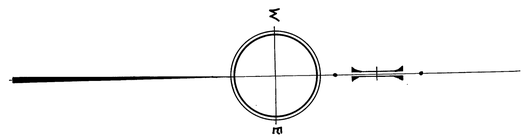
A
EDDY STREET DRAIN

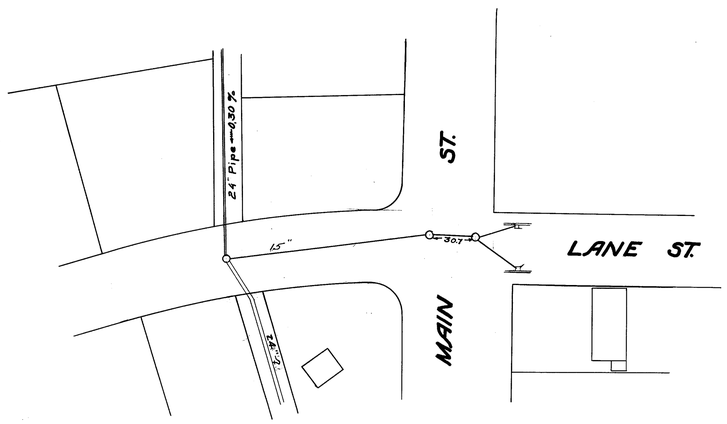
Eddy Street
Drain
Lake Street

EDDY ST DRAIN

Scale 40Ft Hor. – 4Ft per inch





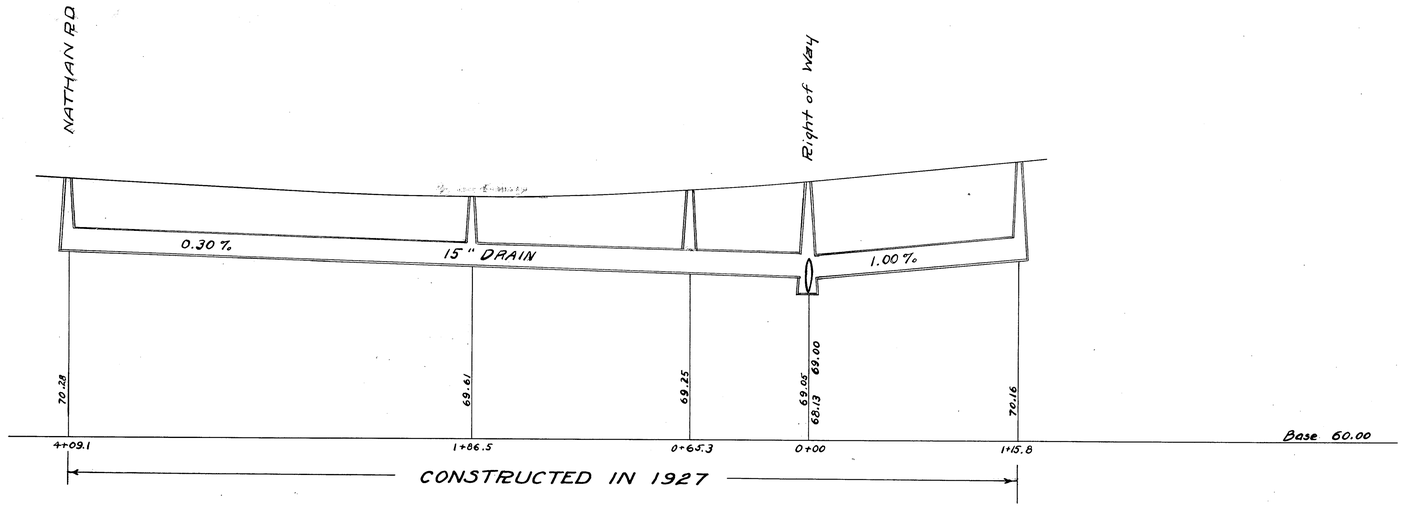


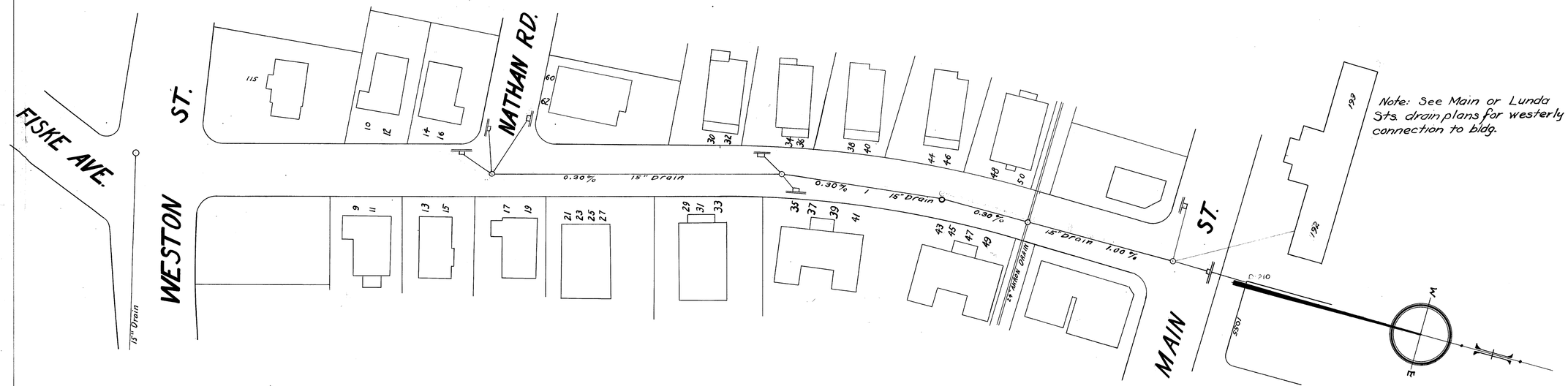
EDDY ST. B

Everett Street
Drain
Weston St – Main St

EVERETT STREET DRAIN.

