The City of Waltham

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

Russell Street Sewer Repairs and Replacement

<u>The bid opening will be held</u>: 10:00 AM on Thursday August 11, 2016,

<u>A pre-bid meeting</u>: 10:00 AM on Wednesday August 3, 2016
(Meet in the Auditorium of 119 School Street, Waltham, MA 02452)

<u>Last day for written questions</u>: 12 Noon Thursday August 4, 2016.
(Via e-mail only to Jpedulla@city.waltham.ma.us)

DIVISION 0

SECTION 00010

The City of Waltham

Purchasing Department

INVITATION FOR BID (IFB)

Under the rules of M.G.L. Chapter 30, 39M, the Chief Procurement Officer of the City of Waltham Purchasing Department hereby requests sealed bids for:

Ressell Street Sewer Repairs and Replacement

Price Proposals will be received at the office of the Purchasing Agent, City Hall, 610 Main Street, Waltham MA 02452, until,

Thursday August 11, 2016 at 10 AM

At which time and place the bids will be publicly opened and read.

Site Inspection will be held: **Wednesday August 3, 2016 at 10 AM**
(Meet in the Auditorium of 119 School Street, Waltham)

Last day for written Questions: **12.00 noon Thursday August 4, 2016**
(Via e-mail ONLY to Jpedulla@city.waltham.ma.us)

Specifications and information available on line by visiting the Waltham Purchasing Department web site at www.city.waltham.ma.us/open-bids

BIDS MUST BE SIGNED AND ENCLOSED IN A SEALED ENVELOPE AND MARKED:

BID FOR: **Russell Street Sewer Repairs and Replacement**

A 5% Bid Bond or Certified Check must accompany each bid submitted and made payable to, and become the property of the City of Waltham, if the successful bidder refuses or neglects to comply with the terms of the Contract.

If the Bidder is a corporation, state your correct corporate name and State of incorporation. If Bidder is a partnership, state names and addresses of partners. If Bidder is a trust or other legal entity, state correct names and addresses of trustees or names and address of those legally authorized to bid and enter into contracts.

EXCEPTION OR ALTERNATES TO SPECIFICATIONS, TERMS OF SALE, AND DISCOUNTS AVAILABLE, MUST BE INCLUDED IN THE BID PRIOR TO OPENING DATE.

SECTION 00100
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 WILL 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. EXPLANATIONS, EXCEPTIONS

Explanations, exceptions or other information pertinent to the specifications may be made in writing and included in the same envelope with the bid.

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 Price, Technical, and Compliance requirements.

12. DISCOUNTS.

Discounts for prompt payments 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 *(if applicable).*

The City of Waltham 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 CERTIFICATE OF VOTE AUTHORIZATION, are required by statute and 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. Failure to do so may disqualify the bid.

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 theWaltham Purchasing Department, such damaged or non-complying items before payment will be made.

23. GUARANTEES.

Unless otherwise stipulated in the specifications, furniture, equipment and similar durable items 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.

24. 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 theWaltham Purchasing Department.

25. CHANGE ORDERS.

Change orders are not effective until, if, as and when signed by the Mayor and no work is to commence until the change orders are fully executed.

26. BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

SECTION 00300

BID FORM

To the City of Waltham, Massachusetts:

Regarding: **Russell Street Emergency Sewer Repairs Work, June 2016**

The Owner reserves the right to reject any bid in the event that any bid item or items are obviously unbalanced or appear to the Owner to be so unbalanced as to affect or to be liable to affect adversely any interest of the Owner.

The Owner reserves the right to reject any or all bids if it deems it to be in its best interest to do so. The Owner reserves the right to award the Contract based on sufficiency of appropriated funds to complete the work.

The undersigned states that no officer, agent, or employees of the Owner directly or indirectly have a financial interest in this Bid.

The undersigned, as Contractor, declares as follows:

- The only parties interested in this Bid as Principals are named herein
- No officer, agent, or employee of the owner is directly or indirectly interested in this Bid
- The Contractor has carefully examined the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this Bid, and has carefully read and examined the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof
- Understands that information relative to subsurface and other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered will be the same as those shown within the Contract Documents and agrees that the Contractor shall not use or be entitled to use any such information made available to him through Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner of the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefore in this BID
- The Contractor understands that the quantities of work tabulated in this Bid or indicated in the Specifications of other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer

- The Contractor agrees that, if this BID is accepted will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID from being part of said Contract Documents, and that the Contractor will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies, and all other things required by the Contract Documents in the manner and within the time therein prescribes and according to the requirements of the Engineer as therein set forth, and that the Contractor will take in full payment therefore the lump sum or unit price applicable to each item of the Work as states in the schedule below

Contractors must bid on each Item.

Refer to Section 01024 – Measurement and Payment for Item Descriptions.

BASE SCOPE OF WORK BID FORM

The Base Bid include all the work of the Contractor, being all work covered by Items 1 through 8, inclusive.

Item No.	Item Description and Unit Price	Units	Estimated Quantity	Unit Price (Figures)	Extended Total (Figures)
1	Mobilization, Demobilization and Site Restoration _____ Dollars and Cents	LS	1		
2	Furnish and Install 8" Dia. SDR 35 Sewer Pipe and Fittings, all depths of cover _____ Dollars and Cents	LF	25		
3	Furnish and Install 6" Dia. SDR 35 Sewer Pipe and Fittings, all depths of cover _____ Dollars and Cents	LF	250		
4	Furnish and Install 4" Dia. SDR 35 Sewer Pipe and Fittings, all depths of cover _____ Dollars and Cents	LF	70		
5	Remove and Replace Unsuitable Material Allowance _____ Dollars and Cents	CY	150		
6	Backfill Compaction Testing _____ Dollars and Cents	LS	1		
7	Trench Pavement, Full Depth _____ Dollars and Cents	LF	350		

Item No.	Item Description and Unit Price	Units	Estimated Quantity	Unit Price (Figures)	Extended Total (Figures)
8	Remove and Dispose Asbestos Cement (AC) Pipe Dollars and Cents	LF	10		
9	Police Details for Traffic Management Allowance Dollars and Cents	Hr.	300	$45	$13,500
10	Miscellaneous Work & Cleanup Dollars and Cents	LS	1		

Total Amount of Base Bid (Items 1 through 10, inclusive).

$_____

(Amount in figures)

_____

(Amount in words)

Basis of Award: The basis of award shall be at the Owner's sole discretion.

The Contractor hereby agrees that he will not withdraw this BID within thirty (30) consecutive calendar days after the actual date of the opening of Bids and that, if the Owner shall accept this BID, the Contractor will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledge, the required CONTRACT BONDS within ten (10) calendar days after notification that the AGREEMENT and other Contract Documents are Ready for signature.

If this BID is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the Contract within **21 calendar days**, as stipulated in the AGREEMENT.

A performance bond in an amount equal to 50 percent of the total amount of the bid with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract, as well as a labor and materials bond in an amount equal to 50 percent of the total bid amount.

This Proposal must bear the written signature of the Contractor or that of his duly authorized agent. If the Contractor is a corporation or a partnership, the Bid must be signed by a duly authorized office of such corporation or by a Partner and the title of such officer must be stated. Satisfactory completion of the following data is an essential part of submission of this Proposal and is required. Bid must be embossed with corporate seal.

(SEAL)

_____ By:_____

(Name of Contractor) (Signature and title of authorized representative)

Date:_____

_____ _____

(Telephone Number) (Business Address)

_____ _____

(Fax Number) (City and State)

END OF SECTION 00300

SECTION 00500

AGREEMENT made between the **CITY OF WALTHAM,** a municipal corporation duly established under the laws of the Commonwealth of Massachusetts, through its Mayor thereunto duly authorized, hereinafter called the OWNER, and _____ having a usual place of business at _____ hereinafter called the CONTRACTOR. The OWNER, having by letter dated _____ accepted the proposal of the CONTRACTOR for **"Russell Street Sewer Repairs and Replacement"** all of which are hereto attached and made a part hereof, hereinafter called the DOCUMENTS, and the CONTRACTOR hereby agrees to provide the labor, materials, services and work in accordance with the quotation, bid, proposal and said DOCUMENTS. If applicable, all contractors must comply with the prevailing wage rate law as required under the provisions of all Massachusetts General Law. All appropriate Bonds and Certificates of Insurance, per specifications, will be submitted before Contract is signed. This Contract shall not be in effect nor any work commenced until the Mayor signs the Contract.

IN WITNESS WHEREOF, the OWNER sets its hand and corporate seal through its Purchasing Agent thereunto duly authorized, and the CONTRACTOR hereunto sets its hand and seal on the day and year first above written. Bid package and company response are incorporated herewith by reference.

FOR THE CITY OF WALTHAM

APPROVED AS TO FORM ONLY

_____
John Cervone, City Solicitor
Date_____

APPROVED, MAYOR

_____
Jeannette A. McCarthy, Mayor
Date_____

ENGINEERING

_____
Stephen Casazza, City Engineer
Date_____

AUDITING DEPT. (certifying to the availability of Funds)

_____
Paul Centofanti, Auditor
Date: _____

PURCHASING AGENT

_____
Joseph Pedulla, Purchasing Agent
Date: _____

FOR THE COMPANY

_____
Authorized Signature,
Title: _____
Print Name_____
Date: _____

SECTION 00700

GENERAL CONDITIONS

SECTION 00700

GENERAL CONDITIONS

1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words "or equal as approved" are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City's property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

6. **CONTRACT DURATION**.

This contract is for the period required to complete the project. All guarantees remain in effect.

7. INSURANCE

A. WORKMAN'S COMPENSATION: The Contractor shall provide insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor. Contractors shall provide insurance on a primary basis and the contractor's policy shall be exhausted before resorting to other policies. The contractor's policy is the primary one not the contributory.

B. COMPREHENSIVE GENERAL LIABILITY

Bodily Injury:	$1,000,000 Each Occurrence
	$2,000,000 Aggregate
Property Damage:	$1,000,000 Each Occurrence
	$2,000,000 Aggregate

C. AUTOMOBILE (VEHICLE) LIABILITY

Bodily Injury	$2,000,000 Each Occurrence
Property Damage	$1,000,000 Aggregate

D. UMBRELLA POLICY

General liability	$2,000,000

Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: *"The City of Waltham and all the abutters to this site are a named additional insured for all insurances under the contract, excluding Automobile and Workers Compensation coverage".* Failure by the contractor to provide a current and updated insurance policy, during the entire duration of the contract, may result in additional legal liability. The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent
Purchasing Department
City of Waltham
610 Main Street
Waltham, MA 02452

8. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Labor and Materials or Payment Bond EACH equal to 50% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.

9. PERSONNEL:

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior. The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

10. PREVAILING WAGES

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. The prevailing wage schedule for this project can be found at www.city.waltham.ma.us/open-bids.

11. MATERIALS

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

12. TERMINATION OF CONTRACT

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.

13. CONTRACT OBLIGATIONS

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation.

14. BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

15. NOT-TO-EXCEED AMOUNT

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to comply with this procedure will result in the cancellation of the contract and the non-payment of services provided

16. FINANCIAL STATEMENTS.

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

17 BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the

Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

18 RIGHT TO AUDIT

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars ($2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars ($5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

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SECTION 00900

Compliance

(The following documents shall be properly completed and returned with your bid response.)

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 ……. _____
- 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 Bond for 100% of the contract value and naming the City of Waltham *(letter must be included with your response*)

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.

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)

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.

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: _____

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)

_____
City 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 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.

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 _____

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.

END OF SECTION 00900

DIVISION – 1

SECTION 01000
GENERAL REQUIREMENTS

PART 1 GENERAL

PART 1 GENERAL

1.01 GENERAL

A. The Contractor shall conform to all general requirements as herein specified.

1.02 TRAFFIC CONTROL

A. For control of moderate traffic, the Contractor shall provide an adequate number of flagmen employed at his own expense.

B. Whenever and wherever, in the opinion of the Engineer, traffic is sufficiently congested or public safety is endangered, the Contractor, as required, shall furnish uniformed special officers to direct traffic and keep traffic off the highway area affected by his construction operations. Such officers shall be in addition to the watchmen required under other provisions of the Contract.

1.03 INTERFERENCE WITH/AND PROTECTION OF STREETS

A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Engineer.

B. Streets, roads, private ways, and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.

C. The Contractor shall, 24 hours in advance of closing any street, notify the police and fire departments in writing, with a copy to the Engineer. He shall cooperate with the police

department in the establishment of alternate routes and, at his own expense, shall provide adequate, plainly marked detour signs.

1.04 MAINTAINING STORMWATER AND SANITARY SEWER FLOWS

A. It is essential to the operation of the existing drainage system that there is no interruption in the flow of drainage. To this end, the Contractor shall provide, maintain, and operate all temporary facilities such as dams, pumping equipment, sewers, conduits and all other labor and equipment necessary to intercept the flow before it reaches the points where it would interfere with his work, carry it past his work, and return it to the system below his work.

1.05 HANDLING AND DISTRIBUTION

A. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.

B. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

1.06 INSPECTION OF WORK AWAY FROM THE SITE

A. If work to be away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, testing, or before shipment, the contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

1.07 LINES, GRADES, AND MEASUREMENTS

A. Reference marks establishing the controlling grades are available from the Engineer. These reference marks shall be replaced at the Contractor's expense if damaged or destroyed by construction operations.

B. The Contractor shall be responsible for detailed layout, stakeout and grade control required, and shall employ a registered land surveyor or registered professional engineer for this purpose. The Owner will provide engineering inspection.

C. Construction staking shall consist of construction layout and reference staking necessary for the proper control and satisfactory completion of all structures, grading, paving, drainage and all other appurtenances required for the completion of the Contract and acceptance of the work.

D. The Owner will furnish the Contractor such control points, bench marks and other data as may be necessary for the construction staking and layout by qualified engineering or land surveying personnel. It shall be the responsibility of the Contractor to verify all such data prior to construction.

E. Upon request of the Engineer, the Contractor shall furnish copies of all data used in setting and referencing all stakes and other layout markings used by the Contractor. The Contractor shall be responsible for the placement and for the accurate re-establishment of all baselines shown on the Plans, and for the replacement of existing survey points found on the Project and/or noted on the Plans. All brass survey pins in lead plugs and "PK" nails which are to be set or reset and are not to be set in stone bounds installed under this Contract, as noted on the Contract Drawings, are to be set or reset at no additional cost to the Authority. "PK" nails are to be galvanized, 1 ¼ inch minimum, with the letters "PK" on the head, separated by an indentation which marks the actual survey point, and shall be subject to the approval of the Engineer. All stakes, references and batterboards, including original, additional or replacements which may be required for the construction operations, shall be furnished, set and properly referenced by the Contractor. He shall be solely and completely responsible for the accuracy of the line and grade of all features of the work. Any errors or apparent discrepancies found in previous surveys, plans or in these Contract Documents shall be called to the Engineer's attention by the Contractor for correction or interpretation prior to proceeding with the work.

F. All staking shall be performed by qualified engineering or land surveying personnel, acceptable to the Engineer. These personnel shall perform the staking under the direct supervision of a registered land surveyor or registered professional engineer. All stakes used for control staking shall be of a quality meeting the approval of the Engineer.

G. When requested by the Engineer, the Contractor shall provide safe and convenient access to control points, batterboards and references. The Owner may make a check of the control of the work, as established by the Contractor, at any time as the work progresses. The Contractor will be informed of the results of these checks, but the Owner by so doing in no way relieves the Contractor of his responsibility for the accuracy of the layout work. The Contractor shall, at his expense, correct or replace, as required, any deficient layout and Construction work which is a result of inaccuracies in his taking operation or of his failure to report inaccuracies. If the Owner is required to make further studies, redesign, or both, all expenses incurred by the Owner due to such inaccuracies will be deducted from any monies due the Contractor.

H. The Contractor shall furnish all necessary personnel, engineering equipment and supplies, materials, and transportation incidental to the accurate and satisfactory completion of this work. There will be no direct payment for construction staking, or layout, but the cost thereof shall be considered as included in the bid unit prices or the Bid.

I. The Contractor shall verify dimensions and utility locations shown on the Contract Drawing and if any inconsistencies or discrepancies should be noted on the Contract Drawings, or between the Contract Drawings and actual field conditions, or between

the Contract Drawings and the Specifications, he shall immediately notify the Owner. The Contractor will be held responsible for any errors resulting from his failure to exercise the aforementioned precaution.

1.08 DIMENSIONS OF EXISTING STRUCTURES

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

1.09 PIPE LOCATIONS

A. Exterior pipelines will be located substantially as indicated on the Contract Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Contract Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

B. Small interior piping is indicated diagrammatically on the Contract Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs

1.10 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the work may be properly done and be satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

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

1.11 CUTTING AND PATCHING

A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of

proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.

B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

C. The contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.

D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

E. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

1.12 PROTECTION AGAINST ELECTROLYSIS

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

END OF SECTION

SECTION 01010

SUMMARY OF WORK

1. GENERAL SCOPE OF WORK

A. The Work under this Contract consists of:

i. Replacement and point repairs of approximately 275 linear feet of sewer main varying from 6” to 8” in diameter. Sewer main is to be replaced with SDR 35 sewer pipe matching the existing diameter and will include all appropriate fittings and couplings as required.

ii. Service connections along the repairs will be reconnected using SDR 35 pipe and appropriate fittings, bends, and couplings as needed. Services will be replaced up to a point determined by the Engineer or the Property Line, whichever is least in distance. Service lines are 4” in diameter unless otherwise noted on the plan.

iii. Removal and disposal of existing pipe and excess material.

iv. Testing of backfill in place to ensure compaction to within 95% maximum density.

v. Installation of 3” bituminous trench pavement.

vi. Removal and disposal of Asbestos Cement pipe which comprises the 6” service within the project.

B. In addition, the Work under this Contract include:

i. Work outside the Project Site as called for in the Contract Documents and as required for the performance of the work.

ii. The restoration of any items damaged or destroyed by encroaching upon areas outside the Project Site.

iii. Providing and restoring, where appropriate, all temporary facilities.

iv. All work either shown on the Drawing or included in the specifications unless specifically indicated as not to be done.

2. The Work shall start as stated in the Notice to proceed and all items related to the sewer main repairs and trench paving shall be completed within **21 calendar days.**

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor and plant and perform all operations to complete all work as indicated and specified. Provide all supervision, overhead items, bond and permit costs, protection and precautions, and all other costs incidental to the construction work, complete, and as specified, are also included. Prevailing wages apply.

B. A complete, furnished, working job, as intended by the general nature of these Specifications, shall be produced whether or not any particular wording or direction is omitted or inadvertently not clearly stated.

C. Measurement for payment shall be by the Engineer, except where noted elsewhere in this Specification. Measurement for payment for lump sum items shall be on the basis of percentage of work complete and in place.

D. Each unit or lump sum price stated in the Bid shall constitute full compensation as herein specified for each item of work completed in accordance with the Drawings and Specifications.

E. The prices for those items which involve excavation shall include compensation for disposal of surplus excavated material, handling of water, and any required earth support, shoring or bracing for compliance with OSHA regulations, dust control with calcium chloride as required, backfill with suitable materials, compaction and restoration.

F. The prices for all pipe items shall constitute full compensation for furnishing, laying, jointing, cleaning, and testing of pipe; excavation and backfill; and clean up.

G. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price thereof shall be in addition to the cost of excavating earth, and no deduction will be made in the amount for earth excavation.

H. Unit prices submitted for various items of work will be utilized for determining prices of any additional work necessary during construction.

1.2 ITEM DESCRIPTIONS

A. Item 1 – Mobilization, Demobilization, and Site Restoration

1. Mobilization costs shall be on a lump sum basis. The cost shall not exceed 10% of the total of the other bid items.

2. The lump sum price bid in the Bid Form for this item shall be full compensation for all costs associated with initiation and closeout of the Contract, exclusive of the cost of materials, with 50% payable on completion of mobilization. Payment shall include compensation for all insurance, 50% payment and performance bonds, site preparation, construction equipment delivery, and in general the costs associated with establishing and terminating the work on site. There shall be no additional costs for any remobilization.

3. Under the Lump Sum price for this item, the Contractor shall provide general construction services and furnish other appurtenant items necessary to complete all other work identified within this contract, which is not included in Bid Items. This shall include, but not limited to, the following:

    - Field engineering including site layout and control, the establishment of vertical and horizontal site control, construction line and grade, and layout.

    - Attending the pre-construction conference and all required job progress and community meetings, and coordination of all construction activities with the appropriate local authorities and utilities.

    - Submission of all schedules, lists, laboratory test results, materials and sources, survey documentation, and shop drawings, as required, in a timely manner to the Engineer for review and approval.

    - Coordination of all construction activities with the Engineer, owner, Regulatory Agencies, local utilities, and police. Obtaining necessary permits and licenses, and payment of associated fees, as required.

    - Laboratory analyses and field compaction testing for earthwork material and pavement as required by the Engineer.

    - Providing a site-specific Health and Safety Plan for the Contractor's employees, in accordance with the minimum standards set forth in OSHA 29 CFR 1910.120. The Plan and Statement of Certification shall be submitted to the Engineer for their records prior to construction.

- Provide a set of clearly labelled red line as-built drawings at the completion of the project.

- Temporary facilities and providing required bonds and insurance.

- Coordination with utility companies and any payments required for support of utility poles as required to safely perform the work.

- Maintenance and repair of all work for one (1) year period after final payment is issued.

- Providing equipment and handling sewer bypass pumping as required to handle existing sewer flows.

- Providing certificate of design for the support of excavation and equipment, materials, and labor to install, maintain, and remove the support of excavation as required to complete the work.

- All other project related direct and indirect costs not described above.

- Contract closeout.

B. Items 2 through 4 – Furnish and Install SDR 35 Sewer Pipe – Various Diameters

1. Measurement for payment under Items 2, 3, & 4 shall be the length of the pipeline, sized 8”, 6”, and 4” diameter measured in place and recorded by the Resident Engineer. Payment shall be by the linear foot basis, with no measured deductions made for fittings.

2. Measurement of pipe used for service connections shall be made from the centerline of wyes or tees to the connection with the existing service. Payment shall be by the linear foot basis, with no measured deductions made for fittings.

3. Prices bid under this Item for sewer pipe shall be full compensation for all labor, equipment, tools and materials necessary to complete the work as specified, which shall include all fittings, reducers, wyes, tees, bends, couplings, etc. and appurtenances (not paid for under other items), temporary facilities, handling, storing and distribution of materials, excavation, segregating and stockpiling material suitable for backfill, backfill above trench grade including all bedding materials, placing gravel bedding around new sewer pipe, 12” of roadway gravel, saw-cutting pavement, existing pavement removal and disposal, compacting trenches, dewatering, sheeting and shoring not ordered left in place, restoration, adjusting or supporting of existing utility pipes and conduits, removing and disposing or abandoning existing sewer lines, daily and final cleanup, connections to existing sewer mains, and all other incidental work relative thereto, not specifically paid for under other Items and as specified and as shown on the plans.

4. Payment for furnishing and installing sewer pipe of the various types and diameters listed shall be made at the unit prices bid under the applicable item.

5. Payment shall include all work to reconnect any services which are chimney connections. Measurement for any chimney services reconnected shall be the linear footage of pipe installed, with no measured deductions made for fittings.

C. Item 5 – Remove and Replace Unsuitable Material Allowance

1. If, in the opinion of the Engineer, the material is unsuitable for use as backfill, it shall be removed and disposed of to such depths and widths within the limits of payment as the Engineer may order.

2. The quantity of earth excavation and backfill to be included for payment shall be the number of cubic yards of material ordered to be removed and measured by the Engineer within the normal trench limits shown on the contract drawings.

3. Removal of topsoil, paving materials, or rock excavation will not be considered for payment.

4. The unit price for these items shall constitute full compensation for excavation of unsuitable material, disposal of unsuitable material, as well as furnishing, installing, and compacting approved backfill materials.

5. The Contractor will not be reimbursed for excavation of unsuitable material which has not been ordered by the Engineer.

D. Item 6 – Backfill Compaction Testing

1. Measurement for payment under Item 5 will be a lump sum basis.

2. The lump sum cost shall be full compensation for all work associated with the testing of backfill compaction. The Contractor shall be required to hire a reputable independent material testing firm to perform all compaction testing. Backfill compaction testing will be required at intervals of 150 feet along the repair trenches, a total of seven (7) testing locations will be required. Methods of compaction are solely up to the discretion of the Resident Engineer. The contractor shall compact in lifts no greater in depth than their method of compaction is specified for. Hand operated compaction devices such as vibratory plate compactors and “jumping jacks” shall be used in lifts no greater than 12” loose. Testing with a nuclear density gauge, or approved equal, will be required on every other lift as long as passing results are easily obtained.

3. Included within the lump sum cost associated with this item will be the testing of three (3) representative samples of the native soil. The representative samples shall be taken and tested in accordance with the appropriate ASTM methods, see Section 02250 of the

specifications. It will be the sole responsibility of the Contractor to ensure the backfilled soil is compacted to within 95% of the maximum density.

4. If it is found that the soil has not been compacted to within 95% of maximum density, the Contractor shall be responsible to remove and replace the soil and re-compact to within 95%. The Contractor shall understand that the roadway will be paved shortly after the sewer repair work is completed. In the event the Contractor needs to correct and error or omission a full curb-to-curb mill and overlay will be required after the repair has been made at no additional expense to the Owner.

E. Item 8 – Remove and Dispose Asbestos Cement (AC) Pipe

1. The quantity of pipe to be paid for under this item shall be based on the length of AC pipe removed and new pipe installed, measured on a linear foot basis. Measurement for payment does not signify that the line is accepted. This item shall be used in addition to the appropriate pipe item. If the pipe is marked and broken by the contractor it will not be considered for payment under this item.

2. Measurement for length will be along the horizontal center line of pipe as removed points of repair including wyes, saddles, tee branches and bends from including wyes, saddles, tee branches and bends.

3. Payment for pipe shall be on the basis of the linear foot of AC pipe removed. The Contractor's attention is directed to the Technical Specifications section 02823.

4. Payment shall constitute full compensation for removing AC pipe as required, as above determined at the applicable bid price. Unit price shall constitute full compensation for furnishing all labor, materials, fittings, tools, and equipment necessary for removal, unless specified elsewhere.

5. Payment shall constituted full compensation for trucking of materials to appropriate landfill and disposal fees.

6. The unit price shall include filing notification with the Massachusetts Department of Environmental Protection (MADEP) for any removal, Asbestos Notification Form (ANF-001) and providing licensed and trained personnel to remove the material. (NOTE: MADEP, ANF-001 filing fee is waived for Municipal work).

F. Item 9 – Police Details for Traffic Management Allowance

1. Payment shall be made at the stated allowance in the Bid Form. The police department will bill the Contractor directly and the Contractor shall pay the police department bills within a ten day working period for uniform police officers provided on the job site. The billing shall include a weekly statement outlining the days worked, hours worked, location of the work, and rate for all officers providing service during that billing period.

2. The Contractor will be paid by the Owner for bills paid to the police department. The Contractor shall submit paid bills from the police department, stamped and signed as paid, to the Engineer, with the Contractor's Application for Payment.

3. Uniformed officers required for purposes other than public safety and / or control of traffic shall not be eligible for payment. Details billed to the Contractor due to cancellation of work will not be eligible for payment.

G. Item 10 – Miscellaneous Work and Cleanup

1. Measurement for payment for miscellaneous work and cleanup shall be on a lump sum basis.

2. Payment of the lump sum price under Item 9 shall fully compensate the Contractor for labor, materials, equipment, and incidentals required to do all work specified below, and shown on the Drawings, and any other miscellaneous work obviously necessary to complete the Contract. Payment shall include but but not be limited to supporting all existing utilities, modification to existing utilities, maintaining existing drainage flows, removal and resetting of fences, walls, landscape boulders, driveway edging, etc. The contractor shall be responsible for site restoration and cleanup upon completion of the project.

   Payment of the lump sum price shall also fully compensate the contractor for Miscellaneous Work including, but not be limited to, the following:

   - Coordination with utility companies both Public and Private.
   - The temporary and permanent relocation and protection of any signs, benches, mailboxes, trash barrels, post office boxes, planters, etc. located along the roadway and the existing sidewalks prior to the instillation of the proposed sewer system repairs.
   - Accurately locating service lines
   - All calcium chloride and water as required to control and maintain dust on site as well as all associated work.
   - All permits as specified in Section 00821.
   - Maintaining and handling existing sewer flows. This includes all labor, materials, and equipment needed to operate and maintain temporary bypass pumping system.
   - Furnishing and installing appropriate barricade and protection for the jobsite including barrels and cones for traffic management.

- Resetting curbing as required as well as replacing concrete sidewalk as required.

3. The Engineer may authorize a percent (%) complete of this Item for payment if not all of the work has been accomplished. A breakdown of the lump sum price must be submitted to the Engineer at the start of work.

SECTION 01050

ABBREVIATIONS

PART 1 GENERAL
1.01 ABBREVIATIONS

PART 1 GENERAL
1.01 ABBREVIATIONS

A. Where any of the following abbreviations are used in the specification, they shall have the following meaning:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standard Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Administration

(USASI) (formerly the United States of America Standard Institute)
USEPA United States Environmental Protection Agency

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 INTENT

A. The submittals consist of several classes applying to the execution of several or all of the individual Division 2 thru 16 Specifications.

B. Provisions of this section shall be binding on all applicable work performed under the other detailed specifications and payment for work performed under this section shall be apportioned against each of the payment items listed in the Bid, unless otherwise directed.

1.02 MATERIALS - SAMPLES - INSPECTION - REVIEW

A. Unless otherwise indicated on the drawings or specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor to be incorporated in the work shall be subject to the inspection and review by the Engineer. No material shall be processed for, fabricated for, or delivered to the work without prior review by the Engineer.

B. As soon as possible after the formal execution of the Contract Agreement, the Contractor shall submit to the Engineer, the names and addresses of the manufacturers and suppliers of all materials and equipment he proposes to incorporate into the work. Where such names have been directly specified in the Bid, or where substitutions have been made in compliance with the INSTRUCTION AND INFORMATION FOR BIDDERS, repetitive submission will not be necessary. When shop and working drawings are required as specified below, the names and addresses of the manufacturers and suppliers shall be submitted prior to the submittal of the drawings so that the Engineer may review the manufacturer and/or supplier as to his or their ability to furnish a product meeting the specifications, subject to final review of the particular material or equipment. As requested, the Contractor shall also submit data relating to the materials and equipment he proposes to incorporate into the work, in sufficient detail to enable the Engineer to identify the particular product in question and to form an opinion as to its conformity to the Contract requirements. Such data shall be submitted in a manner similar to that specified for shop and working drawings.

C. If the Engineer so requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped as directed, at the expense of the Contractor. Except as otherwise specified, tests shall be arranged and paid for in accordance with the General Conditions.

D. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the materials is intended, and the name of the Contractor submitting the sample.

E. To ensure consideration of samples, the Contractor shall notify the Engineer in writing that the samples have been shipped and shall properly describe the sample using standard submittal forms supplied by the Engineer. In no case shall the letter of notification be enclosed with the samples.

F. The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection, testing, and approval before the materials and equipment are needed for incorporation in the work. Delay resulting from his failure to do so shall not be used as the basis of a claim against the Owner or the Engineer.

G. In order to demonstrate the proficiency of workers, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall, at his own expense, provide such samples of workmanship on wall, floor, finish, etc., as may be required.

H. When required, the contractor shall furnish to the Engineer triplicate sworn copies of manufacture's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

I. After acceptance of the samples, data, etc., the materials and equipment used on the work shall correspond therewith.

1.03 SHOP AND WORKING DRAWINGS

A. The Contractor shall submit for review shop and working drawings six (6) copies unless otherwise specified) of all materials fabricated especially for this Contract, and of all other equipment and materials except for which such drawings are specifically exempted. Three copies will be returned to the Contractor. Additional copies of shop drawings required by the contractor shall be included in the original submission.

All shop drawings submittals shall be accompanied by a properly completed "Standard Shop Drawing Submittal Form" which will be furnished to the Contractor by the Engineer.

B. Such drawings shall show the principal dimensions, weight, structural and operating features, performance characteristics and wiring diagrams, 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 this Contract.

C. When so specified or if considered by the Engineer to be acceptable, manufacture's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for review in place of shop and working drawings. In such case the requirements shall be specified for shop and working drawings, insofar as applicable.

D. The Contractor shall be responsible for the prompt submission of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.

E. No material shall be purchased for fabricated especially for this Contract until the required shop and working drawings have been submitted and reviewed as conforming to the Contract requirements. All materials and work involved in the construction shall then be as represented by said drawings.

F. 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; that the electrical characteristics are correct; and that the dimensions of work submitted fit the available space. Any deviations from the Contract requirements shall be clearly noted on the shop drawings. The Contractor shall stamp each submittal with his firm's name, date, and approval, thereby representing that the above has been complied with. Shop drawings not so checked and stamped will be returned without being examined by the Engineer.

G. All shop drawings shall be properly identified and indicate the article number of the specifications or the drawing number which applies to the submitted item.

H. The Engineer's review of shop and working drawings will follow a general check made to ascertain conformance with the design concept and functional result of the project and compliance with the information given in the Contract Documents. The contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to the fabrication processes or to techniques of construction; and for coordination of the work of all trades.

I. The classification of Engineer's review shall be as follows:

Review Code	Action Code
No Exception Taken	-
Note Markings	Confirm
Rejected	Resubmit

1.04 RECORD OR AS-BUILT DRAWINGS

A. During the progress of the work, each major subcontractor shall keep on file one complete set of red line prints furnished by the Engineer on which shall be accurately and promptly noted, as the work progresses, changes, revisions and additions to the work. Wherever the work is installed otherwise than as shown on the contract Drawings said changes shall be noted. Corrections shall be made in red ink. The above prints upon completion of the work shall be submitted to the Engineer.

B. Before the Contractor is entitled to receive his final payment under this Contract, he shall submit to the Engineer for transmittal to the Owner the above complete set of annotated plans of his work performed by him indicating in particular the location of covered work, pipes, wires, ducts, etc. All trades must cooperate with the Contractor in preparation of this set of plans to facilitate its accuracy and completeness.

1.05 OPERATION AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall thoroughly instruct the Owner's representative in the proper operation of all mechanical and electrical systems. Skilled personnel shall be retained as long as necessary for this purpose.

B. The Contractor shall submit to the Engineer three (3) typed sets, bound neatly in loose leaf binders, of all instructions for the installation, operation, care and maintenance of all equipment, fixtures and systems. Information shall indicate possible problems with equipment and suggested corrective action. The instructions shall include other information deemed necessary by the Engineers.

C. The Contractor shall furnish three (3) typed sets of instructions for lubricating each piece of equipment. Instructions shall state type of lubricant, where and how frequently lubrication is required.

D. The Contractor shall submit to the Engineer three (3) typed sets of instructions for the ordering and stocking of spare parts for all equipment. The lists shall include catalog numbers of parts and suggested supplier. Each set shall also include an itemized list of component parts that should be kept on hand with information where such parts can be purchased.

E. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models or similar equipment shall be deleted or neatly lined out.

F. Such operating instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site.

END OF SECTION

SECTION 01500

TEMPORARY PROVISIONS AND PROTECTION

OF UTILITIES AND PROPERTIES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor's attention is directed to the location of underground utilities in the proposed area of work.

B. The Contract Drawings indicate the approximate location in plan and profile of existing overhead and subsurface utilities in the vicinity of the work.

C. Whatever measures are necessary to protect these lines during the work shall be included in the Contract Unit Price for the various items involved.

D. In case of damage to utilities, the Contractor shall promptly notify the Owner and shall, if requested, furnish manpower under the Owner's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the Owner, either the municipality or the utility company. The cost of such repairs shall be borne by the Contractor without compensation.

E. The locations of existing underground utilities are shown in an approximate way only. The Contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

F. The work to be done under this Contract may necessitate changes in the properties of utility companies or the municipality hereinbefore listed. Immediately after executing the Contract, the Contractor shall confer with the owners of all utilities in order that relocations of mains or services may be made at times consistent with operations of this Contract.

G. The rims of all utility manholes and boxes shall be set to conform to the required grades and the Contractor shall see that all such setting or resetting is substantially and

accurately done in conformity with new grades, whether such setting or resetting is done by him or by companies owner or controlling same, and shall notify the Engineer of any negligence on the part of the owners of the utilities to perform their work promptly.

1.02 RELATED WORK SPECIFIED ELSEWHERE

SECTION 01300 - SUBMITTALS
SECTION 01570 - TRAFFIC CONTROL AND POLICING
DIVISION 2 - SITE WORK - As Appropriate

PART 2 EXECUTION OF WORK

2.01 COORDINATION WITH OTHERS

A. Before starting any work under this Contract, the Contractor shall submit a Schedule of Operations. The work schedule shall include a plan of his construction procedures and the safety measures he will use during the prosecution of the work.

B. The Contractor shall coordinate his work with the work to be done by the Public Utilities or other agencies, and he shall so schedule his operations as to cause the least interruption to the normal flow of traffic in existing roads.

C. The Contractor shall provide, place and erect all necessary barricades and warning signs and maintain adequate lights and illumination. He shall be held responsible for all damage to the work due to any failure of signs and barricades needed to protect the work from traffic, pedestrians or other causes.

D. The Contractor shall assume full charge of space for the storage of materials of all subcontractors and trucks, confining all apparatus, storage of materials and construction operations to the limits indicated by ordinance or permits. He shall allot space for the storage of materials of subcontractors, facilitate the progress of the work, prevent friction, and maintain order and tidiness throughout the project site. Storage areas within the project are limited. The Contractor may be required to obtain storage areas outside the project limits at his own expense. The Contractor shall enforce any instruction of the Owner or the Engineer regarding signs, advertising, fires, danger signals, barricades, smoking, etc.

E. Existing property markers shall be tied by the Contractor with respect to the construction and/or base line with such ties being given to the Resident Engineer. Such work shall be considered as part of the Contractor's incidental work for which no payment will be received.

F. No extra payment shall be made for scheduling the work or for maintenance of traffic; the cost of which shall be included in the various bid items of the Bid.

G. The casting of all structures, which are required to be set or reset under the pertinent items of this contract or by others shall not be set complete in place to the established grade until after the bituminous concrete base course has been completed in place as directed.

H. The Contractor shall not proceed with surfacing operations without the specific written approval of the Engineer.

I. Wherever it is necessary to meet existing surface, the Contractor shall construct a foundation, base and surface to form a continuous smooth roadway.

J. The Contractor shall provide for the removal of all dirt spilled from his trucks on existing pavement over which it is hauled, or otherwise deposited thereon whenever, in the judgment of the Engineer, the accumulation is sufficient to cause the formation of mud or dust, or interfere with drainage or create a traffic hazard.

K. Private Property that is disturbed, outside of the construction limits, shall be repaired by the Contractor at his own expense. No area shall be used for storage without the permission of the Engineer, and the Contractor may be required to obtain storage areas outside the project limits at his own expense.

L. Particular care shall be taken to establish and maintain methods and procedures which will not create unnecessary or unusual hazards to public safety. The convenience of the general public along and adjacent to the highway shall be provided for in an adequate and satisfactory manner. Adequate access shall be maintained to all buildings in use. Signs are to be kept clean at all times, and legends shall be distinct and unmarred.

M. The Contractor shall place and erect the necessary detour signs as indicated on the Contract Drawings and under the related sections as specified, and shall maintain said signs for the duration of the project.

N. The Telephone Company and the Electric Company shall install and/or relocate poles and services as required. The Gas Company shall relocate its service as required. The Contractor shall schedule his operation so as to permit regulated public service corporations to remove and temporarily or permanently relocate their property which conflicts with respect to line and grade of any structure to be constructed under this Contract. All other structures which are owned by public service corporations and are within the limits of work shall be protected by the Contractor. Any public service corporation's property which require temporary supports shall be supported by the respective utilities during the period of construction.

O. Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities or his intention to commence operations affecting such utilities at least one (1) week in advance of the commencement of such operations that may affect their utilities and the Contractor shall at the same time file a copy of such notice with the Engineer.

P. The Contractor's attention is called to the completion date opening the road for traffic, which have been established with the intent to complete the project and make it available to the traveling public at the earliest possible date.

Q. For the purpose of observing work that affects their respective properties, inspectors for the municipality, public agencies and the utility companies shall be permitted access to the work, but all official orders and directives to the Contractor shall be issued by the Engineer.