Scales: 40 Ft Hor. & 4 Ft. Vert. Per Inch.

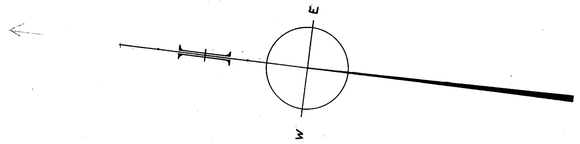


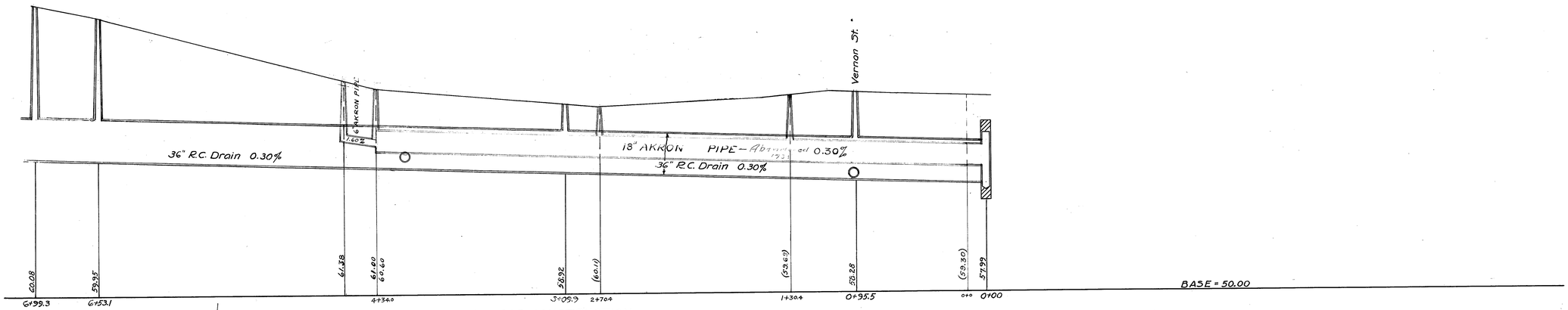


W HF

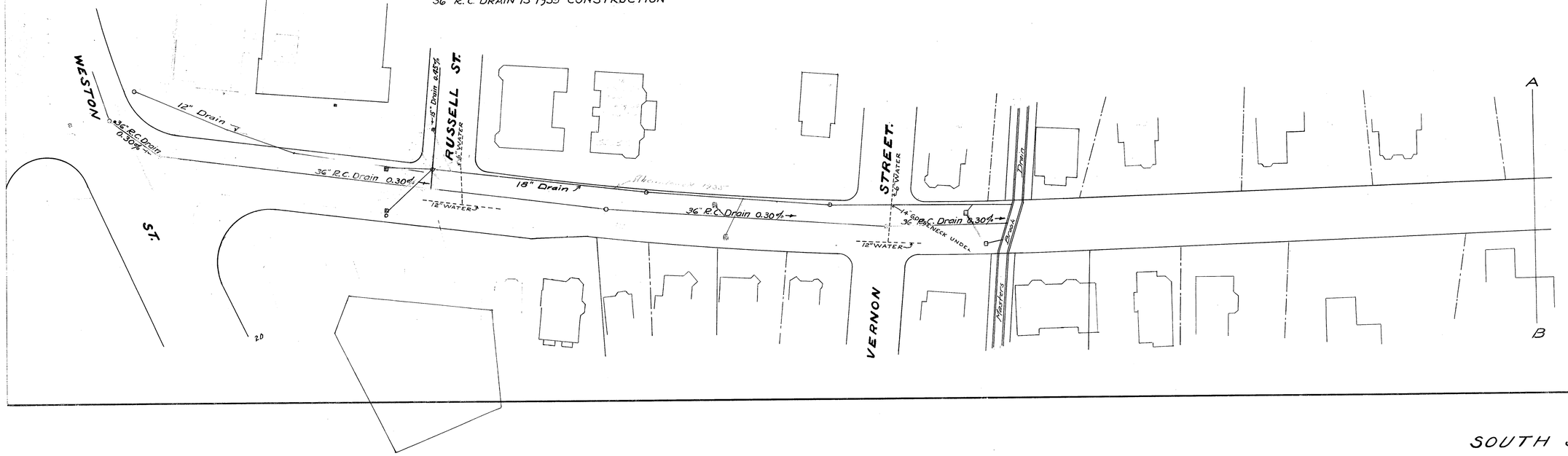
EVERETT STREET.

SOUTH ST. DRAIN.





36" R.C. DRAIN IS 1935 CONSTRUCTION



SOUTH ST.-1

South Street (2)
Drain
82 – # 171

SOUTH ST. DRAIN.

Charles St. | Winthrop St. | Bedford St. | Dartmouth St. | Highland St.