2.02 PUBLIC SAFETY AND CONVENIENCE

A. Trenches shall not be excavated in traveled ways until all materials and equipment required for such work are at the site and available for immediate use. When work is not in progress, trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining a 20 ton truck load with impact. The work in each trench shall be practically continuous, with the placing of pipe, backfilling and patching of the surface closely following each preceding operation. Payment for steel plates will be included under the unit bid price per linear foot for each respective pipe item regardless of width of trench.

B. The Contractor's attention is directed to the AASHTO Guide on Occupational Safety of Highway Construction Projects, subpart N, 1926.550, relating to construction equipment clearances at overhead electric lines, which states in part "...the minimum clearance between the lines and any part of the crane or load must be at least 10 feet from lines rated 50 KV or below, and greater distances for higher voltage...". For the protection of personnel and equipment, the Contractor should be aware of this regulation especially during paving operations using large semi-trailer vehicles.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 GENERAL

1.01 DUST CONTROL OPERATIONS

A. The Contractor shall perform dust control operations, in an approved manner, whenever necessary or when directed by the Engineer, even though all other work on the project shall be suspended. Dust controlling shall be generally accomplished by the use of water; however, the use of flake calcium chloride may be ordered when necessary to control dust nuisance.

1.02 REQUIREMENTS

A. The Contractor shall practice dust control to meet all air pollution standards as set forth by federal and state regulatory agencies.

END OF SECTION

SECTION 01567

POLLUTION CONTROL & ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This work shall consist of temporary and permanent control and restoration measures as hereinafter stated or ordered by the Engineer during the life of the Contract to control water pollution and erosion (through use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion and pollution control devices or methods) and to limit disturbance and/or alteration of the natural environmental setting.

B. The temporary pollution control and environmental protection and restoration provisions contained herein shall be coordinated with detailed construction specifications elsewhere in the Contract to the extent practical to assure economical, effective and continuous pollution and erosion control, and environmental protection and restoration throughout the construction and post construction period.

C. Payment for this work shall be apportioned against each of the payment items listed in the Bid, unless otherwise specified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. This is a general section and relates to any and all other sections wherein the work might result in pollution or environmental damage.

B. SECTION 01710 - CLEANING UP

PART 2 MATERIALS

2.01 POLLUTION AND EROSION CONTROL MATERIALS

A. Mulches may be hay, straw, fiber mats, netting, wood cellulose, corn or tobacco stalks, bark, corncobs, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.

B. Slope drains may be constructed of pipe, fiber mats, riprap, plastic sheets, or other material acceptable to the Engineer that will adequately control pollution.

C. Grass shall be quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area providing a temporary cover which will not later compete with grasses sown later for permanent cover.

D. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Engineer.

E. Flake calcium chloride shall be used for dust control.

PART 3 EXECUTION

3.01 PRECONSTRUCTION CONFERENCE

A. At the preconstruction conference or prior to the start of the applicable construction, the Contractor shall submit to the Engineer for acceptance his schedules for accomplishment of temporary and permanent pollution and erosion control and environmental protection and restoration work, as are applicable for clearing and grubbing and general construction. The Contractor shall also submit for approval his proposed method of disposal of unsuitable material and restoration of disturbed land to its original (prior to construction) condition, either at the time of the pre-construction conference or prior to the starting of any work. No work shall be started until schedules and methods of operations have been approved by the Engineer.

3.02 PROCEDURAL DETAILS

A. The Engineer shall have the authority to limit the area of erodible earth exposed by construction and to direct the Contractor to provide immediate permanent or temporary pollution control and environmental protection measures to prevent contamination of adjacent streams or other watercourses, ponds, or other areas of water impoundment. Such work may involve the construction of temporary mulches, mats, seeding or other control devices or methods as required by the conduct of the work.

B. The Contractor shall be required to incorporate all permanent pollution control and environmental protection features into the project at the earliest practical time as outlined in his approved schedule. Temporary pollution control and environmental protection measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of

permanent pollution control or environmental protection features; or that are needed temporarily.

C. The Contractor shall undertake and comply with the following measures with respect to adverse environmental impacts, resulting from the operations listed below.

1. Clearing Grubbing - Disturbed areas shall be re-grassed at the direction of the Engineer.

2. Tree cutting in undeveloped cross-country or building site areas as designated by the Engineer - Trees within the temporary right-of-way, shall be cut only with the written approval of the property owner. Trees approved for cutting shall be marked with a 2-inch wide paint ring. The Contractor shall furnish the Engineer with sufficient spray paint and shall be present during all tree marking, and shall notify the appropriate property owner, the Owner, and the Engineer, concerning his availability for tree-marking at least ten (10) calendar days prior to the start of the applicable construction. Trees not approved for cutting shall be adequately protected against damage by methods approved by the Engineer. Cut or damaged trees not approved for cutting or outside of the total working right-of-way shall be replaced with trees of similar nature and maturity at the Contractor's expense. When directed, stumps of approved cut trees shall be removed and replaced with seedlings of a similar nature, 6-12 feet in height.

3. Access road construction - Riprap or sodding shall be used to prevent erosion.

4. Material Storage - Materials shall be stored only at approved locations. Petroleum products shall be stored away from wetland areas.

5. Excavation - The Contractor shall use care to contain wet fill where it is dumped. When material is stockpiled next to a trench, the side away from neighboring brooks, swamps, canals, etc., shall be utilized where space conform to the natural angle of repose of the soil. The Contractor shall promptly remove all sediment from brooks and swamp areas, if deposition cannot be avoided during construction. The Contractor shall promptly remove excess fill and regress the work area. Excess fill shall not be disposed of in wetlands, other than in areas defined on the drawings, or areas approved by commissions or authorities having jurisdiction.

6. Water handling - The Contractor shall be required to use crushed stone or plastic sluiceways leading to brooks to filter and pool pumped discharges.

7. Backfilling - The Contractor shall replace unsuitable material with suitable material. He shall also be responsible for surface repairs as required.

8. General - Trash receptacles shall be required on the job site. The Contractor shall perform preliminary clean-up operations as he completes segments of his work.

9. Spillings - Ground Spillings of oil or other petroleum products drained from equipment shall be strictly prohibited. The Contractor shall provide leak proof containers for receiving drained oil and shall properly dispose of such oil away from the site of the job.

3.03 DUST CONTROL OPERATIONS

A. The Contractor shall perform dust control operations, in an approved manner, whenever necessary or when directed by the Engineer, even though all other work on the project shall be suspended. Dust lying shall be generally accomplished by the use of water; however, the use of flake calcium chloride may be ordered when necessary to control dust nuisance.

B. The Contractor shall practice dust control to meet all air pollution standards as set forth by federal and state regulatory agencies.

3.04 ACCEPTANCE

A. Final inspection and acceptance in regard to cleanup, site restoration and pollution control measure areas shall be made in the presence of the Owner and/or commissions or authorities having jurisdiction. The Contractor shall notify the Owner in writing of readiness of the work for final inspection.

END OF SECTION

SECTION 01570

TRAFFIC CONTROL AND POLICING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall install construction traffic and pedestrian controls as specified herein and any additional construction and/or detour controls deemed necessary by the Engineer or the Contractor himself, or required by the Manual on Uniform Traffic Control Devices.

B. Where the roadway under construction is the only means of vehicular or pedestrian access to a particular area, the Contractor must provide continual access to that area for residents and emergency vehicles.

C. Work under these items shall conform to the relevant provisions of the Massachusetts "Standard Specifications for Highways and Bridges", latest edition, as amended and specified herein.

PART 2 MATERIALS

2.01 GENERAL

A. All signs, barricades, and drums shall have encapsulated lens and reflective sheeting in accordance with the Massachusetts "Standard Specifications for Highways and Bridges".

PART 3 EXECUTION OF WORK

3.01 SCHEDULE OF OPERATIONS

A. At a reasonable time in advance of the construction work, the Contractor shall submit to the Engineer for approval a traffic management plan, stamped by a Massachusetts Registered Professional Engineer, showing all construction and/or detour control

devices to be erected. All of the devices shall be moved after each phase of the project and after the project is completed.

3.02 LOCATION OF SIGNS

A. The detour signs and other control devices shall be located as specified herein.

B. The construction and/or detour signs as herein specified shall be removed and relocated after each phase of the project.

C. The Contractor shall notify the responsible heads of the Fire, Police, and Public Works Departments, before beginning each phase of the project.

D. All signs, barricades, makings and lighting devices shall conform to the Manual on Uniform Traffic Control Devices - latest edition.

E. The contractor shall submit a Traffic Control Management plan detailing types of signs, detours, and locations of signs for review by the City. The submitted traffic plan shall be stamped by a Massachusetts Registered Professional Engineer.

END OF SECTION

SECTION 01710
CLEANING UP

PART 1 GENERAL
1.01 SCOPE OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

A. During its progress the work and the adjacent areas affected thereby shall be kept clean and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that public property owners will be inconvenienced as little as possible.

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

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him, shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

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

E. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors and on completion of the work shall deliver it undamaged and in a fresh and new appearing conditions. All mechanical equipment shall be left fully charged with lubricant and ready for operation.

F. Payment for cleanup and restoration shall be apportioned against each of the payment items listed in the BID, unless otherwise specified.

END OF SECTION

SECTION 01720

CONSTRUCTION PERMIT APPLICATIONS AND FEES

1.1 GENERAL

1. The City of Waltham has waived all fees for this Project; Contractor is required to file an Application and obtain all pertinent Permits before construction.

2. Obtain forms from Building Department.

END OF DOCUMENT

DIVISION 2

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, tools, equipment, and service necessary to perform the following items of work which relate to the performance of the construction contract, in accordance with the contract drawings.

B. Work shall include:

1. Field engineering and grade control.
2. Modifications and/or abandoning or removal of existing utility structures and lines not paid for under other items.
3. Furnish and Install Erosion Control Barriers and remove barrier upon completion of project.
4. Sawcutting of pavement
5. Excavation of pavement and subbase and removal of surplus as specified under Section 02220.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK - As Appropriate

PART 2 NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passersby. Streets, roads, adjacent property, and existing utilities to remain shall be fully protected throughout the construction operations.

B. This item shall include any additional work required in crossing existing culverts, water courses, catch basins, drains, fire hydrants, gas, water and sewer lines and services, utility poles, and other utilities. Also included in this item is all work required to support existing utilities and structures including, but not limited to, the following: bracing, hand excavation and backfill (except concrete cradles), and any other work required for crossing the utility or obstruction, but included for payment in other items of this Specification.

C. Fences, trees, signs, traffic islands, guardrails, and utility poles in the vicinity of the work shall be protected from damage under this item. If damaged or removed, they shall be replaced in a condition equal to that existing before construction began.

3.02 PRELIMINARY SITE PREPARATION

A. Prior to any excavation the Engineer will furnish the following survey work: location of the benchmark(s) at the site and copies of survey notes. The Contractor shall furnish and set, at his own expense, all remaining stakes required for the construction operations and he shall be solely responsible for the accuracy of the line and grade of his work.

B. The Contractor shall be held responsible for the preservation of all stakes and marks placed by the Engineer. If any of such stakes or marks are disturbed or destroyed by the Contractor, he shall replace them at his expense.

3.03 EXPLOSIVES

A. Explosives will not be permitted.

3.04 CONSTRUCTION NEAR TREES

A. When excavation occurs around trees to remain, the tree roots shall not be cut. Excavation shall be accomplished by careful hand digging and without injury to the roots.

3.05 DISPOSAL

A. All disposal costs are the Contractor's expense.

B. Material to be removed shall be removed by the end of each day's work, as it accumulates. Should the Contractor elect to continue work beyond normal working hours, material to be removed shall not be allowed to accumulate for more than 36 hours.

C. Burning on site will not be permitted

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall make all excavation of normal depth in earth for sites, structures, roads, and trenches in whatever substance encountered, and shall place and compact backfill to the dimensions and levels shown on the plans or as required by the Engineer. The Contractor shall provide all labor, material, equipment, supervision and incidentals to execute the work in strict accordance with these specifications and applicable drawings. Work under this section includes, but is not necessarily limited to, stripping and stockpiling of suitable topsoil, excavation of all materials encountered, trenching, sheeting, shoring, dewatering, blasting, maintenance of excavation, backfill, fill, providing borrow, compaction, and grading. The Contractor shall do layout.

B. The Contractor is advised that lines and grades, as shown on plans and profiles, are subject to change. Although it is the intention to adhere to that which is shown on the plans, the Engineer reserves the right to make changes in lines and grades of utilities and locations of manholes when such changes may be necessary or advantageous.

C. The Contractor's particular attention is directed to the related sections of the specifications. Specific information is provided for stockpiling material on-site or off-site and disposal of unsuitable material. Special requirements applicable to excavation to remove soft material, site preparation settlement, and timing of construction are identified.

D. In open trenching on State, County, or local highways and railroad properties, the Contractor shall be governed by the conditions, restrictions and regulations made by the appropriate body. All such regulations shall be in addition to those set forth in these specifications.

E. Any excavation, dewatering, sheeting, and bracing shall be carried out in such a manner as to eliminate any possibility of undermining or disturbing the foundations of any existing structures or any work previously completed under this Contract, or as specified herein.

F. The Contractor shall fill or backfill all excavations as indicated on the Contract Drawings and as specified herein, but is advised that some of the excavated material may not be suitable as backfill material.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 02224 - FILL AND BACKFILL MATERIALS
B. SECTION 02250 - COMPACTION CONTROL AND TESTING
C. SECTION 02575 - PAVING REPAIR AND REPLACEMENT

1.03 SITE INFORMATION

A. Existing grades and other site information shown on the applicable Contract Drawings are approximate and have been compiled by field surveys. The Owner does not guarantee that grades shown will not vary from the actual site conditions. The Contractor must make his own field investigations to determine all conditions affecting the work to be done and materials needed and make his bid in sole reliance thereon.

1.04 PROTECTION OF EXISTING CONDITIONS

A. General: Extreme care shall be exercised to avoid existing trees, shrubs, facilities, utilities, fences, and private property that are to remain and all necessary precautions taken to prelude damage to these items. Any damage to these items as a result of work performed by the Contractor shall be repaired by the Contractor at his own expense.

B. Utility agencies shall be contacted and advised of proposed work prior to the start of actual excavation. The Contractor shall obtain information from the proper sources and authorities concerning locations of all utilities within the scope of this work, in order that there will be no damage done to such utilities.

C. If and when encountered, utilities shall be supported and protected, and the Engineer shall be notified. Entrance, opportunity, and ample time shall be allowed for such measures as may be required for the continuance of utility services. Utilities to be abandoned within excavation areas shall be removed, plugged, or capped by the Contractor as directed by the Engineer. Permanent existing utilities near the excavation and/or construction work shall be properly protected during construction work, and any damage to such permanent utilities shall be repaired by the Contractor without expense to the Owner or Engineer.

D. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs. No separate item is provided for service supports and the Contractor must cover supports in the unit prices bid for the roadway construction.

E. The Contractor shall not be compensated for any additional work involved whenever a utility or underground structure is so encountered within the work limits.

F. The Contractor shall not be compensated for any additional work involved if the utilities or underground structures cross the trench line transversely above or below the proposed work.

G. Rules and regulations governing the respective utilities shall be observed. Active utilities shall be adequately protected from damage, and shall not be removed or relocated except as indicated or directed.

H. All existing pipes, poles, wires, fences, curbing, and other structures which, in the opinion of the Engineer, must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from injury by the Contractor, and in case of injury, the Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. The Contractor shall at his own expense replace, repair, or restore the affected facilities to their original condition or shall reimburse the owner of said facilities for such expenses as the owner may accrue. When the owners do not wish to make the repairs themselves, all damage shall be repaired by the Contractor, or, if not promptly done by him, the Engineer may have the repairs made at the expense of the Contractor.

I. Survey markers: Any existing property boundary markers, Town bounds, control points, and datum elevations markers or bench marks to be removed and replaced as shown on the Contract Drawings or directed by the Engineer shall be removed and replaced by the Contractor with all expenses for such replacement paid for by the Contractor.

J. The Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Barricades, etc., shall conform with all codes and regulations, and shall be lighted at night with lanterns, and reflectorized paint as directed or required for safety, and shall be removed upon completion of the Contract.

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 DESCRIPTION

A. The Contractor shall make excavations in such manner and to such width as will give suitable room for building the structures or for constructing the roadways but complying with the limits shown on the Contract Drawings. The Contractor shall furnish and place all sheeting, bracing, and supports; shall do all pumping and draining and any other work necessary for dewatering and shall render the bottom of the excavation firm and dry and in all respects acceptable.

B. In no case, except as provided for in Part 3.10 titled "Trench Limits", shall the earth be plowed, scraped, or dug by machinery so near to the finished grade as to result in disturbance of material below said grade. The last of the material to be excavated shall be removed with pick and shovel just before placing pipe, masonry, or other structures.

C. All excavations shall be braced with steel sheeting or steel excavation boxes as specified in the related specifications or as shown on the Contract Drawings.

3.02 OPEN EXCAVATION

A. All excavation, except as otherwise specified or permitted, shall be open cut. The length of trench open at any one time will be controlled by the Engineer. The Contractor shall not have more than three hundred (300) feet of trench open at any one time during daylight hours.

3.03 SEPARATION OF SURFACE MATERIALS

A. From areas within which excavations are to be made, loam, topsoil, sand, and gravel shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate materials, he shall furnish as directed and without additional compensation, clean backfill and loam and topsoil at least equal in quantity and quality to that excavated.

B. When excavations are to be made in paved surfaces, the Contractor shall machine cut the pavement along the proposed trench lines, with either a pneumatic hammer or mechanical saw in such a manner that the edges of the remaining pavement follow clean, trim, straight lines. If pavement is removed, it shall not be mixed with other excavated material, but shall be disposed of away from the site before the remainder of the excavation is made.

3.04 EXCAVATED MATERIAL

A. Excavated material shall be so placed as not to interfere with travel on the streets and driveways by the occupants of adjoining property, cause undesirable settlement, or obstruct free access to hydrants and gate valves. Access for emergency vehicles shall be maintained at all times. Excavated material shall not be deposited on private property until written consent of owner or owners thereof has been filed with Engineer. Onsite excavated material stockpiles shall be stored as directed by the Engineer. However, if it is impractical or unsafe to stack suitable, excavated, backfill material adjacent to the work, the material shall be hauled and stored at a location provided by the Contractor at no additional expense to the Owner. Excavated material shall not be deposited in brooks or streams. Excavation shall include the removal of unearthed wooden structures.

B. It is expressly understood that no excavated materials shall be removed from the site of work or disposed of by the Contractor except as directed or approved by the Engineer. All material designated by the Engineer to be removed from the site shall be immediately removed and legally disposed of according to Federal, State and Local codes and regulations. The Contractor will be required to clean any roads and streets of material that is spilled from his operation of hauling and disposing of unsuitable excavated material.

C. Suitable excavated material may be used for fill or backfill on other parts of the work.

D. Upon completion of the backfilling, the streets or property shall be cleaned, surplus material removed, and the surfaces restored to the condition in which they were before construction. All materials left over in public highways shall become the property of the Contractor. If the Contractor fails to promptly remove such surplus material, the Engineer may have the work done and charge the cost thereof
as money paid to the Contractor.

E. Material excavated from private property shall belong to the property owner or his representative, and shall be disposed of by the Contractor, as required by said property owner or representative, but the longest haul requested by the Owner shall in no case exceed 5 miles. If the Contractor fails to promptly remove such surplus material, the Engineer may have the same done and charge the cost thereof as money paid to the Contractor.

3.05 DRAINAGE

A. At all times during construction, the Contractor shall provide, place and maintain ample means and devices with which to intercept and/or remove promptly, and dispose properly all water entering trenches and other excavation, or the water may flow along or across the site of work; and keep said excavations dry until the structures, pipes, and

appurtenances to be built have been completed to such extent that they will not be damaged. At this time the Contractor shall remove such temporary means and devices.

B. Every precaution necessary to obtain watertight construction of all joints in pipe, manholes, wyes, and drop connections must be taken.

C. All ground water which may be found in trenches or excavations and any water which get may into them from any cause whatsoever shall be removed.

D. All water pumped or drained from the work shall be disposed of in a suitable manner, satisfactory to the Engineer, without undue interference with other work or damage to pavements, other surfaces, or property.