Approximate Grade

0.52 % 18" DRAIN | 2.4 % 15" DRAIN | 1.96 % 15" Pipe | 1.60 % 15" Pipe

55.33 | 55.84 | 56.17 | 61.78 | 64.39 | 67.12 | 69.12 | 71.01 | 71.44 | Elev. 50.00

0+00 | 0+97.9 | 1+68.1 | 3+99.6 | 5+32.6 | 6+70.9 | 7+95.4 | 9+24.4

CONSTRUCTED IN 1928 — CONSTRUCTED IN 1932

Masters Brook

CHARLES ST. — 18" Pipe

18" Pipe 0.52% — 18" Pipe 0.52% — 15" Pipe 2.4% — 8" pipe 15" Pipe 1.96% Constructed in 1932 — 15" Pipe 1.96%

8" Pipe

WINTHROP ST.

BEDFORD ST.

DARTMOUTH ST.

HIGHLAND ST.

1.60% 15" Pipe Constructed in 1932

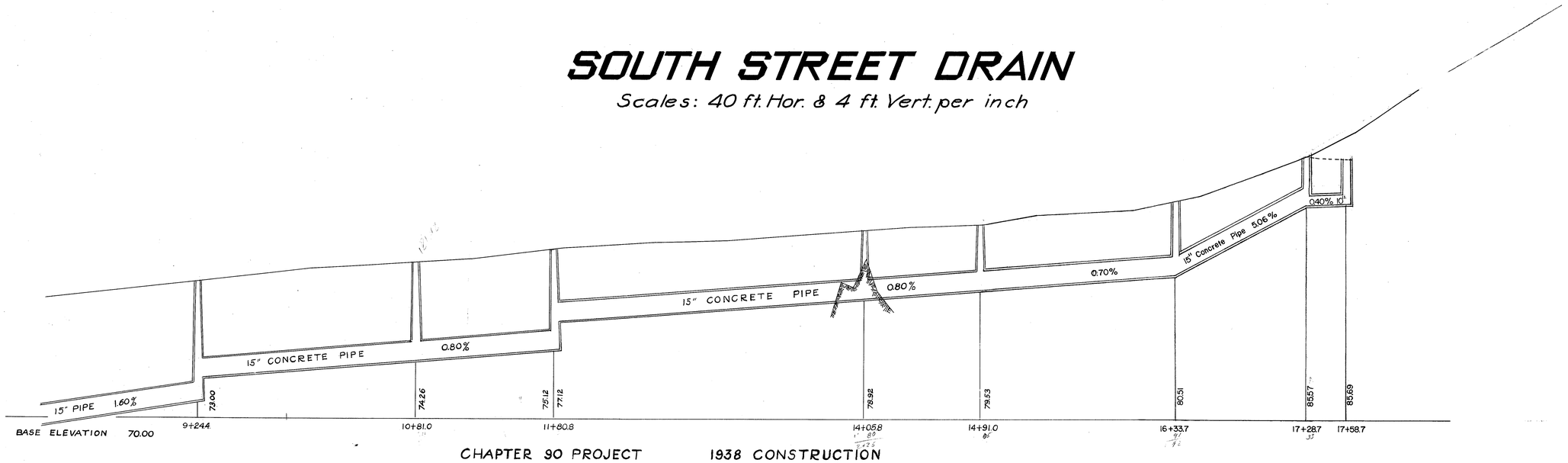
1.60%

A — B — C — D

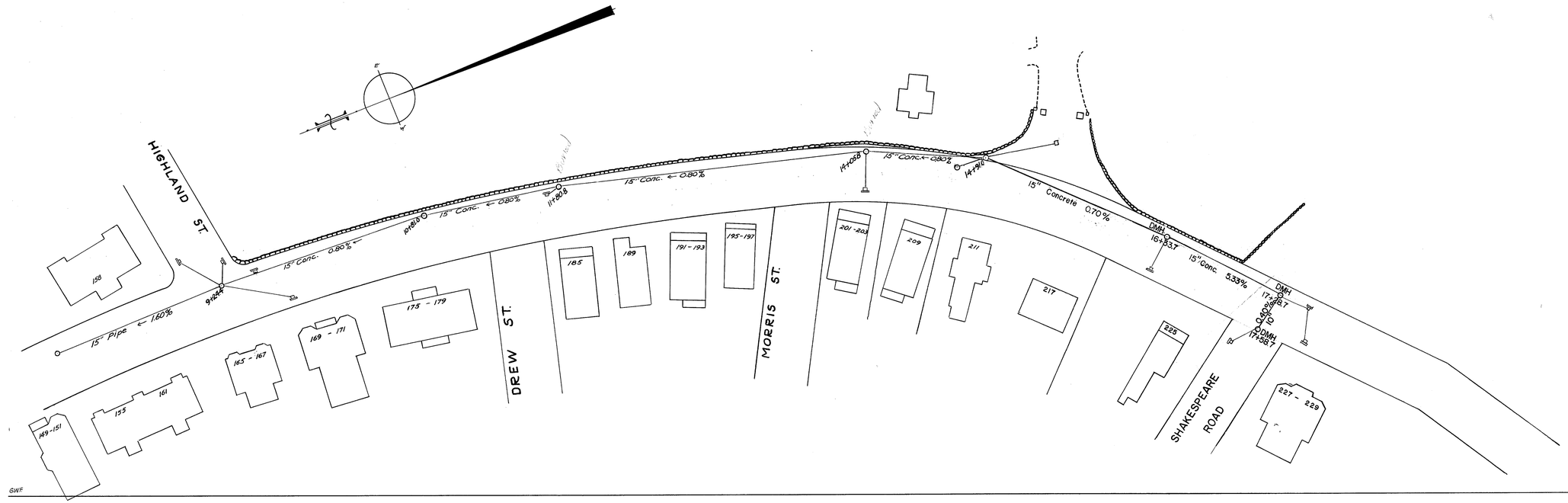
SOUTH ST.-2

SOUTH STREET DRAIN

Scales: 40 ft. Hor. & 4 ft. Vert. per inch



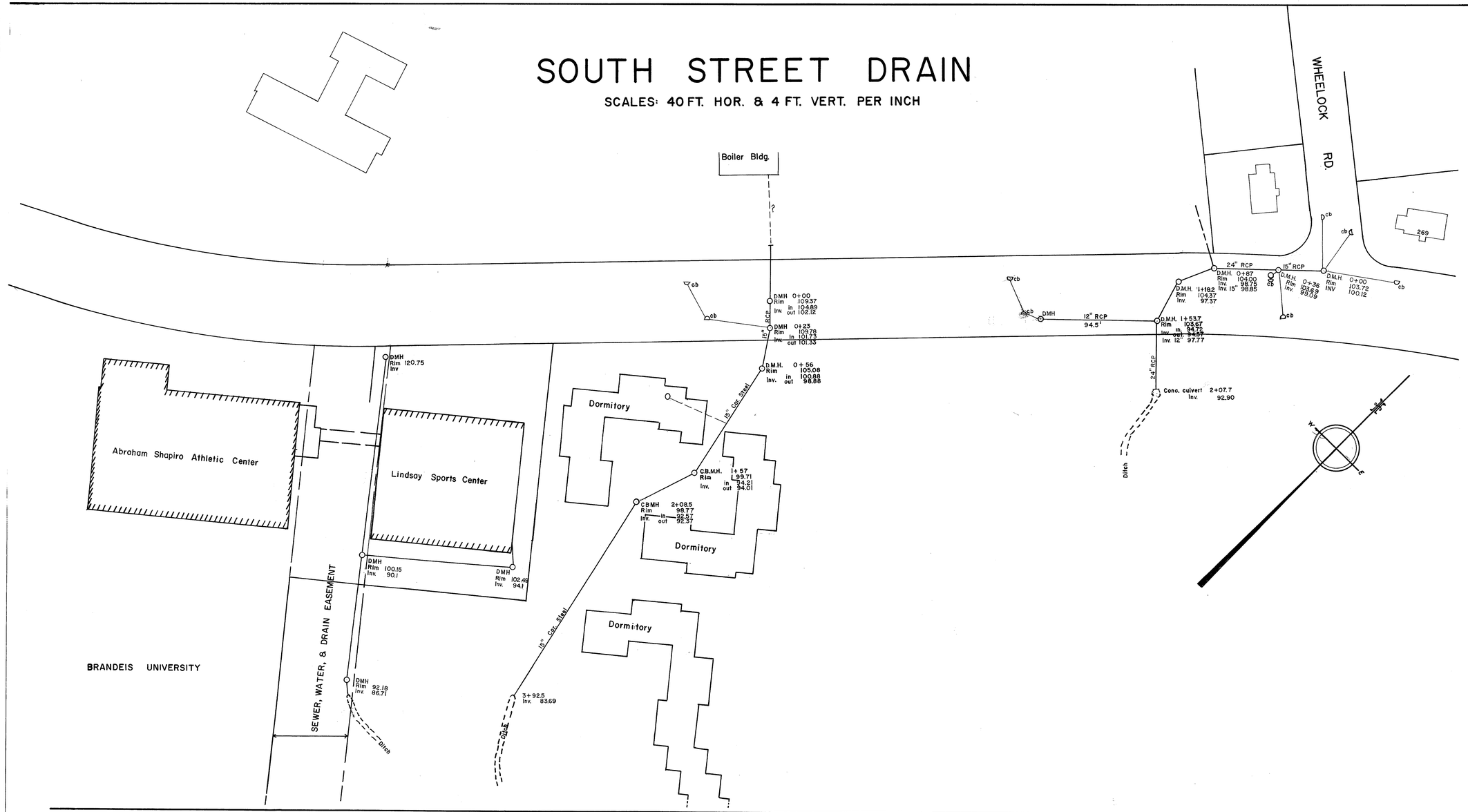
CHAPTER 90 PROJECT 1938 CONSTRUCTION



South Street (4)
Drain
269 – # 415

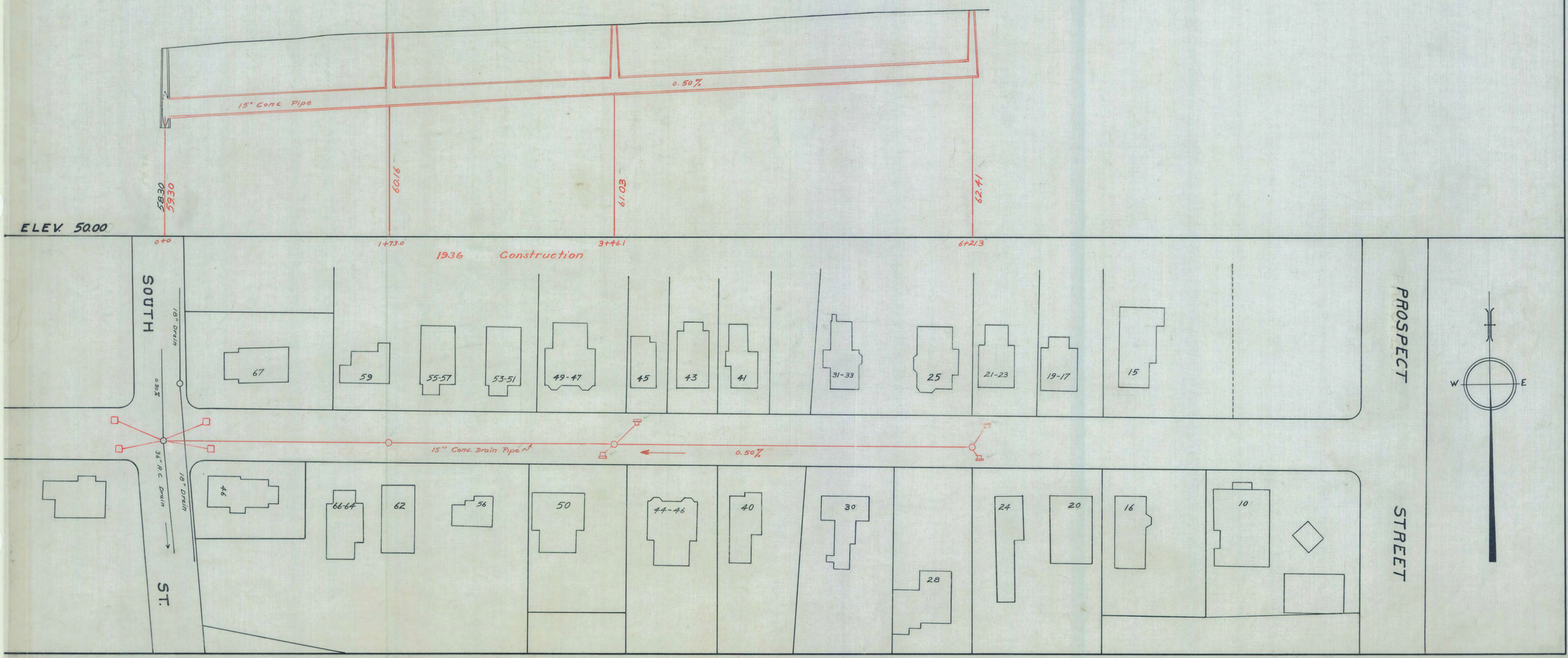
SOUTH STREET DRAIN

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH



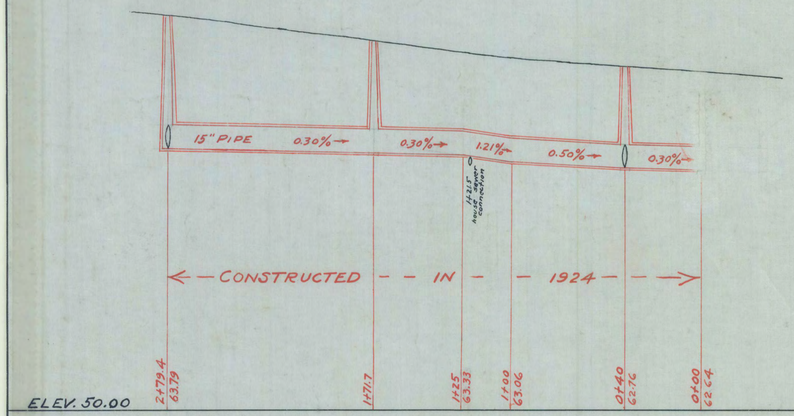
VERNON ST DRAIN

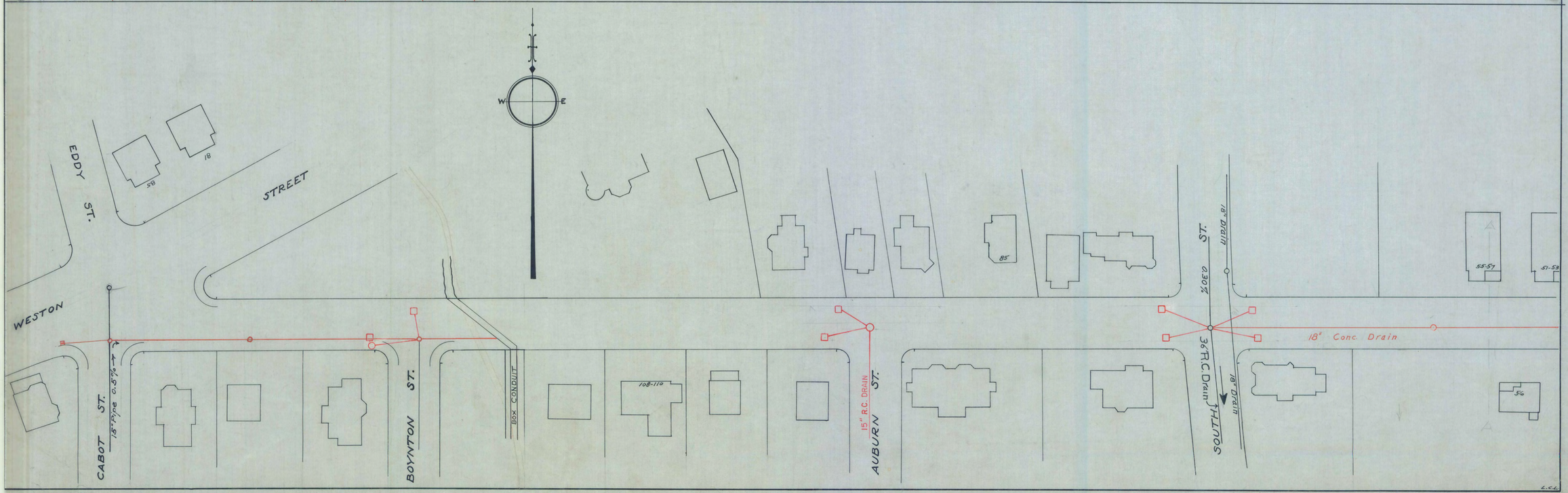
Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch.