3.06 STRUCTURE EXCAVATION

A. The Contractor shall excavate to the elevations shown on the plans, or as directed by the Engineer. If the Contractor excavates below the elevations specified, he shall bring the excavation back to the proper elevation by backfilling with screened gravel (Type 6 material) and tamping in 6" layers to provide a compact base. The backfill material must be approved by the Engineer before being placed. If the Engineer directs any changes in elevation or dimension of the structure excavations from that shown on the plans, the Contractor shall be paid for work performed under the appropriate bid item. Any increase in cost resulting from backfilling, or increasing the size of the excavation or foundations because of over excavation in depth, shall be borne by the Contractor. Cut slopes shall have a maximum slope of 2:1 if not braced. When excavation has reached specified dimensions, the Engineer shall be notified and he will determine if conditions are satisfactorily met before work is allowed to continue.

3.07 SLABS ON GRADE

A. Where slabs on undisturbed earth occur, all loams, organic or other undesirable materials shall be removed as required by the Engineer, and the area grubbed to a depth of at least six (6) inches below the finished sub-grade elevation or as indicated on the Contract Drawings. Where slabs on fill occur, the fill will also be compacted in accordance with the related section of the specifications.

3.08 TRENCH EXCAVATION

A. Excavation shall not commence in any section until the pavement covering the proposed excavation has been properly cut.

B. In general, trenches shall be excavated to such depth as will permit pipe to be laid at elevations, slopes or depths of cover as indicated on the Contract Drawings. Deeper trenches shall be provided where necessary on account of the conformation of the ground and to permit the alignment of the pipe without undue deflection of joints.

C. Trenches shall be excavated by hand or machinery to the width and depth indicated on the Contract Drawings and specified herein under Paragraph 3.10 "Trench Limits". All

loose material shall be removed from the bottom of the trench so that the bottom of the trench will be in an undisturbed condition, and so as to provide a proper foundation for pipe bedding material.

D. Particular care shall be taken that no stone 6 inches or larger in any diameter protrudes more than 3 inches from the bottom or side of the trench. Suitable bell holes shall be made in the trench at joints as required.

E. At completion of a workday, all excavations shall be covered by backfilling to existing grade or plating to entirely cover the opening or completely enclosing with a 6 foot high temporary chain link fence.

F. In earth excavation in sections where bedding is excluded, the bottom of the trench shall be shaped so as to conform to the outside of the pipe, particular care being taken to recess the bottom of the trench in such a manner as to relieve the bell of all load.

3.09 TRENCH EXCAVATION IN FILL

A. If pipe is to be laid in embankments or other recently filled material which are more than 1 foot below the invert of the pipe, the fill material shall be placed and properly compacted to final grade or to a height of at least 3 feet above the top elevation of the pipe, whichever is the lesser, before laying pipe. Particular care shall be taken to ensure maximum consolidation of material under the pipe. The pipe trench shall then be excavated as though in undisturbed material.

3.10 TRENCH LIMITS

A. The limits of normal trench excavation shall be as shown on the Contract Drawings or specified herein. Trenches shall be excavated to the required depths, adding, however, to such depths the thickness of the pipe and, where applicable, the thickness of the bedding. The width of the trench at the bottom shall always be wide enough to make the joints properly. When, in the opinion of the Engineer, it is necessary to lay a concrete foundation, the excavation shall be made as shown on the details or as ordered by the Engineer.

B. Where the bottom of the trench, by mistake of the Contractor, has been taken out to a greater depth than above specified, it shall be refilled to the proper grade, using screened gravel material by the Contractor who shall receive no additional compensation whatever therefore. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted.

C. The Contractor shall at all time exercise care not to excavate outside the trench limiting lines as shown on the Contract Drawings unless otherwise authorized by the Engineer.

D. Bedding for pipe will be as detailed on the Contract Drawing and as specified in the related section of the specifications.

3.11 EARTH EXCAVATION BELOW NORMAL GRADE

A. If in the opinion of the Engineer, the material at or below the depth to which excavation for structures and pipes would normally be carried is unsuitable for foundation, it shall be removed to such widths and depths as directed and replaced with suitable material. Such work shall be paid for under appropriate items.

1. Roadway over-excavations shall be backfilled with compacted Type 3 material.

2. Trench over-excavation shall be minimum of 3 feet or as directed by the Engineer and shall be lined with a geotextile fabric.

3.12 EXCAVATION NEAR EXISTING STRUCTURES

A. Attention is directed to the fact that there are pipes, drains, and other utilities in certain locations. Some of these have been indicated on the Contract Drawings, and an attempt has been made to show all of the lines and services, but the completeness of accuracy of the information given is not guaranteed.

B. All pipes and other utility conduits shall be located on the ground with pipe finding equipment well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or by marked stakes in the ground. All such location work shall be provided by the Contractor in cooperation with the appropriate utility to the satisfaction of the Engineer at no extra cost.

C. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools, as directed. Such manual excavation when incidental to normal excavation shall be done to the satisfaction of the Engineer at no extra cost.

3.13 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. Whenever the Contractor encounters certain existing structures as described below and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed, to change the location or, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.

B. In removing existing pipes or other structures, the Contractor shall use care to avoid damage to material, and the Engineer shall include for payment only those new materials which, in his judgment are necessary to replace those unavoidably damaged.

C. The structures to which the provisions of the preceding two paragraphs shall apply include pipes, wires, and other structures which (a) are not indicated on the Contract Drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot

proceed until they have been changed in location, removed (to be later restored), or replaced.

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

3.14 CARE AND RESTORATION OF PROPERTY

A. Excavation machinery and cranes shall be of suitable type and be operated with care to prevent damage to trees not to be cut and overhanging branches and limbs.

B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. In case of cutting or unavoidable damage to branches, limbs, and trunks of trees, the cut or damaged portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations shall be protected by suitable means or shall be dug up and temporarily replanted and maintained. After the construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured so such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to the kind and quality existing at the start of the work.

D. On paved surfaces, the Contractor shall not use or operate tractors, bulldozers, or other power operated equipment, with treads or wheels of which are so shaped to cut or otherwise damage such surfaces. All surfaces which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operation. Suitable materials and methods shall be used for such restoration.

E. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

3.15 DUST CONTROL

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities so as to minimize the creation of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish the material, load, deliver, and spread it as directed.

3.16 BACKFILLING - GENERAL

A. In general, and unless other material is indicated on the Contract Drawings or specified elsewhere, material used for backfilling trenches and excavations around structures shall be suitable material which was removed in the course of construction excavation. Backfilling shall not commence until the Engineer gives permission. Where the trench is in an area to be paved, or in an unpaved vehicular or pedestrian traveled way, or the shoulder of a paved roadway, a suitable pavement base shall be provided to a depth of at least that required in the related sections of the specifications.

B. Suitable backfill material shall be free from cinders, ashes, refuse, boulders, rocks, or stones greater than 6 inches in any dimension, unsuitable organic material, or other material which, in the opinion if the Engineer, is unsuitable.

C. Frozen material shall not be placed in the backfill, nor shall backfill be placed upon frozen material. Previously frozen material shall be removed, or shall be otherwise treated as required, before new backfill is placed.

3.17 BACKFILLING AROUND STRUCTURES

A. The Contractor shall not deposit backfill against structures until the structure has obtained sufficient strength to withstand the earth pressure placed upon it and in no case less than seven days, nor before carrying out and satisfactorily completing the tests specified in the related sections of the specifications. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to the structure than the depth of the structure below grade. Such backfilling shall be carried up evenly on all walls of a structure simultaneously with maximum allowable variation of 2 feet in elevation at any point. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.

B. In addition, where pipe is connected to the structure, the backfilling procedure shall be carried out as specified in "Backfilling in Open Trench".

C. Measurement of fill material under this work will not include any filling made beyond a vertical plan of one foot outside the footings except as directed.

D. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled or graded to eliminate ridges of soil left by compaction equipment. No fill shall be placed and compacted on snow, ice, or soil that was permitted to freeze prior to compaction.

3.18 BACKFILLING IN OPEN TRENCH

A. As soon as practical after pipe has been laid in accordance with the appropriate sections and the pipe joints have been properly made, the backfilling shall begin, and shall continue without delay. However, the trench shall be kept open long enough for the Engineer to locate existing utilities uncovered during excavation and to inspect pipe or structure conditions.

B. If a screened gravel or concrete envelope is not used, the selected material shall be (see Contract Drawings for additional or superseding information) free from large lumps and stones having any dimension greater than 2 inches, and shall be placed simultaneously on both sides of the pipe, so that there will be no tendency to displace the pipe alignment. In placing the material, care shall be taken that stones do not strike the pipe and geotextile fabric shall be installed to the limits shown on the Contract Drawings at the locations specified on the drawings or as directed by the Engineer.

C. A sand blanket (Type 2 material) shall be placed at the sides of the pipe up to the top of the pipe and shall be hand-placed and thoroughly compacted using approved hand-operated tampers. Backfilling shall be carried up evenly on both sides of the pipe.

D. Type 2 material shall be extended up to a level of 1 foot above the top of the pipe shall be placed in 6 inch layers, leveled along the length and width of the trench and thoroughly compacted with approved tampers.

E. The sand blanket (Type 2 material) may be omitted for cast iron, ductile iron and reinforced concrete pipe provided, however, that no stone large than 2 inches is in contact with the pipe.

F. The backfill in the remainder of the excavation above the top of the screened gravel or concrete envelope, if used, shall be Type 1, backfilled in approximately 12 inch layers and promptly compacted by mechanical tamping. Material used for backfilling to a point two feet over the pipe shall contain no stones larger than three inches in greatest dimension. Backfilling or tamping with trenching machines is prohibited.

G. Care shall be taken in the use of mechanical or other tampers not to injure or move the pipe or cause the pipe to be supported unevenly.

H. Large masses of backfilling material shall not be dropped into the trench in such a manner, in the opinion of the Engineer, as to endanger the pipe.

I. All backfilled trenches shall be thoroughly surface tamped with a tamping machine approved by the Engineer.

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

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

3.19 MATERIAL FOR FILLING AND EMBANKMENTS

A. Approved selected materials available from the excavations and not required for backfill around pipes or under structures may be used for site preparation except as otherwise

specified. Material needed in addition to that available from construction operations shall be obtained from approved Type 1, 2, 3, or 4 sources.

B. All material, whether from the excavations or offsite, shall be such nature that after it has been placed and properly compacted in 12-inch layers, it will make a dense, stable fill. It shall not contain vegetation, roots, stones over 6 inches in diameter, or porous material.

3.20 GRADING

A. Grading, in preparation for placing of paved walks and drives and appurtenances, shall be preformed at all places to the lines, grades, and elevations as directed by the Engineer. All unsuitable material encountered, of whatever nature, shall be removed and disposed of as directed. During the process of grading, the sub-grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or conditions or the work.

B. The right is reserved to make minor adjustments or revisions in lines or grades if found necessary as the work progresses or in order to obtain satisfactory construction.

C. All slopes cut during construction shall be uniformly redressed to the slope, cross-section and alignment existing prior to construction as indicated on the Contract Drawings or as directed by the Engineer.

END OF SECTION

SECTION 02221

ROCK EXCAVATING AND DISPOSAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this section consists of furnishing all labor, tools, equipment and supervision necessary to excavate rock, if encountered, to the lines and grades required to install the pipe as indicated on the Contract Drawings. The Contractor shall dispose of the excavated material for backfill in place of the excavated rock.

B. In general, rock in trench shall be excavated so as to be not less than 6 in. from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or when so specified or indicated on the drawings, it shall be backfilled with the same material as that required for bedding the pipe and will be furnished and placed at the expense of the Contractor.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 -SITE WORK

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 ROCK EXCAVATION - GENERAL

A. "Rock" shall be classified as a material that requires for excavation drilling, blasting, or breaking by means of power tools. Boulders and concrete structures one cubic yard or greater, however removed, are included within this definition of rock. When material is encountered with respect to which the Contractor may claim removal as rock excavation, such material shall be uncovered and exposed and the Engineer notified by the Contractor before proceeding with the excavation. The Contractor shall not

proceed with the excavation of the material to be re- moved as rock excavation until this material has been cross-sectioned and classified by the Engineer. Failure on the part of the Contractor to uncover such material, notify the Engineer, and allow time for cross sectioning the undisturbed surface of such material, will forfeit the Contractor's right of claim to any classification other than that allowed by the Engineer for the areas of work in which the deposits occur. Rock excavation shall be considered unsuitable backfill material and shall be used for ditch and slope protection or wasted off-site as directed by the Engineer.

3.02 ROCK BLASTING

A. If blasting is required and allowed, it shall be done in a safe manner by a licensed blaster, and the Contractor shall take all precautions necessary for the protection of persons and property. Extreme care shall be exercised in the handling and use of explosives. No blasting work shall be performed without permission from all governing authorities and the Engineer. Any blasting work approved as necessary shall be done in accordance with all applicable safety regulations including all State and local regulations. Ample warning shall be given for all blasts, and adequate means taken to prevent all persons from entering the blasting area. Experienced personnel shall do all blasting operations. The Contractor shall be entirely responsible for any blasting operations and the results therefrom. The Contractor at no additional expense to the Owner shall correct any damage caused by blasting.

B. Prior to conducting any blasting, the Contractor shall prepare, and submit to the Engineer for review, a description of the blasting procedures that the Contractor proposes to use on the various segments of the work. The Contractor shall measure vibration from blasting operations at all structures within 100 feet of a blast with a seismograph. The Contractor shall perform a series of test shots to ascertain the allowable load per delay. The Contractor shall adjust the maximum allowable particle velocity to site-specific requirements.

C. The Contractor shall perform a pre/post construction survey of existing structures, utilities, bridges, and roadways on both sides of the water main alignment where any structures are within 100 feet of the water main centerline.

D. The surveys shall be performed under the supervision of a Professional Engineer, registered in Massachusetts, and shall be documented with photographs.

E. Blasting and explosion coverage shall be obtained if there is a need for blasting under this Contract, and no blasting shall be performed until such insurance has been secured. Insurance amounts shall correspond with Contract general and supplemental conditions.

3.03 EXPLOSIVES

A. The Contractor shall keep explosives on the site only in such quantity as may be needed for the work underway and only during such time as they are being used. He shall notify the Engineer, in advance, of his intention to store and use explosives. Explosives shall be stored in a secure manner and separate from all tools. Caps or

detonators shall be safely stored at a point over 100 feet from the explosives. When the need for explosives has ended, all such materials remaining on the site shall be promptly removed from the premises.

B. In addition to observing all municipal ordinances and State and Federal laws relating to the transportation, storage, handling and use of explosives, the Contractor shall conform to any further regulations that the Engineer may think necessary to this project, including those of property owners through whose properties the proposed facilities pass. The licensed blaster shall at all times, have his license on the site and shall permit examination thereof by the Engineer or other officials having jurisdiction. Blasts shall be fired according to a schedule to be given to the Engineer.

C. All operations involving explosives shall be conducted by experienced personnel and only with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives, in such manner as will break the rock approximately to the intended lines and grades, and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with rugs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the work before a charge is exploded.

D. All blasting shall be completed within a distance of 50 ft. before any portion of a masonry structure is placed or any pipe is laid.

3.04 BLASTING RECORDS

A. The Contractor shall keep and submit daily to the Engineer an accurate record of each blast. The record shall show the general location of the blast, the depth and number of drill holes, the kind and quantity of explosive used, and other data required for a complete record.

3.05 EXCESS ROCK EXCAVATION

A. If rock is excavated beyond the limits of payment indicated on the plans, and not specified or authorized in writing by the Engineer, the excess excavation, whether resulting from over breakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.

B. In pipe trenches, excess excavation below the elevation of the top of the bedding, cradle or envelope shall be filled with material of the same type, placed and compacted in the same manner, as specified for bedding, cradle, or envelope. Excess excavation, above said elevation shall be filled with suitable backfill material.

C. In excavations for structures, excess excavation in rock beneath foundations shall be filled with concrete that shall possess strength of 4,000 psi, or 3,000 psi, at the option of the Engineer. Under any foundation that over excavation has occurred, the entire area under the foundation shall be either all concrete or all backfill, but not both. Other excess excavation shall be filled with suitable backfill material.

3.06 SHATTERED ROCK

A. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches gravel fill may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.

3.07 BACKFILLING ROCK EXCAVATIONS

A. Where rock has been excavated and the excavation is to be backfilled, the backfilling above normal depth shall be done as specified under the related specifications. If material suitable for backfilling is not available in sufficient quantity from other excavation, The Contractor at his own expense, shall furnish suitable material from outside sources.

END OF SECTION

SECTION 02224

FILL AND BACKFILL MATERIALS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, equipment, fill and backfill material and incidentals for site preparation and to meet finished contours as shown on the Contract Drawing. The use of the fill and backfill material is specified elsewhere. The Engineer may order the use of granular fill materials for purposes other than those specified in other sections, if in his opinion such use is advisable.

1.02 APPROVAL OF MATERIALS

A. The Contractor shall furnish the Engineer with representative samples and a gradation analysis of each type of soil. If the source of materials changes significantly or a different source is used, re-submittals and re-approvals must be made.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 02200 - EARTHWORK
C. SECTION 02250 - COMPACTION CONTROL AND TESTING

PART 2 MATERIALS

2.01 TYPE 1 - COMMON BORROW

A. Common Borrow shall be a granular material obtained from approved on-site or off-site natural deposits and unprocessed except for the removal of unacceptable material and stones larger than six (6) inches. It shall not contain vegetation or roots. It shall be free from loam, clay, fine wood, trash, and other objectionable materials or harmful substances.

B. Common Borrow shall consist of a material satisfactory to the Engineer and not specified as gravel borrow, sand borrow, special borrow material or another particular kind of borrow. This material shall have the physical characteristics of soils designated as group A-1, A-2 - 4 or A-3, under AASHTO-M145. It shall have properties such that it may be readily spread and compacted for the formation of embankments.

2.02 TYPE 2 - SAND BORROW

A. Sand Borrow shall consist of clean, inert, hard, durable grains of quartz or other hard durable rock. It shall be free from clay, loam, vegetable or other objectionable matter.

B. Material for pipe cover, landscaping, or other uses as determined by the Engineer, shall be well graded as follows or as indicated on the Contract Drawings. The allowable amount of material passing a No. 200 sieve as determined by AASHTO-T11 shall not exceed 10 percent by weight.

Sieve Size	Percent by Weight Passing Through
$^3/_8$ inch	85 - 100
#16	50 - 85
#200	0 - 10

2.03 TYPE 3 - SAND AND GRAVEL

A. The sand and gravel material for foundation sub-grades or structural fills shall meet AASTHO-M145, for A-1-a, A-1-b, or A-3 soils. The mixture shall consist of clean hard durable particles or fragments. It shall be free from loam, organic or other objectionable matter.

B. Subgroup A-1-a includes those materials consisting predominantly of stone fragments or gravel, either with or without a well-graded binder of fine material and with 50% maximum passing the No. 10 sieve, 30% maximum passing the No. 40 sieve and 15% maximum passing the No. 200 sieve. The fraction passing the No. 40 shall have a maximum plasticity index of 6.

C. Subgroup A-1-b includes those materials consisting predominantly of course sand either with or without well-graded soil binder and with 50% maximum passing the No. 40 sieve and 25% maximum passing the No. 200 sieve. The fraction passing the No. 40 shall have a maximum plasticity of 6.

D. Group A-3 material shall be fine beach sand without silty or clay fines or with a very small amount of non-plastic silt. The group includes also stream deposited mixtures of poorly-graded fine sand and limited amounts of coarse sand and gravel; 51% minimum shall pass the No. 40 sieve, and 10% maximum shall pass the No. 200 sieve.

2.04 TYPE 4 - COARSE GRAVEL

A. The material shall consist of clean hard, inert, durable particles or fragments. It shall be free from clay, loam, vegetable or other objectionable matter. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used.

B. Material for foundation under drainage, pavement subbase, or other uses as determined by the Engineer shall be well graded as follows:

SIEVE SIZE	PERCENTAGE BY WEIGHT PASSING
3 inch	100
1 ½ inch	70- 100
¾ inch	50- 85
#4	30- 60
#200	0-12 (based on fraction passing No. 4)

C. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

2.05 TYPE 5 - LOAM BORROW AND TOPSOIL

A. Material shall conform to related sections of the specifications.

2.06 TYPE 6 - SCREENED GRAVEL MATERIALS

A. The gravel shall generally conform to ASTM-C33 and shall consist of clean, hard, inert, durable particles or fragments. It shall be free from clay, loam, organic or other objectionable matter. Crushed rock of suitable size and grading may be used instead of screened gravel. The specifications which follow shall apply to whichever material is used.