VERNON ST. DRAIN.

Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch.





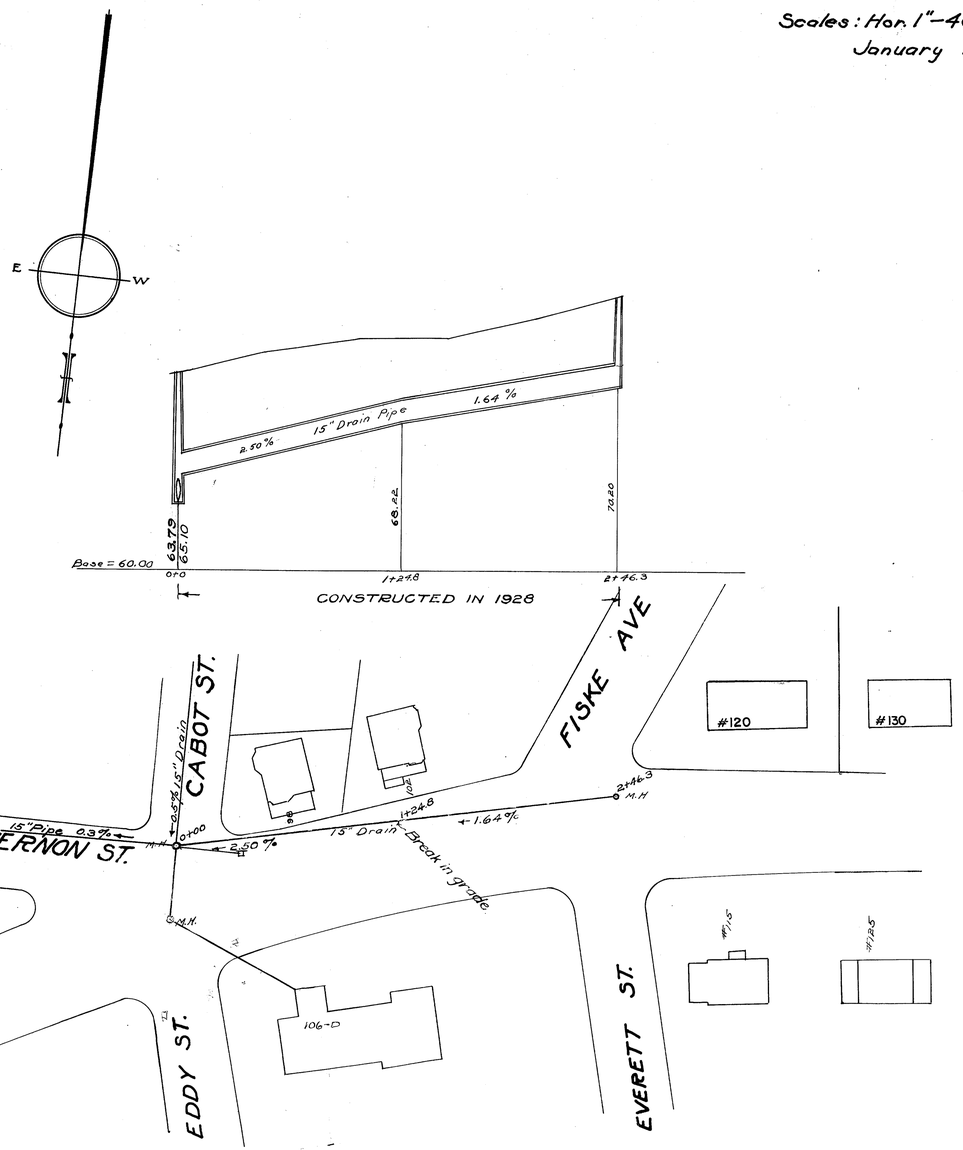
FB 184/130

VERNON ST.

Weston Street (B)
Drain
85 – # 120

WESTON STREET

Scales: Hor. 1"–40' Vert. 1"– 4'.
January 1928



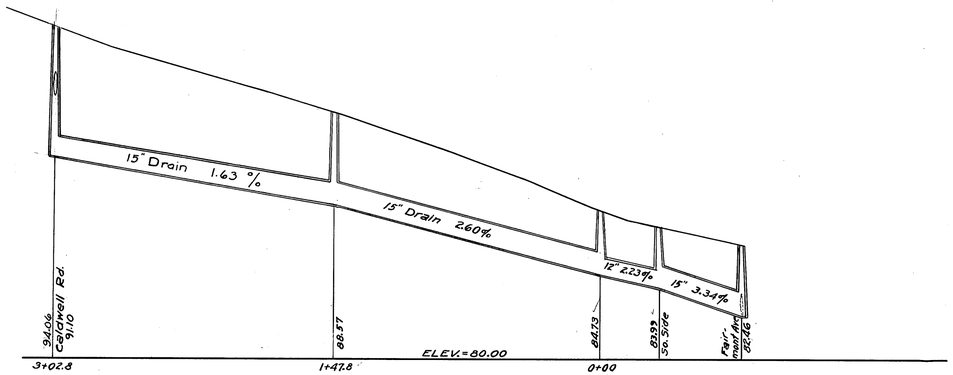
No sheet

WESTON ST. B

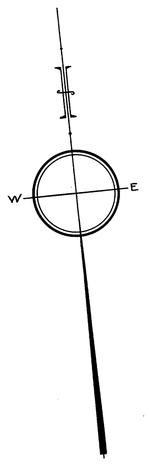
Weston Street (C)
Drain
Fairmont – Caldwell

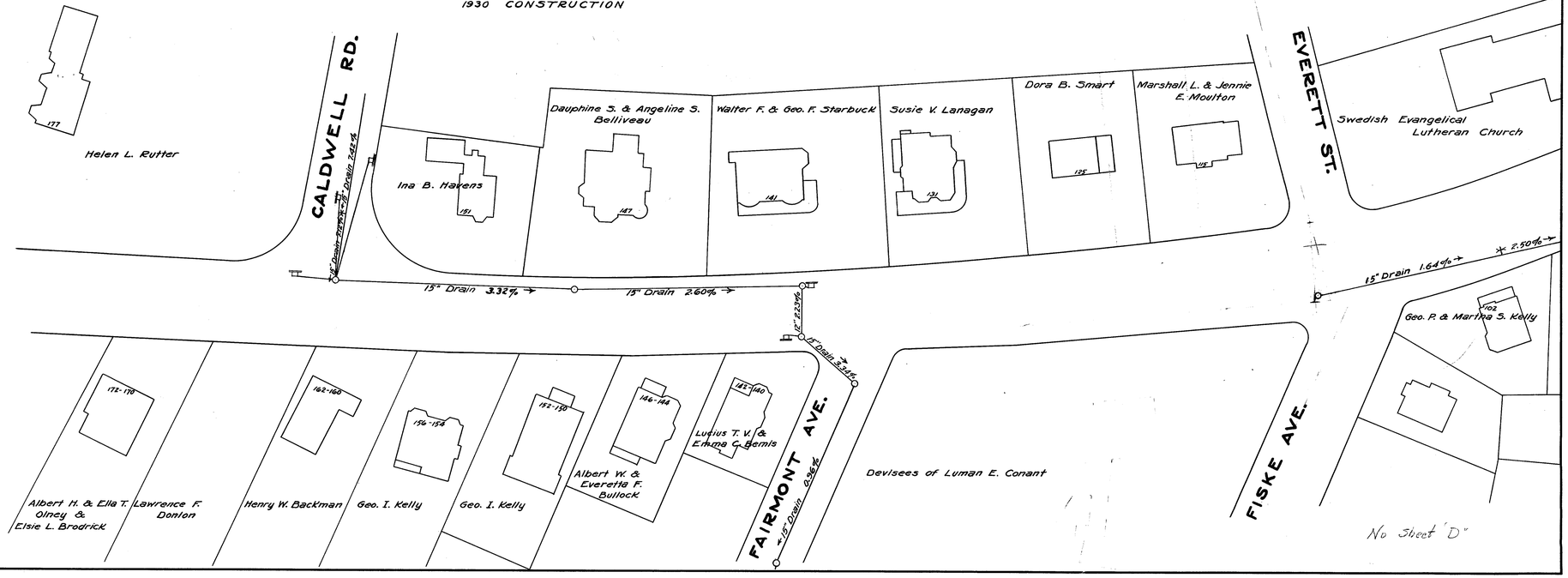
WESTON ST. DRAIN

Scales: 40 ft. Hor. & 4 ft. Vert. per inch.



1930 CONSTRUCTION





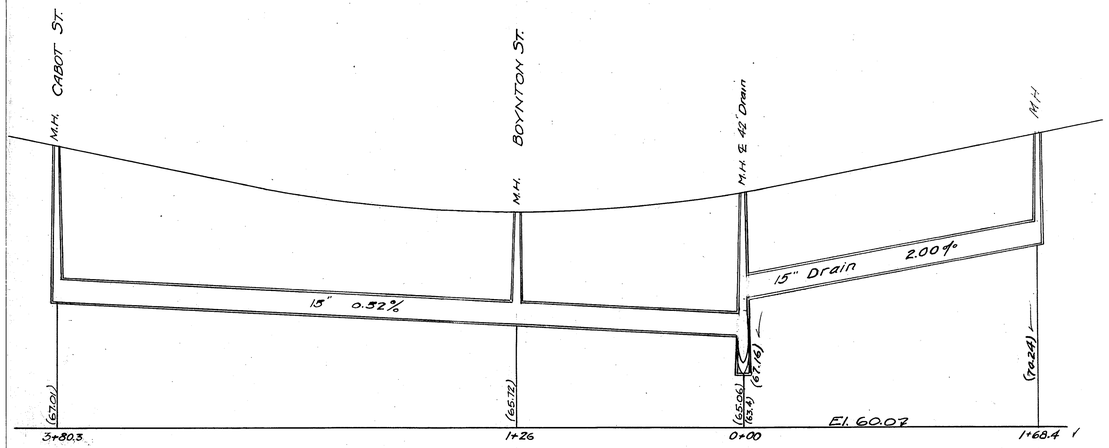
E.G.