B. Material for trench stone fill shall consist of sound angular stones; 50 to 70 percent of which shall weigh at least 500 pounds and the remainder shall weigh not less than 50 pounds each.

C. Material for trench bedding shall be well graded from ¾ inch to 2 inch.

D. Material for stabilizing trench base shall be well graded from ½ inch to 1 ½ inch.

E. Material for pipe bedding, landscaping, or other uses as determined by the Engineer, shall be well graded as follows:

SIEVE SIZE	PERCENT BY WEIGHT PASSING
1 inch	100
¾ inch	90 - 100
3/8 inch	20 - 55
#4	0 - 10
#8	0 - 5

2.07 TYPE 7 - CRUSHED STONE

A. The crushed stone shall consist of clean, hard, inert, durable particles or fragments. It shall be free from clay, loam, vegetable or other objectionable matter.

B. At least 50% of the material passing a one (1) inch sieve shall have a fractured face. The percent of wear of the crushed stone for pavement base coarse shall not exceed 50.

The stone sizes for the crushed stone shall be as follows:

SIEVE SIZE	PERCENT BY WEIGHT PASSING
1 ½ inch	100
1 ¼ inch	85 - 100
¾ inch	10 - 40
½ inch	0 - 8

C. The equipment for producing crushed stone shall be of adequate size and with sufficient adjustments to produce the required materials without unnecessary waste. The plant shall be capable of removing excess sand. The Engineer may order final screening of crushed stone if flat or elongated pieces are present in objectionable amounts.

PART 3 EXECUTION OF WORK

3.01 PLACING AND COMPACTING

A. The material shall be placed and compacted as specified in related specification sections.

END OF SECTION

SECTION 02250

COMPACTION CONTROL AND TESTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials and equipment necessary to place and compact fill or backfill. The Contractor shall furnish all equipment necessary to collect soil samples.

B. Actual testing of soil samples with the exception of insitu-density determinations shall be done by an independent testing laboratory approved by the Owner. Insitu-density determinations shall be made by the Engineer or his representative. Copies of test results shall be furnished by the test laboratory directly to the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 02200 - EARTHWORK

B. SECTION 02224 - FILL AND BACKFILL MATERIALS

C. SECTION 02226 – SAND BLANKET

1.03 SUBMITTALS

A. Prior to commencement of filling and backfilling operation, the Contractor shall submit for approval a detailed list six (6) copies unless otherwise specified) of the types of compacting equipment to be utilized in the work, and the number of each.

PART 2 MATERIALS

2.01 TEST METHODS

A. Contractor shall provide heavy-duty sample bags for fill or backfill material to be tested. Soils shall be classified as in the in the related sections of the Specifications which include AASHTO specifications M145 Recommended Practice for Classification of Soils as Soil-Aggregate Mixtures for Highway Construction Purposes.

B. Soil samples shall be prepared for testing according to ASTM D42 Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.

C. Gradation testing shall be done according to ASTM D2216 Particle Size Analysis of Soils and ASTM D1140 test for Amount of Materials in Soils Finer than the No. 200 sieve.

D. Moisture content of soil shall be determined by ASTM D2216 Laboratory Determination of Moisture Content of Soil.

E. Liquid Limits and Plasticity Index shall be determined ASTM D423 Liquid Limit of Soils and ASTM D424 by Plastic Limit and Plasticity Index of Soils.

F. Maximum dry density for each type of fill shall be determined by ASTM D1557 Method D Moisture - Density Relations of Soils using 10-lb. Hammer and 18-in. Drop.

G. In-place field unit weight shall be determined by ASTM D- 1556 Density of Soil in Place by the Sand-Cone Method.

H. Maximum dry density at the discretion of the Engineer may be determined in accordance with ASTM D-2049 test for Relative Density of Cohesionless Soils.

PART 3 EXECUTION OF WORK

3.01 COMPACTION EQUIPMENT

A. No backfilling shall be done until the compacting equipment list has been submitted and approved as conforming to the Contract requirements. Sufficient compacting equipment shall be available at all times, thereafter while backfilling is being conducted.

B. Each layer of fill shall be inspected prior to compaction. All visible roots, vegetation, or debris shall be removed. Stones larger than 6 inches in diameter shall be removed. The water content of each layer shall be determined to be suitable for compaction or shall be brought to a suitable condition. Material incorporated in the fill which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense. Placement of fill on frozen ground or placement of fill material which is frozen will not be permitted.

C. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.

D. Filling shall begin in the lowest section of the area. Fill shall be spread in layers as specified. The surface of each layer shall be approximately horizontal but will be provide with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point. Filling shall be conducted so that no obstruction to drainage from other sections of the fill area is created at any time. Sumps, if any, shall be continuously maintained in effective operating condition.

E. Each layer of material shall be compacted by the use of only approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, or where such equipment is not permitted, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.

F. The compaction equipment shall be operated so as to make a minimum of three passes over each section of each layer of fill. Each successive pass shall overlap the adjacent pass by not less than 10%. Additional passes shall be made to obtain the required compaction, if necessary.

G. Compaction by water jetting or puddling will be allowed only if the Engineer deems the conditions suitable for this method. Wherever the material contains excessive amounts of clay or loam to prevent satisfactory drying, water-jetting shall not be used.

H. If the material is allowed to be compacted by water jetting or puddling, it shall be placed in uniform layers not exceeding 4 ft. deep. Each layer shall be thoroughly saturated throughout its full depth and at frequent intervals until all slumping ceases. For water jetting or puddling, the Contractor shall provide one or more jet pipes, each of sufficient length to reach the specified depth and not less than 1 ½ in. in diameter. The jet pipe shall be equipped with a quick-acting valve and sufficient fire hose to connect to a hydrant or pump having adequate pressure and capacity. A hydrant shall be utilized only upon approval of the local Water and/or Fire Departments. The Town requires that all water usage shall be metered. The Contractor shall obtain a meter for hydrant usage at the water department. There will be no additional charge for water used for the project.

3.02 COMPACTION REQUIREMENTS

A. Pipe Bedding: Bedding shall be Type 6 fill placed uniformly in 6 inch layers and compacted unless otherwise specified. Compaction shall be accomplished by 20 lb. hand tampers.

B. Pipe Sand Blanket: Material shall be Type 2 fill placed uniformly in 6 inch layers and compacted to 90% of maximum dry density of the sand. Compaction shall be accomplished by 20 lb. hand tampers.

C. Trench Cover: Material shall be Type 1, 2, 3 or 4 fill placed uniformly in 12 inch layers and compacted to 95% of maximum dry density for the type of material used. Compaction shall be accomplished by mechanical tampers. Compaction by water-jetting shall be in accordance with the related sections of the specifications.

D. Catch Basin and Manhole Base Bedding: Material shall be Type 6 fill placed uniformly in 6 inch layers and compacted. Compaction shall be accomplished by 20 lb. hand tampers or pneumatic tampers.

E. Structural Fill (foundation sub-grade, foundation under drainage, pavement sub-grade, pavement sub-base): Material for foundation sub-grade or pavement sub-grade shall be Type 3 fill. Structural fills shall be placed in 6 inch layers compacted to 95% maximum dry density for a given type of material. Compaction shall be by mechanical power driven vibratory compactors. Pavement sub-grade in cut areas shall be rolled and compacted to 95% density of the in situ material.

F. Fill around structures shall be Type 1, 2, 3, or 4 material placed in 6 inch layers and compacted to 95% maximum dry density. Compaction shall be accomplished by mechanical power driven vibratory compactors. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to the structure than the depth of the structure below grade.

G. Non Structural Fill (Landscaping and other uses as designated by the Engineer): Material shall be Type 1, 2, 3 or 4 placed in 12" layers and compacted to 45% maximum dry density for the given type of material used. Compaction shall be accomplished by mechanical power-driven vibratory compactors.

3.03 APPROVAL OF FILL OR BACKFILL MATERIAL

A. Before placing or compacting any on-site or borrow material, the Contractor shall submit a sample of the material for testing. No on-site material shall be placed until approved by the Engineer.

B. The Engineer may at any time require additional laboratory testing should he observe any changes in gradation of the material being placed. No additional fill shall be placed or compacted until the material has been approved. If the material does not meet the required gradation and Otterburg limits for a given type of fill, the Contractor shall remove it as his expense. The Contractor may use the material for other types of fill providing it meets the required gradation and properties of that type.

3.04 FREQUENCY OF COMPACTION TESTING

A. The Engineer may perform tests of the degree of compaction obtained, in any area he may select. Payment for performing tests will be made by the Owner. If test results are unsatisfactory, all costs involved in correcting deficiencies in compacted material including retesting, shall be borne by the Contractor. If improper compaction methods are used, the Owner shall have the right to discontinue payments from the Contractor for said payment item until the situation is corrected.

3.05 FAILED TESTS

A. If the percentage compaction at any point is found to be unacceptable, additional compaction with or without modification of the field moisture content as directed by the Engineer, shall be performed and a second moisture-density determination made. This procedure shall be repeated until satisfactory compaction is obtained. If after five (5) tests any fill or backfill material cannot be compacted to the required density it shall be removed and disposed of at the Contractor's expense.

END OF SECTION

SECTION 02380

SHEETING AND BRACING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall do all permanent and temporary work involved in the bracing of excavation through the use of steel sheet pilings, timber sheeting, shoring boxes, and steel plates or as shown on the Contract Drawings or as directed by the Engineer.

B. The Contractor shall take responsibility and shall furnish all parts, labor and materials for the placement and maintaining of sheeting, bracing or shoring of the sides of the excavation so as to prevent earth movements which would in any way diminish the width of excavation so as to interfere with proper construction, which would cause injury to persons in or about the work site, which would endanger adjacent structures, or which would delay the progress of work.

C. The Contractor shall engage a Professional Engineer, registered in the State of Massachusetts and possessing prior experience in this field to design all necessary sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design, and written certification of this shall be provided promptly by the Professional Engineer.

D. No sheeting, bracing or shoring operations shall commence until the Engineer has reviewed all descriptions, plans, sketches and time sequences and until the Engineer has given his approval of such items. The furnishing of such materials is only for review purposes and does not serve to relieve the Contractor of any part of his responsibility for the safety of the work or the successful completion of the work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer in triplicate a detailed written description of the equipment and methods he proposes to use in the sheeting, bracing and shoring operations along with the computations and sketches of his Professional Engineer. This material shall be submitted to the Engineer at least fifteen (15) working days prior to the proposed start of work. In addition, the Contractor shall also supply the Engineer with an overall time schedule of the sheeting, bracing and shoring work.

PART 2 MATERIALS

2.01 STEEL SHEET PILING

A. Steel sheeting and associated bracing shall be of adequate weight for the use intended. The materials used for steel sheet piling shall conform to the requirements of ASTM-A328. Gauged sheeting shall not be acceptable for use where sheeting must be left in place.

2.02 TIMBER SHEET PILING

A. Timber Sheeting shall be composed of a 3 layer laminated timber with tongue and groove connecting edges. The toe of the sheeting shall be cut on a diagonal so that, in driving, the pile will be continuously wedged back against the previously driven pile. Timber sheet piling shall conform to the requirements of AASHTO M. 09. 01-1.

B. Timber Sheeting shall be sound, straight grained, free from shakes, loose knots, and other defects liable to impair its strength or durability.

2.03 STEEL SHORING BOXES

A. In areas where temporary sheeting is specified, steel shoring boxes may be utilized to protect the excavation from collapsing when approved by the Engineer.

B. The boxes shall be composed of sections, the number of which shall be dictated by the depth of excavation. The forward end of the box shall be equipped with cutting edges to facilitate the movement of the box along the trench bottom and shall be equipped with eyelets or hooks by which the excavator may pull the boxes along.

2.04 STEEL PLATES

A. Steel plates and associated bracing shall be of adequate weight for the use intended. The materials used for steel sheet piling shall conform to the requirements of ASTM-A328. Gauged plating shall not be acceptable for use where sheets must be left in place.

PART 3 EXECUTION OF WORK

3.01 GENERAL

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

B. The Engineer may direct that sheeting and bracing be cut off at any specified elevation, at least 3 feet below final grade.

C. In streets, the Contractor will generally be required to install the braced excavation from the existing ground surface.

3.02 INSTALLATION OF SHEETING AND PLATES

A. Sheet piles shall be driven in such a manner as to preserve interlocking between piles and so as to be vertical without any tendency to leaning.

B. If handling holes on sheets should extend below normal static groundwater elevation, they shall be welded or plugged so as to facilitate trench dewatering operations.

C. Splicing of steel piles shall not occur without the prior approval of the Engineer and spliced sections shall not be driven until inspection of the welded splice has been conducted by the Engineer.

D. Bracing of the sheeting shall follow the designs of the Contractor's Professional Engineer and be subject to additional bracing if directed by the Engineer.

3.03 EXCAVATION UTILIZING SHORING BOXES

A. The use of shoring boxes is an acceptable measure of excavation protection; however, special attention should be made to ensure that the boxes are set stable in the excavation, that when it is pulled along the trench the box remains on line and that the proper grade and depth is maintained.

B. When other utilities or cross-connections are encountered within the excavation, the use of the shoring box may be somewhat limited and may necessitate the use of other sheeting or bracing measures as needed or as directed by the Engineer.

3.04 SHEETING AND PLATES LEFT-IN-PLACE

A. When indicated in the Contract Documents, or as directed by the Engineer, sheeting and/or bracing shall be left-in-place and properly backfilled.

B. The Engineer may direct the Contractor at any time in writing, to have sheeting, bracing, left in place to be embedded in backfill or concrete for the purpose of preventing subsequent injury to structures or property.

3.05 EXTRACTION OF SHEETING AND PLATES

A. All sheeting and bracing not to be left in place shall be carefully removed in such a manner as to not endanger the construction, other structures, utilities or property. All Voids left or caused by withdrawal of sheeting shall be refilled immediately with sand by ramming with tools especially adapted to that purpose, by watering, or by other means as may be approved.

END OF SECTION

SECTION 02401

DEWATERING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, appurtenant material and equipment, and incidentals required to design, install, operate and remove a temporary dewatering system to prevent surface and groundwater from entering any excavations required as per this Contract. The dewatering system installed shall lower the groundwater and prevent surface water intrusion to provide a firm, dry excavation with a stable bottom and sidewalls capable of supporting structures, pipes and backfill.

B. The Contractor shall retain the services of a Professional Geotechnical Engineer, registered in the State of Massachusetts and experienced in dewatering systems, to design the dewatering system to be used during construction. A copy of the proposed dewatering system including plans and calculations shall be submitted to the Engineer for review at least two weeks prior to commencing any work. All drawings and calculations shall bear the stamp and signature of the Registered Professional Geotechnical Engineer. The Registered Professional Geotechnical Engineer shall monitor the installation of the dewatering system and visit the site periodically during the construction period.

C. The dewatering system shall include the installation of one or a combination of the following dewatering methods as necessary: sumps and ditches, horizontal drainage systems, cofferdam dewatering, well method, well point method, cutoff methods and other methods as designated by the Contractor's Geotechnical Engineer and approved by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. The bottom of all excavations shall be dry and firm. All excavation, construction, backfilling and compaction shall be conducted "in-the-dry" unless hydraulic compaction measures are dictated by the Engineer.

B. The following measures shall be met in all areas where predrainage of the existing water table is required prior to construction operations.

1. No excavation below the elevation of the groundwater level existing at the time of construction will be allowed until this groundwater level has been lowered to, and maintained at, an elevation at least 2 feet below the bottom of excavation.

2. The dewatering system shall maintain the groundwater level at least 2 feet below the bottom of excavation until sufficient backfill has been placed to prevent flotation of any structures or pipelines.

3. The Contractor and his Professional Geotechnical Engineer shall be responsible for insuring that dewatering measures and well points are so installed and situated as to provide sufficient dewatering of the work area and abutting soil stratum.

4. The design of well points of other dewatering units shall be such that removal of fines during pumping is minimized.

5. A single stage well point system with the header at ground surface will not be adequate to lower the water level to the required depths.

C. Safe working conditions shall be ensured by whatever dewatering measures deemed necessary, including the use of chemical and soil stabilization.

D. During the course of construction if alterations or re-design of the dewatering system is necessitated, the Contractor's Professional Geotechnical Engineer shall submit plans and calculations, stamped and signed, indicating such alterations and changes. The Contractor shall bear all costs of the Geotechnical Engineer any modifications.

E. Dewatering measures shall be so designed as to prevent the removal of any lines during pumping or excessive subsidence about the construction site. Discharged groundwater shall be properly detained, settled, filtered, or otherwise treated to prevent contamination, and to prevent contamination of nearby waterways.

1.04 SUBSURFACE CONDITIONS

A. Test borings and groundwater observation wells installed along the excavation route by the Owner or Engineer shall be made available to the Contractor for his use.

B. The Contractor shall also consider groundwater level fluctuations due to the season, precipitation, or other factors.

C. The Contractor shall be responsible for obtaining all additional and supplementary information he deems necessary for the design of the dewatering system.

PART 2 MATERIALS

2.01 SUBMITTALS

A. The Contractor shall submit to the Engineer for approval a plan showing a typical dewatering method to be used during the construction. The plans shall be submitted to the Engineer four weeks prior to beginning the work. Plans shall show location of a given method and the materials to the used for a given installation. Submittal shall include a description of each piece of equipment to be used for the dewatering operation.

PART 3 EXECUTION OF WORK

3.01 GENERAL

A. The Contractor shall conduct all dewatering operations in a manner, which will protect existing structures, pipelines and utilities from undermining of their bearing soils or disturbance to soil supporting, overlying or adjacent to structures. The Contractor shall be solely responsible for damage to properties, buildings, structures, utilities, pavements, sidewalks or pipelines resulting from his dewatering and surface water control operation.

B. The Contractor shall control all surface and groundwater so that dry, firm, undisturbed bearing soils exist in the trench or pit during all stages of excavation, construction and backfilling. Softening and instability due to the presence of seepage of water shall not be allowed to occur.

C. The Contractor shall maintain surface and groundwater control until backfilling is completed so as not to cause shifting of pipe due to flotation and buoyant forces.

3.02 CONCRETE STRUCTURES

A. The Contractor shall construct concrete cutoff dams to prevent the unnatural flow of groundwater through the backfilled trenches as detailed on the Contract Drawings. Intervals between the dams shall not exceed 300 feet. At least one dam shall be constructed between manholes.

B. The Contractor shall not permit water to rise above concrete or brick masonry within 24 hours after being placed, nor shall moving water be allowed to rise over any masonry for 96 hours. In no event shall water be permitted to rise to set up unequal pressures in structures until the concrete or mortar has set at least 24 hours.

3.03 SURFACE WATER CONTROL

A. The Contractor shall control surface water inflow through the construction of dikes, ditches, pumps or any other control method required to prevent the flow of any surface water into any excavation.

3.04 INSTALLATION OF DEWATERING SYSTEM

A. The Contractor shall install the dewatering system, and shall show to operate to the Engineer's satisfaction, prior to the excavation of any trench or pit. The system shall be shown to maintain the groundwater level as specified or modified to provide the required level as directed by the Engineer. Provisions shall be made to have standby pumps and generators available at all times.

3.05 OBSERVATION WELLS

A. The Contractor shall install observation wells along the trench centerline in all areas requiring predrainage. There shall be an operating observation well located within 50 ft. of the working edge of the excavation. The Contractor shall install all observation wells to a minimum bottom of the excavation. Observation wells shall consist of a screened or slotted well point and a riser pipe shall be fitted with a threaded watertight cap. Additional observation wells may be required as instructed by the Engineer in areas where a sand stratum underlies a clay layer located at or below the bottom of the excavation.

B. The Contractor shall make water level readings in the observation wells twice daily, and submit a copy to the Engineer on a daily basis. The Engineer shall be permitted to make independent readings as he requires.

3.06 SITE RESTORATION

A. Upon completion of the excavation work and approval of the Engineer, the Contractor shall restore the area to its pre-construction condition. All equipment, materials and accessories shall be removed and shall become the property of the Contractor. Observation wells shall be filled with sand upon completion of the Contract or as directed by the Engineer.