WESTON ST. DRAIN
C

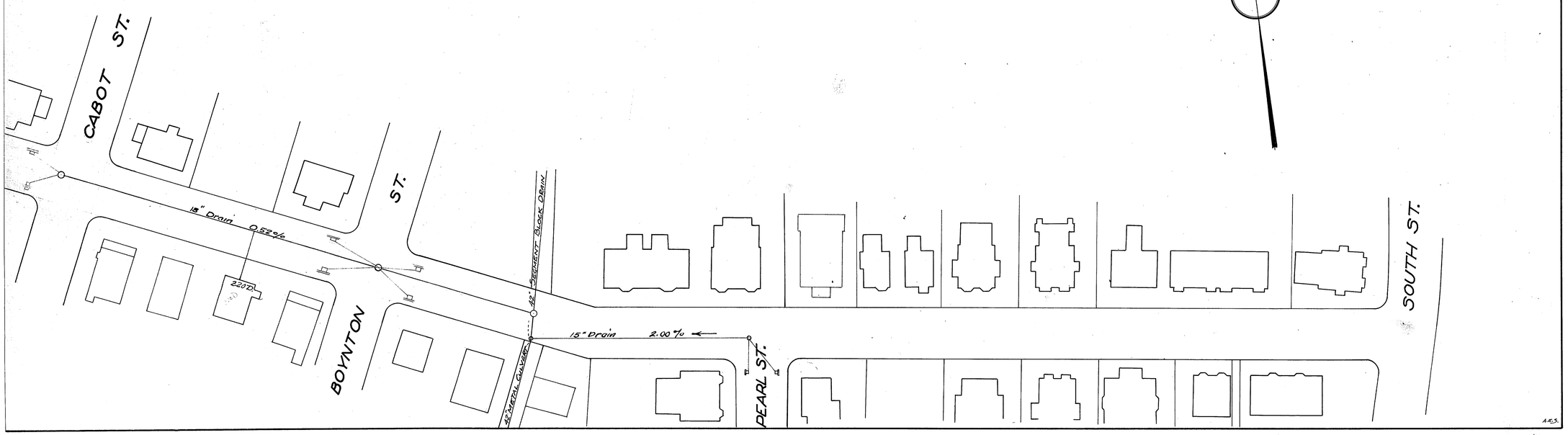
Winthrop Street
Drain
Pearl St. – Cabot st.

WINTHROP ST. DRAIN

Scales 40 ft. Hor. and 4 ft. Ver. per Inch



CONSTRUCTED IN 1925 × CONSTRUCTED IN 1928



WINTHROP ST.

ATTACHMENT 1

Attachment 1

City of Waltham

Jeannette A. McCarthy
Mayor

RECEIVED
AUG 22 2018
WALTHAM
ENGINEERING DEPT

TO: Steve Casazza, Joe Pedulla, Mike Chiasson, Luke Stanton
FROM: Jeannette A. McCarthy JAM
RE: Sewer Area 1314-B Streets
DATE: August 21, 2108

Steve per your attached representation, there are 44 streets involved in this phase. Since they were not grouped by location, I have done that so as not to upset numerous neighborhoods with your projects. (I **may** bid Group I and Group II) together.

Since the West End Streets are in horrendous condition, gas work, sewer work, etc., the following streets will be bid first and THERE WILL BE A PROVISION IN THE BID AND CONTRACT THAT THE SEWER WORK AND FULL STREET REPAVING has to be completed NO LATER THAN NOVEMBER 1, 2019.

Summer 2020

GROUP I

West End Streets (11) to be done first:

Andrea Road, Auburn Street, Auburn Terrace, Bedford Street, Boynton Street, Cabot Street, Pearl Street, South Street, Vernon Street, Weston Street- Fiske Ave to South Street, Winthrop Street; and then **Bear Hill Road (1). (Water work done)**

480 days

PUT THE ABOVE 12 STREETS OUT TO BID ASAP.

GROUP II

Brook Avenue, Charles Street - from South Street to Floyd Street, Charles Street Avenue, Curtis Street, Dartmouth Street, Drew Street, Hammer Street, Highland Street, Hope Avenue, Morris Street, Pratt Avenue, Prospect Street, Prospect Street Avenue, Russell Street - from Prospect to South, Shakespeare Road, Sharon Street, Wheelock Road and Wheelock Terrace.

Those 18 streets get done next- sewer and full street paving.

GROUP III

Eddy Street, Edge Hill Road, Elm Avenue, Everett Street, Fox Road, Hickory Drive, Hill Road, Lunda Street, Main Street- from Malone to Eddy Street, Nathan Road, Overland Road, Phillips Terrace, Ravenswood Road and Sheridan Road

Group Fox w/Bear Hi

Those 14 go out to bid once Group I is finished and you are working on Group II.

610 Main Street • Waltham, Massachusetts 02452 • (781) 314-3100 • Fax (781) 894-9581