B. Any areas requiring repaving shall be repaved in accordance with related sections of the specifications.

END OF SECTION

SECTION 02525

CURB

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this section consists of furnishing all material, labor, tools, equipment, and supervision necessary to remove and reset (granite only) or install new curb, curb corners, transition curb, and curb inlets.

B. The contractor shall be responsible for removing and resetting (granite only) or furnishing and installing new curbing, in accordance with these specifications and in close conformity with the lines and grades shown on the Contract Drawings and as approved by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

B. DIVISION 3 - CONCRETE

PART 2 MATERIALS

2.01 PRECAST CONCRETE CURB

A. New curbing shall meet the requirements of the Massachusetts Highway Department Standard Specifications for Highways and Bridges, Subsection M4.01.14. Curbing shall be as shown on the Contract Drawings. Transition curbing shall be placed at the ends and beginnings of curbing and at handicap ramps.

B. Joints shall be tight and less than 1/4" and joint sealant shall not be required.

2.02 GRANITE CURB

C. New granite curbing shall meet the requirements of the Massachusetts Highway Department Standard Specifications for Highways and Bridges, Subsection 501.40. Granite curbing shall be Type VA4 or VA5, as shown on the Contract Drawings. Transition curbing shall be placed at the ends and beginnings of curbing, at drain inlets, and at handicap ramps.

D. If curb, curb corners, or curb inlets of different quarries is used, curbing of each quarry shall be segregated and set together to give a uniform appearance.

2.03 BITUMINOUS CURB

A. New bituminous curbing shall meet the requirements of the Massachusetts Highway Department Standard Specifications for Highways and Bridges, Subsection 501.64 and M3.12.0. Curbing shall be as shown on the contract drawings.

PART 3 EXECUTION OF WORK

3.01 EXCAVATING TRENCH

A. The trench for the curb shall be excavated to a width of eighteen (18) inches. The subgrade of the trench shall be at a depth below the proposed finished grade of the curb equal to six (6) inches plus the depth of the curbstone.

3.02 PREPARATION OF FOUNDATION

A. The foundation for the curbing shall consist of a cement concrete bed placed on the gravel subbase as shown on the details.

B. The foundation for curb inlets shall consist of a full bed of Portland cement mortar on the supporting back wall of the catch basin or gutter inlet and with sufficient gravel on each side to support the overhang. The trench for the gravel foundation shall be at least six (6) inches in depth and eighteen (18) inches in width. This trench shall be filled with gravel and thoroughly tamped to the required grade.

C. The trench for curb corners shall be excavated so that there is a foundation of gravel which, when thoroughly compacted, will be six (6) inches in depth and extending six (6) inches beyond the front and back of the curb corner to the full depth of the foundation.

3.03 SETTING CURB

A. Curb and curb corners shall be set on a concrete foundation as shown on the Contract Drawings, and shall be fitted together as closely as possible.

B. All spaces under the curb and curb corners shall be filled with concrete so that the curb and curb corners will be completely supported throughout their lengths. The curb shall be set to the line and grade required as shown on the plans, unless otherwise directed. Concrete shall be flowed to the finished road gravel grade and bottom of the paved binder course.

3.04 SALVAGING OF CURB

A. The Contractor shall carefully remove, store, and clean all curbing specified for resetting. The Contractor shall replace all existing curbing that is to be reset which is lost, damaged, or destroyed because of his operations, at no expense to the Owner.

END OF SECTION

SECTION 02575

PAVING AND ROAD CONSTRUCTION

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.

B. The Contractor shall be responsible for maintaining all pavements and sidewalks placed as part of the Contract, in a safe and satisfactory condition until the project is accepted as complete. For any pavement or sidewalk area damaged, the Contractor shall remove the entire pavement structure in the damaged area and replace it as directed by the Engineer.

C. Should the application of the wearing surface be delayed for any reason including bad weather, the Contractor shall provide and maintain the base in acceptable condition until the new pavement is place.

D. During construction, all existing pavement, not to be removed, shall be protected by the Contractor. Any pavement damaged shall be removed and replaced by the Contractor at the Contractor's expense.

1.02 DESCRIPTION OF WORK

A. Work under this section consists of furnishing all materials, labor, tools, equipment and supervision necessary to restore existing or construct new pavement sub-grades, subbase, bituminous base courses, tack coats and bituminous surface courses for roadways and all curbs, sidewalks, driveways, and parking areas.

B. The materials and construction methods used for this work shall conform to the Massachusetts Highway Department, "Standard Specifications for Highways and Bridges", 1988 Edition, and subsequent revisions and addenda.

C. All temporary construction roads, ditches, and drainage facilities shall be removed and the site restored before completion of the project.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 02200 - EARTHWORK

B. SECTION 02224 - FILL AND BACKFILL MATERIALS

C. DIVISION 2 - SITE WORK -As Appropriate

D. DIVISION 3 - CONCRETE - As Appropriate

PART 2 MATERIALS

2.01 GENERAL CRITERIA

A. The Contractor shall be responsible for obtaining any permits and meeting State requirements for all work within State highways.

2.02 SUBGRADE

A. Sub-grade shall be either Type1, 2, 3 & 4 materials in accordance with related specifications.

2.03 SUBBASE

A. Sub-base shall be Type 6 screened gravel material in accordance with related specifications or reclaimed material.

2.04 TRENCH PAVEMENT – IF REQUIRED

A. Trench pavement shall be a Class I Bituminous Concrete Pavement surface course as given in the Massachusetts Highway Department Standard Specifications for Highways and Bridges, Section 460.20 to 460.68.

2.05 BASE COURSE - PERMANENT PAVEMENT

A. Base course shall be the first layer of bitumen and aggregate mixture overlying the screened gravel or reclaim sub-base.

B. Bituminous base course shall be Class 1 Bituminous Concrete Base Course Type I-1 as given in the Massachusetts Highway Department Standard Specifications for Highways and Bridges.

2.06 SURFACE COURSE - PERMANENT PAVEMENT

A. Surface course shall be Class I Bituminous Concrete Pavement as given in the Massachusetts Highway Department Standard Specifications for Highways and Bridges, Section 460.20 to 460.68.

2.07 SIDEWALKS, DRIVEWAYS AND CURBS

A. Bituminous concrete for driveways, sidewalks and curbs shall be in accordance with the appropriate section in the Massachusetts Highway Department Standard Specifications for Highways and Bridges or as noted on the design plans.

PART 3 EXECUTION OF WORK

3.01 BITUMINOUS PAVING - GENERAL

A. All mixtures delivered to the job site shall be accompanied by a Certificate of Compliance. Deliveries not accompanied by a certificate will not be used in the work.

B. Construction methods shall conform to the requirements of the Massachusetts Highway Department Standard Specifications for Highways and Bridges, including the following:

1. Mixtures delivered to the job site shall not possess signs of segregation of ingredients or surface crust.

2. The temperatures of the mixture when delivered to the spreader will be a minimum of 250 F.

3. Mixtures shall be placed only upon approved surfaces that are clean from foreign material and are dry; and when weather conditions are suitable. No mixture shall be placed when the weather is foggy or rainy, provided, however, that the Engineer may permit, in the case of sudden rain, the placing of mixture then in transit from the plant, if laid at the proper temperature and if the roadbed is free from pools of water. Such permission shall in no way relax the requirements for the quality of the

pavement and smoothness of the surface. Paving materials shall not be placed upon a frozen base or when ambient air or surface temperature is less than 40 degrees Fahrenheit or when wind conditions are such that rapid cooling will prevent satisfactory compaction.

4. Wherever possible material shall be compacted using steel-wheeled rollers.

5. In areas not accessible to a roller, compaction shall be accomplished by using mechanical compactors or hand tampers, approved by the Engineer.

6. All material place shall receive final compaction before nightfall of the day placed, unless artificial light, satisfactory to the Engineer, is provided.

7. The density of completed paving shall not be less than 95% of the density obtained from laboratory compaction of a mixture composed of the same materials in like proportions.

8. The Engineer may require the Contractor to remove and replace at his own expense, any work deemed defective based on sampling and testing for composition and density, or faulty procedures.

3.02 CARE AND RESTORATION OF PROPERTY

A. All streets, sidewalks, gutters, driveways and curbs that have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations.

B. Suitable materials and methods shall be used for restoration of curbs and other types of gutters, driveways and sidewalks.

C. Materials and method of all restoration work shall be subject to approval by the Engineer.

D. All frames, grates, covers, street boxes, manhole rings and other castings removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations.

E. All frames, grates, covers, street boxes, manhole rings and other castings within the limits of new paving shall be reset by the Contractor such that they are flush with the new surface.

3.03 PREPARATION OF SUBGRADE IN CUT AREAS

A. After excavation to the proposed sub-grade elevation the insitu material is determined by the Engineer to be unsuitable, the Contractor shall excavate an additional 1-foot and backfill with Type 3 sand and gravel compacted to 95% of maximum dry density.

Changes in the depths and limits of excavations or fills shall be an appropriate bid adjustment item.

B. The Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which subbase and pavement material will be placed. The subgrade shall be shaped as indicated on the Contract Drawings and shall be compacted to 95% of maximum dry density.

3.04 PREPARATION OF SUBGRADE IN FILL AREAS

A. The Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which embankments will be built or material will be placed for grading.

B. After the area has been stripped and grubbed as herein specified, Type 1, 2, 3 and 4 materials or reclaimed material shall be placed thereon and built up in successive layers until it has reached the required elevation.

C. Layers shall not exceed 6 inches in thickness before compaction. The layers shall be slightly convex toward the center. Layers shall be compacted to 95% of the maximum dry density of the particular material used.

3.05 PREPARATION OF SUBBASE

A. Subbase material shall conform to Type 6 Screened Gravel or reclaimed material as described in the related sections of the specifications.

B. Screened gravel subbase for either permanent paving shall be a minimum of 12 inches in thickness.

3.06 TRENCH PAVEMENT

A. Trench paving shall be the depth as specified, or as directed by the Engineer.

B. Prior to placing trench pavement, trenches shall have been backfilled in accordance with related sections of the specifications. The top of the trench shall be backfilled with the specified gravel subbase materials, spread and compacted as specified herein.

C. Prior to placing trench pavement, the backfilled trenches shall be excavated and compacted to proper depth. The edges of the existing pavement, previously cut for the trenching operations, shall be retrimmed a minimum of 1 foot back along clean, straight, undamaged lines, on each side, as directed by the Engineer, and the gravel base course shall be recompacted to form a satisfactory, stable foundation.

D. Prior to the placing of trench pavement, the cut edges of existing pavement shall be swept clean and painted with a prime or tack coat of compatible asphalt materials.

E. Trench pavement shall be furnished, placed and compacted, as specified, to such widths necessary to meet undisturbed existing pavement. The completed pavement shall match the grade and shape of the adjoining existing surfaces.

F. The Contractor shall continuously maintain trench pavement in good repair, flush with existing pavement, at his own expense. Should soft, damaged or broken areas develop, such areas shall be removed immediately and be replaced with new, properly compacted materials.

3.07 PERMANENT PAVEMENT

A. Permanent top course paving is to be placed after at least 90 days has elapsed from the installation of the binder course paving for required compaction to have occurred as determined by the Engineer.

B. Prior to permanent top course paving, the Contractor shall make all final repairs to the previously installed binder course, and raise or cause to be raised, all existing, manhole, catch basin, valve box, curb box, and utility covers, etc., to conform to the final pavement grade. All loose or damaged material on the binder course pavement shall be removed and a leveling course may be installed, as hereinbefore specified. Leveling course shall also be installed at depths and locations, as directed by the Engineer, to fill existing holes and depressions, or to improve roadway crowns. Leveling course quantities used for permanent paving shall be included for compensation under the paving item.

C. All surfaces to receive permanent paving shall be dry and thoroughly cleaned of foreign or loose material; a compatible prime or tack coat shall be applied to the rate of 0.05 to 0.15 gallons per square yard of pavement, depending upon the condition of the existing surface. All castings and edge stones will be protected from the tack coat.

D. Prior to the installation of the final top pavement, the binder shall be swept of all debris. A uniform layer of bituminous asphalt emulsion (tack) shall be spread with approved equipment. To achieve the minimum spreading rates for the tack, a tanker truck will be required with spreader bar for uniformity. Slips will be required stating the volume (gallons) of tack spread and the engineer shall verify the spreading rate prior to placement of the final top pavement. A tack wand or wagon will not be acceptable for application of the tack.

3.08 MAINTENANCE OF PAVING

A. The Contractor shall maintain pavement placed under this Contract until the expiration of the one-year guarantee period and shall promptly fill with similar material all depressions and holes that may occur to keep the pavement in a safe and satisfactory condition for traffic.

3.09 SIDEWALKS, DRIVEWAY AND CURB CONSTRUCTION AND RECONSTRUCTION

A. All granite curbs, cement concrete sidewalks, and driveways damaged during construction will be reconstructed to their original condition after construction is completed. Granite curbing to be reset shall be removed and reset to proper grade and alignment in accordance with the construction methods of Section 701 of the Massachusetts Highway Department Standard Specifications for Highways and Bridges.

B. Curbing to be reset shall be carefully removed and stored. The Contractor shall replace any edging damaged or lost due to his negligence. The base upon which the edging is to be set shall be compacted to a firm even surface. Joints shall be pointed with mortar and the exposed portion finished with a jointer. Granite curb inlets shall be set in full mortar beds.

END OF SECTION

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, tools, equipment, materials, and services necessary to lay, join and test all PVC pipe and fittings, and appurtenant materials as shown on the Contract Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 02200 - EARTHWORK

B. SECTION 02224 - FILL & BACKFILL

PART 2 MATERIALS

2.01 PVC - PRESSURE PIPE

A. The PVC pressure pipe shall be Class 150 or DR18 unless otherwise specified and conform to ANSI/AWWA C-900 standard for PVC Pressure Pipe. PVC pipe shall meet the criteria of ASTM D-2241 "Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR)". PVC Class 150 Pipe shall be manufactured to dimensions of standard Cast Iron Pipe outside diameters instead of dimensioning according to Iron Pipe Standards (I.P.S.). PVC pipe

(SDR-18) shall meet all requirement of Uni-Bell Standard Uni-B-2-72. Class 150 pipe & couplings shall meet the following requirements:

PHYSICAL PROPERTY	REQUIREMENT	TEST METHOD
90 second Minimum Burst Pressure	755 PSI	ASTM D-1599
Sustained Pressure	500 PSI	ASTM D-1598 ASTM D-2241
Impact	100 Ft. - lbs.	ASTM D-2244
Hydrostatic Integrity	Non-Failure	ANSI/AWWA C 900-81 Section 3.1.1
Flattening	Non-Failure	ASTM D-2412
Extrusion Quality	Non-Failure	ASTM D-2152
Coupling Pressure Seal	Non-Failure of Seal	ASTM D-3139

2.02 PVC PIPE - GRAVITY SEWER

A. PVC gravity sewer 8" through 15" shall be SDR 35 unless otherwise specified and shall conform to ASTM D3034 Standard for PVC pipe. PVC gravity Sewer pipe 18" through 27" shall be Type 1 heavy wall unless otherwise specified and shall conform to ASTM F679-80 standard for PVC pipe. The PVC pipe shall be supplied in lengths of 13 or 20 feet.

B. Except as indicated differently on the Contract Drawings or in the specifications or where specifically directed by the Engineer, gravity sewer pipe shall be furnished with standard integral bell and spigot ends and elastomeric gasket joint.

C. PVC gravity sewer tees, wyes and tee wyes to be used for service connections shall be PVC SDR 35 fittings with ring tite joints. All fittings shall be capped.

2.03 PUSH-ON JOINTS

A. Push-on joints shall consist of 1) a single continuous, molded, rubber, ring gasket, 2) a bell socket cast integrally with the pipe or fitting and 3) a pipe or fitting plain end. The configuration shall be such that when the plain end is inserted into the pipe fitting socket the gasket shall compressed radially to form a positive seal. The gasket and annular space shall be so designed and shaped that the gasket is locked in place after the plain end is inserted into the fitting socket.

B. Push-on joints shall have the same pressure rating as the pipe or fitting of which they are a part.

C. Gaskets for push-on joints shall be vulcanized natural or synthetic rubber. All gaskets shall be free of porous areas, foreign material and visible defects.

2.04 PVC BELL (INTEGRALLY CAST)

A. The bell shall consist of an integral wall section with locked-in, solid cross section elastomeric ring which meets the requirements of ASTM F-477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C-900.

2.05 SOLVENT WELD JOINTS

A. Where solvent weld joints are required they shall be made with solvent supplied by the pipe manufacturer's specifications or with ASTM Recommended Practice D2855. The dry fit of joints shall be snug; pipe and fittings which afford loose fits will be rejected by the Engineer. The use of multiple layers of filler solvent to overcome a loose fit will not be permitted. Solvent cements shall conform to ASTM D-2564.

2.06 PIPE MARKINGS

A. Pipe and couplings shall bear identification markings that will remain legible during normal handling, storage, installation and during the life of the pipe. Markings shall have been applied to the pipe and couplings in a manner which will not reduce strength or durability or otherwise damage the pipe.

B. Markings for pressure pipe shall be applied at intervals of not more than 5 Feet and shall include the following: nominal size and OD base, "PVC", dimension-ratio number, AWWA pressure class, AWWA designation number for AWWA C-900, manufacturer's name or trademark and production record code, and mark or seal of pipe testing agency.

PART 3 EXECUTION OF WORK

3.01 HANDLING AND CUTTING PIPE

A. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring its surfaces and ends.

B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used may be perfectly sound. The cut shall be at least 12 inches from the visible limits of the crack.

D. All cutting of PVC pipe is to be square. The pipe to be cut shall be marked around its entire circumference prior to cutting.

E. Using a factory finished beveled end as a guide to determine the angle and length of the taper, the end of a freshly cut pipe shall be beveled similarly.

3.02 PIPE BEDDING

A. Pipe bedding and foundation design shall be as specified in related sections.

3.03 INSTALLATION OF PIPE

A. Standard laying lengths shall be 20 feet for pressure pipe with 85% of the total footage of pipe being full lengths and the remaining 15% being furnished as random lengths. Random lengths shall not be less than 10 feet long. Standard laying lengths for gravity sewer shall be 13 feet.

B. Prior to assembling, the bell and plain end shall be cleaned of all foreign matter. Push-on joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special non-toxic gasket lubricant, supplied by the pipe manufacturer, uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe. The end of the plain pipe shall be chamfered to facilitate assembly. The end shall be inserted into the gasket and then forced passed it until it seats against the bottom of the socket.

C. Pipe shall be installed in such a manner that will ensure that external loads will not subsequently cause a deflection of greater than 5% in the vertical cross-section dimension.

D. For PVC pressure pipe horizontal deflection from joint to joint shall be limited to 12 inches for PVC pipe sizes 6 inches to 12 inches based on 16 foot length.

E. The bedding of the pipe shall conform to the trench detail as shown on the Contract Drawings. Installation precautions are also given in ASTM D 2774.

F. Cleanouts shall be installed where shown on the Contract Drawings and at convenient points in long runs of pipe.

G. Installed pipe shall rest flat and straight on the bedding at all locations without bridging or binding. Backfill shall be carefully placed to avoid damage to the pipe. The pipe shall be placed to the grades shown on Contract Drawings.

H. Only laborers competent in laying plastic pipe and suitable equipment shall be employed. Pipe and fittings shall be handled with care so as to prevent scratching or other damage to the materials. All joints shall be properly cleaned and free of foreign matter. The installation instructions of the manufacturer shall be strictly followed with the exception that the pipe bedding shall be as shown on the Contract Drawings.

I. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, hammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.

J. Before a joint is made, the pipe shall be checked to insure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and form to the required grade.

K. The Contractor shall take all necessary precautions to prevent flotation of the pipe from trench flooding. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary water-tight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

L. Any defective pipe or fitting found in the line shall be removed and replaced without cost to the Owner. All pipes and fittings shall be kept clean of all dirt and debris before being laid, and shall be kept clean until acceptance.

3.04 PIPE ENCASEMENT

A. Concrete encasement of the PVC Pipe shall be conducted as specified herein or as shown on the Contract Drawings. Concrete requirements for such encasement shall be specified in related sections.

3.05 SEWER REPLACEMENT

A. The Contractor shall take the necessary precautions to support and protect existing sewer pipes from being damaged during construction of new the water main.

B. Sewer pipes that are shown on the contract drawings or located in the field and are damaged by the Contractor shall be replaced with PVC pipe at the Contractor's expense.

C. Should the Engineer feel that PVC is insufficient for use as a replacement pipe, based on field conditions, a different pipe material such as ductile iron pipe may be specified as directed by the Engineer.

D. The size of the replacement pipe shall closely approximate the size of the existing section to be replaced, allowing a watertight joint to be made while maintaining the existing pipe slope.

E. Joints between the existing pipe and replacement pipe shall be made with suitable watertight sleeve or couplings.

F. Joints shall not be backfilled until approved for water-tightness by the Engineer.

END OF SECTION

SECTION 02823

REMOVAL OF UNDERGROUND NONFRIABLE ASBESTOS CEMENT PIPE

PART 1 GENERAL

1.01 GENERAL:

A. Definitions –

"Friable" – material can be crushed, pulverized, or reduced to powder, when dry, by hand pressure. "Non-friable" – material that cannot be crushed or pulverized under hand pressure.

B. This section specifies requirements for the removal of non-friable (pipe that has been below the groundwater level or is in otherwise saturated soils will generally be non-friable because it has been saturated/wet) asbestos-cement pipe during trenching and excavation operations associated with the installation of new water or sewer pipes, where existing AC pipes may be encountered.

C. All asbestos cement pipe that is shown on the drawings and which is removed during construction is the responsibility of the Contractor, for removal, transportation and proper disposal.

1.02 RELATED WORK:

A. Section 02200, EARTHWORK

B. Section 02100, SITE PREPARATION

C. Section 02401, DEWATERING

1.03 SUBMITTALS:

The Contractor shall submit to the Engineer the following listed items at least 14 days before work is to proceed. No asbestos pipe removal work activities shall commence until the Engineer reviews these items, unless otherwise waived.

Submittal No. 1
Plan of Action and Standard Operating Procedure: Submit a detailed plan of the procedures proposed for use in complying with all applicable regulations and the requirements of this specification.

Submittal No. 2
Name, location, and copies of applicable licenses for primary and secondary landfill for disposal of asbestos-containing or asbestos-contaminated waste.

Submittal No. 3
Within 30 days of receipt of asbestos waste at the approved landfill, the Contractor shall submit to the Engineer the original copy of the "Waste Shipment Record" acknowledging disposal of all associated waste material from the Contract showing delivery date, quantity, and appropriate signature of Contractor, transporter, and landfill's authorized representative.

1.04 GENERAL APPLICABILITY OF CODES, REGULATIONS AND STANDARDS:

A. All applicable federal, state and municipal codes, regulations, 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. All regulations by governing agencies in their most recent version are applicable. Provisions contained in this specification that are more stringent than applicable codes, regulations and standards shall govern for this project.

1.05 LICENSING AND TRAINING WORKERS

A. Contractor and Contractor's workers performing asbestos pipe removal must meet the licensing and training requirements of the Commonwealth of Massachusetts (453 CMR 6.00).

PART 2 PRODUCTS

A. Wetting Materials: For wetting before disturbance of asbestos-containing materials use either amended water or a removal encapsulant. The material must be odorless, nonflammable, non-toxic, non-irritating, and non-carcinogenic. It shall be applied as a mist using a low-pressure sprayer recommended by the manufacturer.

1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the asbestos containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

2. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of asbestos containing material. Use a material which results in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

B. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

1 Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

2 Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

3 Removal Encapsulant: A penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.

C. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mils thick as required, frosted or black as indicated.

D. Duct Tape: Provide duct tape in 2-inch or 3-inch widths as indicated, with an adhesive, which is formulated to aggressively stick to sheet polyethylene, is waterproof, and will adhere to other materials.

E. Spray Cement: Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

F. Waste Containers: Provide 6 mil thick leak-tight polyethylene bags labeled as follows:

DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD

If the waste material contains sharp edges or may otherwise puncture polyethylene bags, provide properly labeled drums or other closed containers for storage, transportation, and disposal.

G. War. Warning Signs and Labels: Shall comply with 29 CFR 1926.59(k), and all other federal, state, or local codes and regulations.

H. Brushes: All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small fibers. Wire brushes may be used on pipe joint applications upon prior written notice to the Engineer.

PART 3 --- EXECUTION:

A. Nonfriable asbestos cement pipe shall be handled, transported, and disposed of in a way that prevents it from becoming friable and releasing asbestos fibers. AC pipe cannot be shattered, crumbled, pulverized, sanded, chipped, or ground.

B. Nonfriable AC pipe may not be used as fill; it shall be disposed of at a landfill that is state-approved to accept asbestos waste. Landfills may require special packaging and labeling in order to accept the AC pipe.

C. AC pipe shall not be removed from the excavation if it is not necessary to disturb it during the installation of the new pipeline.

D. AC pipe shall never be handled unless it is wet. Dry pipe shall be wet down with a suitable wetting material prior to handling it.

3.02 NOTIFICATION OF MASSDEP:

A. At least ten (10) working days in advance of asbestos pipe removal, submit Asbestos Notification Form ANF-001 to MassDEP. This may be done online using the MassDEP website.

3.03 PRE-DEMOLITION SURVEY:

A. Contractor shall conduct a thorough inspection to determine the location of any asbestos-containing pipe, insulation or other materials. Contractor may satisfy this requirement with:

1 As-built plans or other documents identifying the content of particular cement pipes or pipe segments and any other material in the conduit that may be affected by a removal or repair project, provided that the documentation has been updated to reflect any repairs or alterations; or

2 Other measures that demonstrate that a "thorough inspection" has been completed to identify asbestos cement pipe that will be affected by a removal or repair project. These

measures can include visual identification through field observations of the pipe to be worked on (e.g., the manufacturer's brand-label markings indicating transite material or the source of the pipe); or sampling and analysis of cement pipe material at a laboratory certified by DLS.

B. A qualified person must be present to observe the pipe when it is exposed and document in writing what features were used to identify the type of pipe to be removed/repaired/replaced. Contractor shall provide this documentation to the owner using the form included at the end of this section as "Template A". A DLS-certified asbestos inspector is qualified to perform this work. If relying on someone other than a DLS-certified asbestos inspector, a person is deemed qualified by having completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g., the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course developed jointly by the Massachusetts Water Works Association (MWWA) and the Utility Contractors of New England (UCANE), or another course similar in length and content that has been reviewed and approved in writing by DLS).

3.04 POST-DEMOLITION VISUAL INSPECTION:

A. Contractor shall, upon the conclusion of each asbestos abatement activity, provide a visual inspection that is performed by a qualified person, as defined in 3.03(B) above. The person doing the inspection must inspect all surfaces within the work area for visible debris and if any is found, the contractor must re-clean the work areas until there is no visible debris.

B. The following conditions must be met to complete to satisfy the requirement for a visual inspection by a qualified person:

1 The qualified person is physically present to conduct the final visual inspection of the work area prior to backfilling the trench.

2 The qualified person documents in writing that there was no visible debris remaining in the excavation trench, in soil excavated from the trench, in the surrounding area adjacent to the trench after the removal of the asbestos cement pipe, and on any tools used during the removal/repair/replacement activities.

3 All ACWM has been removed for proper storage/disposal.

4 The qualified person signs and dates the documentation of the final inspection as evidence that the inspection was performed and that the condition of no remaining visible debris was met. Contractor shall provide this documentation to the owner using the form included at the end of this section as "Template B".

3.05 PERSONAL PROTECTION:

A. Contractor shall comply with applicable provisions of OSHA Construction Standard for Asbestos, 29 CFR Part 1926.1101, for personal protection.

3.06 AC PIPE REMOVAL DURING EXCAVATION:

A. This section is provided for removal of AC pipe in excavation areas.

1 Removal of Non-Friable Asbestos Materials:

2 Carefully excavate, by hand but no closer than 6-inches from the pipe, a sufficient area around the pipe to perform the work. Assess if the pipe is damaged, cracked or broken. Any asbestos debris that is present or generated by these activities will be promptly wetted and placed into 6-mil asbestos waste bags before continuing with the work.

3 Once excavation is complete and the pipe is found to be intact, place one layer of 6-mil polyethylene sheeting on sidewalls and bottom of trench under the AC pipe to be removed.

4 Thoroughly encapsulate AC pipe with an acceptable penetrating encapsulant per manufacturer guidelines.

5 Remove AC pipe as follows:

i. Whenever possible, the Contractor will limit cutting of asbestos cement materials and dismantle materials in intact sections

ii. Remove pipe to the nearest coupling by sliding it apart at the joints. Sections of pipe will be removed from the trench and immediately wrapped and sealed in two layers of 6-mil asbestos waste bags, sealed with duct tape, and labeled. Removal shall be up to Contractor's means and methods in accordance with applicable laws and regulations, including 310 CMR 7.15 and 310 CMR 19.061.

iii. Pipe that must be cut shall be done so within a "mini-containment" in accordance with 310 CMR 7.15 and DOS regulations at 453 CMR 6.00 unless such activity is conducted using HEPA exhausted, shrouded cutting equipment. Wrap, seal and label as stated above.

iv. Packaged waste will then be placed into acceptable waste transportation vehicle.

3.07 AC PIPE LEFT IN PLACE

A. Ends of AC pipe to be left in the excavation shall be encapsulated. AC pipe is not to be crushed and left in place. Any crushed pieces must be removed and properly disposed of.

3.08 AC PIPE DISPOSAL PROCEDURES

A. The Contractor shall package, label, and remove all AC pipe as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. Transportation and disposal of the containerized waste at an approved landfill shall be the responsibility of the Contractor.

B. Waste Labeling:

1 Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA and Department of Transportation requirements shall be affixed to or printed on the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible.

2 In compliance with NESHAPS, 40 CFR, Part 61.150, all waste containers or bags shall be labeled with the following generator information:

a. Name of waste generator.

b. Location where waste was generated.

C. Dispose of ACWM in accordance with 310 CMR 7.15 and 310 CMR 19.061.

D. Contractor to provide Engineer and Owner one copy of each waste shipment record.

END OF SECTION

SECTION 02995

MISCELLANEOUS WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to complete the miscellaneous work under this Section and as noted on the contract drawings.

B. When applicable, the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable Specification exists, the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, any incidental work not specifically identified elsewhere.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 1 THROUGH 16 - As Appropriate

PART 2 MATERIALS

2.01 GENERAL

A. The Contractor shall furnish all materials necessary to remove, replace, and restore the site or structures sufficiently and to the satisfaction of the Engineer.

B. The materials provided by the Contractor shall meet all requirements as specified herein, of the applicable specification, or to the satisfaction of the Engineer.

C. All material not furnished, in the opinion of the Engineer, in accordance with the Contract Drawings and Specifications shall be removed immediately. Suitable material, which is satisfactory, shall be furnished at no additional compensation to the Contractor.

PART 3 EXECUTION OF WORK

3.01 INCIDENTAL WORK

A. The Contractor shall do all incidental work including all work listed under the miscellaneous work item 7B in section 01025 of the contract documents and not otherwise specified, but obviously necessary to the proper completion of the Contract as specified on the Contract Drawings.

3.02 RESTORATION OF CROSS COUNTRY AREAS

A. The Contractor shall furnish all labor, materials, and equipment to restore all areas disturbed by his operations. The ground surface shall be loamed and seeded as specified in related sections. It shall be maintained as required until the site has been restored to the original condition.

3.03 PRECAUTIONS UNDER ELECTRIC LINES

A. The bidders' attention is directed to the AASHTO Guide on Occupational Safety and the section on Highway Contraction Projects, Subpart N, 1926.550 relating to construction equipment clearances at overhead electric lines. This guide states, "...the minimum clearance between the lines and any part of the crane or load must be at least 10 feet from lines rated 50 kV or below, and greater distances for higher voltage..."

B. For the protection of personnel and equipment, the Contractor should be aware of this regulation especially during paving operations using large semi-trailer vehicles.

3.04 PUBLIC SAFETY

A. The Contractor shall furnish all labor, materials, tools, and equipment to provide public safety to vehicular and pedestrian traffic in the vicinity of the construction work. This includes all signs, barriers, warning lights, and any other controls deemed necessary by the Engineer.

END OF SECTION

DIVISION 3

SECTION 03300

CAST-IN-PLACE CONCRETE - SIDEWALKS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall perform all concrete work, including installation of all embedded items as shown on the construction drawings. This requires the furnishing of all labor, equipment, materials, and services necessary for completion.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 01300 – SUBMITTALS
B. SECTION 02224 – FILL AND BACKFILL MATERIALS

PART 2 MATERIALS

2.01 CEMENT

A. Cement shall be an approved brand of domestic Portland cement Type II conforming to "Specification for Portland Cement" (ASTM C150), except where otherwise specified on the plans. Type III shall be used only where specifically designated on the plans or by the Engineer.

2.02 COARSE AGGREGATE

A. Coarse aggregate shall be hard, washed gravel or crushed stone conforming to "Specification for Concrete Aggregates" (ASTM C33). Use the largest size of aggregate which satisfies the requirements that it shall be no larger than one-fifth of the narrowest dimension between sides of forms of the member, nor larger than ¾ of the minimum clear space between reinforcing bars and forms. Upon request from the Engineer, the Contractor shall furnish for approval a standard sample of one cubic foot of coarse aggregate.

2.03 FINE AGGREGATE

A. Fine aggregate shall be well graded, natural, washed sand conforming to "Specification for Concrete Aggregates" (ASTM C33). Upon request from the Engineer, the Contractor shall furnish for approval a standard sample of one cubic foot of fine aggregate.

2.04 WATER

A. Water shall be clean, fresh water, suitable for drinking and free from deleterious amounts of acids, alkalis, or organic materials.

2.05 ADMIXTURES

A. Admixtures shall conform to "Specifications for Air-Entraining Admixtures for Concrete (ASTM C260). No other types of admixtures are allowed unless permission is granted by the Engineer.

2.06 DESIGN

A. All concrete work shall conform to the "Building Code Requirements for Reinforced Concrete" (ACI 318).

B. Quality and Proportion Requirements: The Contractor shall design the concrete mix in accordance with these specifications and the "Recommended Practice for Selecting Proportions for Concrete" (ACI 618), and shall submit the design and trial batch test results of the proposed mix design from a laboratory approved by ASTM or ACI to the Engineer for approval prior to construction. Test shall include strength, slump, percent air, weight per cubic foot, and yield.

	Class A	Class B
Minimum Cement Content 94 lb. sacks/cubic yd.	6 ½	5 ½
Maximum Water Cement Ratio (gal/sack)	5 ½	6 ½
Minimum Strength-28 day Cylinder, psi	4,000	3,000

Air Entrainment:

Air Content ± 1% (by vol.)	Maximum Agg. Size
6%	¾ - 1"
5%	1 ½ - 2"
4%	3"

C. Slumps as defined and determined by "Test for Slump of Portland Cement Concrete" (ASTM C143) shall not exceed 4 inches.

2.07 READY-MIX CONCRETE

A. The ready-mixed concrete manufacturer is to be approved by the Engineer. The concrete delivered to the job site must conform to "Specifications for Ready-Mixed Concrete" (ASTM C94). The Engineer shall have free access at all times to the batching and mixing plant for sampling of all materials and inspection of work performed for this project.

B. Delivery of concrete to the site of the work shall be completed within ½ hour after the introduction of the mixing water to the cement and aggregates, or the cement to the aggregate, unless otherwise authorized by the Engineer.

2.08 INSERTS AND APPURTENANCES

A. No items made of aluminum are allowed in the concrete, unless coated with a heavy coat of bitumastic paint approved by the Engineer.

B. Flexible water stops shall be of the center bulb type complying with Corps of Engineers CRD-C582 for PVC units. Web thickness shall be not less than 3/8 inch. Width shall be at least 6 inches.

2.09 REINFORCEMENT

A. Concrete reinforcement in sizes No. 3 (3/8 in.) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings. The steel shall be newly rolled stock,

substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be billet steel of intermediate grade conforming to ASTM Specifications for Billet-Steel Bars for Concrete Reinforcement, Designation A615.

B. Wire mesh shall be electrically welded wire fabric conforming to ASTM Specification A185 and shall be at the size and spacing indicated on the drawings.

C. Deformations on bars for concrete reinforcement shall conform to the ASTM Specifications for Minimum Requirements for the Deformations of Deformed Billet Steel Bars for Concrete Reinforcement, Designation A615.

2.10 FORMS

A. Plywood for formwork shall comply with U.S. Products Standard, PS-1, and "B-B (Concrete Form) Plywood, Class 1, Exterior Grade or better and shall be mill-oiled and edge sealed. Each piece shall bear the legible trademark of an approved inspection agency.

B. Plywood forms to be re-used shall be maintained clean and in good condition as to accuracy, shape, strength, rigidity, tightness, and smoothness of surface. Forms shall be cleaned and checked between each use. Any lumber which is split, warped, bulged, marred, or has defects that will produce work inferior to that resulting from using new material shall not be used.

C. Prefabricated plastic, metal, or plywood form panels shall be used where required to form a smooth surface, and shall be as approved by the Engineer.

2.11 TIE RODS

A. Tie rods or other means for holding forms shall be of a type acceptable to the Engineer. They shall be of such type as to leave no metal closer than two inches from the surface.

2.12 FORM OIL

A. Forms shall be oiled with an approved non-bonding, non-staining oil or liquid form coating before reinforcement is placed.

2.13 JOINT FILLER

A. Poured joint compound shall be bituminous rubber joint compound equal to Para-Plastic waterproof seal made by Servicized Products Corp., Chicago, Illinois; Carey Co., Inc., Cincinnati, Ohio, or equal. The compound shall be applied in accordance with the instructions of the manufacturer, using a suitable primer if necessary.

B. Pre-molded mastic joint filler shall be of the thickness indicated on the drawings, shall be of suitable length and width, and shall conform to ASTM Specification D-544. As far as practicable, sheets shall be of correct width so that no longitudinal cutting will be

required in the field. When strips are cut in the field, the cut surface shall be heavily coated with hot asphalt or shall be treated as recommended by the manufacturer.

C. Bituminous coating shall be equal to Inertol Plastic (Black) made by the Inertol Div., Koppers Company, Carbomastic made by Carboline Corp., or approved equal.

D. Water-stops for construction and expansion joints shall be 6 inch rubber or plastic water stops of the flat dumbbell or corrugated type with a minimum web thickness of 3/8 inch.

E. Rubber water-stops shall have the following physical characteristics:

Tensile strength, min. psi	3,000
Elongation at break, min. %	450
Specific gravity	1.15 ± 0.30

F. Polyvinylchloride water-stops shall be of the types and sizes indicated on the drawings and shall conform to the Corps of Engineers Specification for Polyvinyl-chloride Water stops, Designation CRD-C572-66.

PART 3 EXECUTION OF WORK

3.01 REINFORCEMENT

A. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than six times the minimum thickness, except for bars larger than 1 inch in which case the bends shall be made around a pin of 8 bar diameters. All bars shall be bent cold.

B. Bars shall be shipped to the work site with bars of the same size and shape fastened in bundles with securely wired-on metal identification tags giving size and mark.

C. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt and other coatings, including ice, that reduce or destroy bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when necessary.

D. Reinforcement shall be accurately positioned as indicated on the drawings, and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Reinforcement shall be supported by concrete or metal supports, spacers, or hangers; wood blocks, stones, brick chips, etc., shall not be used.

E. Reinforcement which is to be exposed for a considerable length of time after having been placed shall be painted with a heavy coat of cement if required by the Engineer.

3.02 FORMS

A. Forms shall be accurately constructed in accordance with "Recommended Practice for Concrete Formwork" (ACI 347). They shall be substantial, tight, unyielding, and so maintained that the finished work which they confine will be as required by the plans and as specified. Wood forms shall be thoroughly wetted prior to placement so as to avoid absorption of water from the concrete mix.

B. Forms shall not be disturbed until the concrete has adequately hardened. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to construction loads shall be adequately shored to support both the members and the construction loads in such a manner as will protect the members from damage. Removal of forms shall be accomplished in such a manner that will prevent injury to the concrete.

C. Formwork may be removed after 72 hours, provided the concrete will not be injured. In no case shall supporting forms or shoring be removed until members have acquired sufficient strength to support their weight and imposed loads safely. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods.

3.03 PLACING CONCRETE

A. The Contractor shall notify the Engineer at least 24 hours prior to placement of any concrete.

B. Concrete shall be handled from the mixer to the place of final deposit in a continuous manner that will prevent separation or loss of material, and as rapidly as practicable until the unit of operation is complete. Concrete which has reached an initial set or has contained water for more than one hour shall not be deposited in the work.

C. Depositing of concrete shall be made as close as practicable to the final position so as to prevent segregation due to re-handling. Concrete shall be compacted immediately after placing by thoroughly agitating the mass in a manner which will force out all air pockets and work the mixture into the corners, around reinforcement and inserts, and prevent the formation of voids. Vibrators shall not be used for the purpose of moving concrete horizontally. Concrete trucks will not be permitted on existing foundations. No concrete shall be deposited in or under water without permission of the Engineer.

D. Fresh concrete shall not be placed on concrete which has hardened sufficiently to cause formation of cold joints or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for on the drawings or as approved by the Engineer. When work is resumed, concrete previously placed shall be thoroughly cleaned of foreign materials and laitance, using a stiff wire brush or other tools, and a stream of water if necessary, and then slushed with grout consisting of 1 part Portland cement and 2 parts sand.

E. Free drop of concrete for more than 5 feet will not be allowed. Where greater drops are required, a tremie shall be employed. Discharge of the tremie shall be controlled such that the concrete may not be effectively less than 12" in thickness with a minimum of lateral movement.

F. Hot weather placement of concrete shall be in strict accordance with "Recommended Practice for Hot Weather Concreting" (ACI 605). Sub grades shall be kept moist in hot weather to prevent extraction of water from the concrete.

G. Cold weather placement of concrete shall be in strict accordance with "Recommended Practice for Cold Weather Concreting" (ACI 306).

3.04 INSERTS AND APPURTENANCES

A. All necessary curb boxes, hydrants, sign supports, inserts, and other appurtenances shall be set and adjusted in the forms accurately, true, plumb, and in a manner to prevent dislocation during concrete placement.

3.05 JOINTS

A. Expansion and contraction control joints shall be as indicated on the drawings. Construction joints shall be keyed as shown in the drawings and placed as indicated therein or by the Engineer.

B. All construction joints shall be treated with a retardant made by Sida Chemical Corporation, Euclid, Co., or equal, to expose aggregate and joints. Apply the retardant in strict accordance with the manufacturer's directions. Remove all unset mortar by wire brushing or with a water jet within the time limit specified by the manufacturer.

C. Flexible rubber water-stops shall be installed in all construction joints and expansion joints where indicated. They shall be supported during concrete placement so as to maintain their proper position.

3.06 FINISHING CONCRETE

A. The finish of all concrete surfaces shall be made in accordance with Mass Highway Specifications for sidewalk construction or as directed by the Engineer. The Engineer shall be the sole judge of acceptability of all such concrete finish work.

3.07 CURING

A. Concrete shall be maintained in a continuously moist condition for at least seven (7) days following placement. Fresh concrete shall be protected from heavy rains, flowing water, freezing temperatures, and mechanical injury. All exposed surfaces of finished or unfinished work shall be kept constantly moist by sprinkling with clean water at short intervals (unless otherwise directed during cold weather) or by covering with moistened burlap, or by such other means as may be approved.

B. Where wood forms are kept in place, these too shall be kept wet during the period of curing. The Contractor shall not permit walking upon or over the concrete until it has set for a sufficient length of time. The Contractor shall protect steel reinforcement, and protect the concrete from disturbances until the concrete has been satisfactorily cured.

3.08 TESTS

A. When required by the Engineer, compression tests shall be made of cylinders cast from sample batches of each concrete mix design that the Engineer considers acceptable for approval. Results of these tests will determine criteria for judging the quality of concrete placed during construction. Three test cylinders will be required from each sample batch.

B. As work progresses, concrete shall be sampled in accordance with "Sampling Fresh Concrete" (ASTM C172). Slump tests shall be made according to "Test for Slump of Portland Cement Concrete" (ASTM C143). Air content of concrete shall be tested according to "Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231).

C. Compression test specimens shall be made in the presence of the Engineer's representative and cured according to "Making and Curing Concrete Compression and Flexure Test Specimens in the Field" (ASTM C31).

D. There shall be at least one set of three cylinders made for each type of concrete placed in one day. Additional cylinders shall be made and tested when deemed necessary by the Engineer. Tests shall be in accordance with "Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39).

3.09 EXPANSION AND CONSTRUCTION JOINTS

A. Construction and expansion joints shall be of the types indicated on the drawings and shall be constructed wherever and only in such places as are indicated on the drawings or otherwise directed or approved. The Contractor shall plan the work to minimize the use of joints in addition to those indicated.

B. Slabs shall have no horizontal joints, unless otherwise indicated. All construction joints shall have keyways the widths of which are equal to one-third the thickness of the member in which the keyways are placed.

C. Concrete to be sealed with poured joint compound shall be clean and dry and, if required, shall be primed. The compound shall be carefully poured to prevent spilling the material over the adjoining surfaces. As the material cools and subsides, additional compound shall be poured until the joint is filled to the required level. Surfaces to which bituminous coating is to be applied shall be prepared and primed, and the coating material shall be applied in accordance with the instructions of the manufacturer.

D. Mastic sheets shall be placed against the bulkhead form and lightly fastened with brads to the inside to hold the sheets in place when the concrete is poured. Ten penny galvanized nails shall be driven through the sheets with points projecting into the concrete placed against them. Care shall be taken at all times to prevent any disturbance of or damage to mastic sheets or rubber or plastic water-stops.

END OF SECTION

CCTV REPORTS

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH001	SMH002	SMH002_SMH001REV	6/3/2016	Russel St.	Vitrified Clay Pipe	6	138	138

Pipe Size: 6 Total Ln.: 138 Inspected Ln.: 138

Project Total Ln.: 138.0 Project Inspected Ln.: 138.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH001	138		Circular	

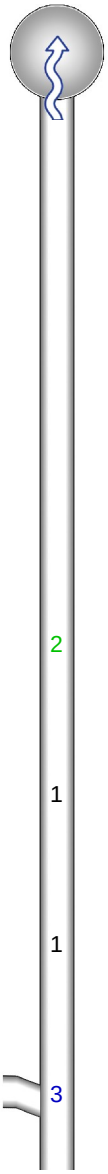
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH002	138		6	6	3

SPR	21	MPR	17	PO Number	Customer
SPRI	1.9	MPRI	1.7		
QSR	4132	QMR	3125	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
38	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
1.8	U-510-10732	Jetting	11:13	Dry

Date Cleaned	End Time	Additional Info
20160603	11:31	



0.0 ft.	Access Point Manhole		SMH002
0.0 ft.	Water Level		
0.0 ft.	Repair Point Pipe Replaced		PVC
0.0 ft.	Water Level Sag		
1.5 ft.	Joint Separated Medium		
1.5 ft.	Joint Offset Medium		
10.4 ft.	Tap Break-In Defective		Roots

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH001	138		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH002	138		6	6	3

SPR	21	MPR	17	PO Number	Customer
SPRI	1.9	MPRI	1.7		
QSR	4132	QMR	3125	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
38	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
1.8	U-510-10732	Jetting	11:13	Dry

Date Cleaned	End Time	Additional Info
20160603	11:31	

10.6 ft.	Fracture Longitudinal	3	
12.2 ft.	Roots Tap Joint	2	
16.2 ft.	Roots Tap Joint	2	
20.3 ft.	Roots Tap Joint	2	
22.6 ft.	Roots Fine Joint	1	
26.3 ft.	Tap Factory Made		
28.4 ft.	Joint Offset Medium	1	
28.5 ft.	Roots Fine Joint	1	

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH001	138		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH002	138		6	6	3	

SPR	21	MPR	17	PO Number	Customer
SPRI	1.9	MPRI	1.7		
QSR	4132	QMR	3125	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label	
38	A_Morris	Upstream	20160603		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1.8	U-510-10732	Jetting	11:13	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20160603			11:31		

34.6 ft. Fracture Multiple

4

34.6 ft. Roots Fine Joint

1

44.7 ft. Roots Fine Joint

1

48.9 ft. Tap Break-In Active

50.3 ft. Water Level

54.2 ft. Tap Factory Made Capped

56.3 ft. Tap Factory Made Capped

62.8 ft. Crack Longitudinal

2

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH001	138		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH002	138		6	6	3	

SPR	21	MPR	17	PO Number	Customer
SPRI	1.9	MPRI	1.7		
QSR	4132	QMR	3125	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
38	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
1.8	U-510-10732	Jetting	11:13	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			11:31	

70.7 ft. Joint Offset Large

2

71.9 ft. Tap Factory Made

82.8 ft. Fracture Longitudinal

3

85.1 ft. Deposits Attached Grease

2

86.6 ft. Joint Offset Large

2

87.9 ft. Tap Factory Made

88.0 ft. Joint Offset Medium

1

88.7 ft. Joint Offset Medium

1

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH001	138		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH002	138		6	6	3

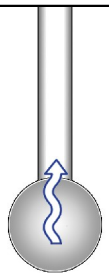
SPR	21	MPR	17	PO Number	Customer
SPRI	1.9	MPRI	1.7		
QSR	4132	QMR	3125	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
38	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
1.8	U-510-10732	Jetting	11:13	Dry

Date Cleaned	End Time	Additional Info
20160603	11:31	

138.0 ft. Access Point Manhole



SMH001

SMH001

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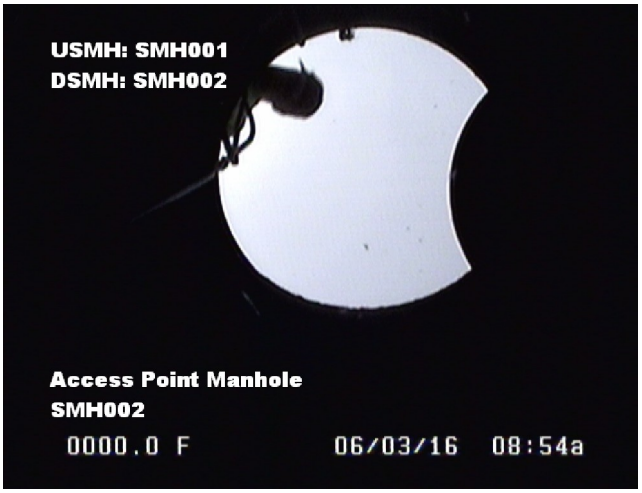
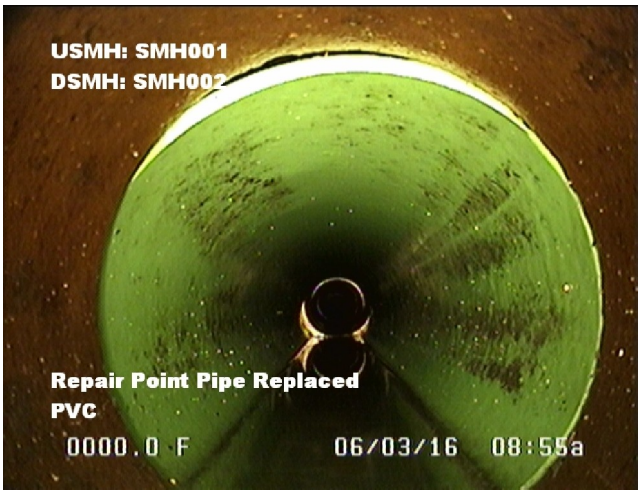
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	



Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH002

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A



Distance: 0.0 ft. Grade: 0
Condition: Repair Point Pipe Replaced
Remarks: PVC

Distance: 0.0 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

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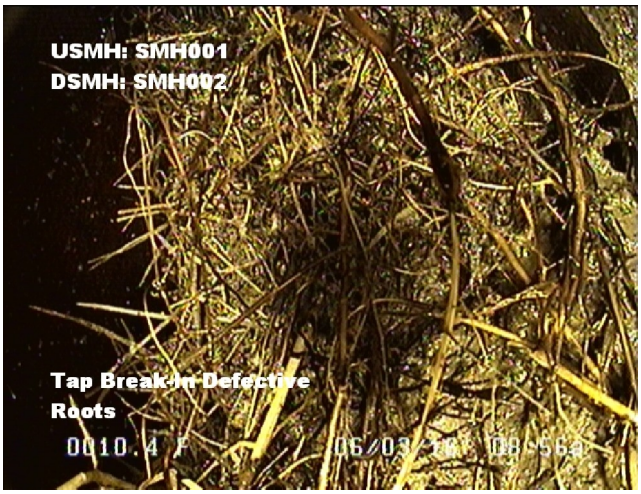
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	

Distance: 1.5 ft. Grade: 1
Condition: Joint Separated Medium
Remarks: N/A

Distance: 1.5 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 10.4 ft. Grade: 3
Condition: Tap Break-In Defective
Remarks: Roots

Distance: 10.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	

Distance: 12.2 ft. Grade: 2
Condition: Roots Tap Joint
Remarks: N/A

Distance: 16.2 ft. Grade: 2
Condition: Roots Tap Joint
Remarks: N/A

Distance: 20.3 ft. Grade: 2
Condition: Roots Tap Joint
Remarks: N/A

Distance: 22.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	

Distance: 26.3 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 28.4 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 28.5 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 34.6 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	

Distance: 34.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 44.7 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 48.9 ft. Grade: 0
Condition: Tap Break-In Active
Remarks: N/A

Distance: 50.3 ft. Grade: 0
Condition: Water Level
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	

Distance: 54.2 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 56.3 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 62.8 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 70.7 ft. Grade: 2
Condition: Joint Offset Large
Remarks: N/A

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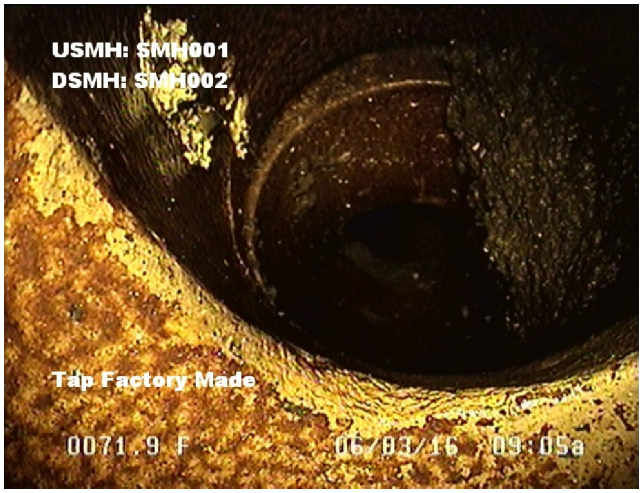
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	



Distance: 71.9 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 82.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 85.1 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 86.6 ft. Grade: 2
Condition: Joint Offset Large
Remarks: N/A

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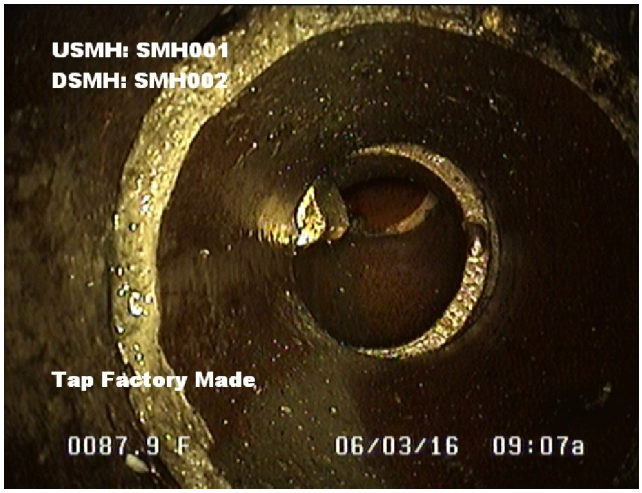
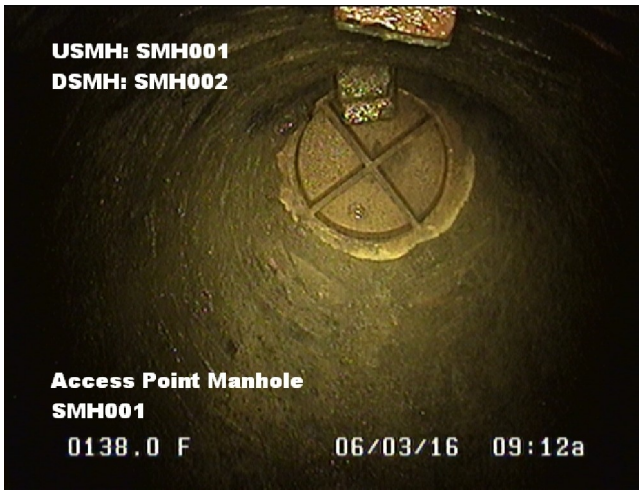
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH001REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH001	138		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH002	138		6	6	3	



Distance: 87.9 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 88.0 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 88.7 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 138.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH001

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH002	SMH003	SMH002_SMH003	6/3/2016	Russel St.	Vitrified Clay Pipe	6	105	49

Pipe Size: 6 Total Ln.: 105 Inspected Ln.: 49

Project Total Ln.: 105.0 Project Inspected Ln.: 49.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH002_SMH003	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH002	105		Circular	

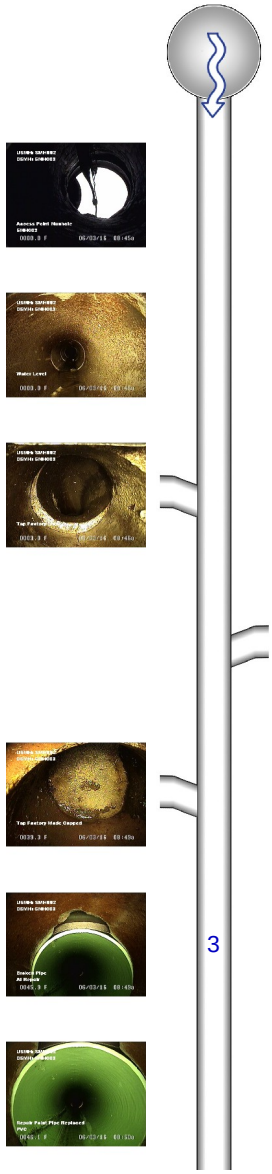
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH003	49		6	6	3

				PO Number	Customer
SPR	3	MPR	N/A		
SPRI	3	MPRI	N/A	Work Order	Purpose
QSR	3100	QMR	N/A		Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
3	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
3	U-510-10732	Jetting	11:04	Dry

Date Cleaned	End Time	Additional Info
20160603	11:09	



0.0 ft.	Access Point Manhole		SMH002
0.0 ft.	Water Level		
3.0 ft.	Tap Factory Made		
33.3 ft.	Tap Factory Made Capped		
39.3 ft.	Tap Factory Made Capped		
45.9 ft.	Broken Pipe		At Repair
46.1 ft.	Repair Point Pipe Replaced		PVC

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH002_SMH003	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH002	105		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH003	49		6	6	3

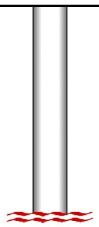
				PO Number	Customer
SPR	3	MPR	N/A		
SPRI	3	MPRI	N/A	Work Order	Purpose
QSR	3100	QMR	N/A		Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
3	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
3	U-510-10732	Jetting	11:04	Dry

Date Cleaned	End Time	Additional Info
20160603	11:09	

49.0 ft. Survey Abandoned



End of Survey

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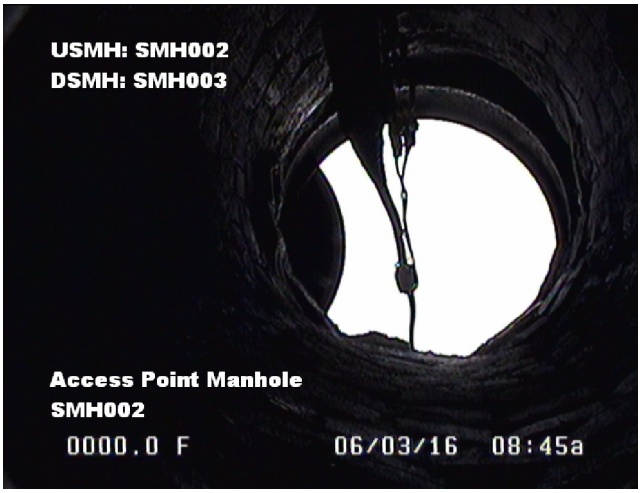
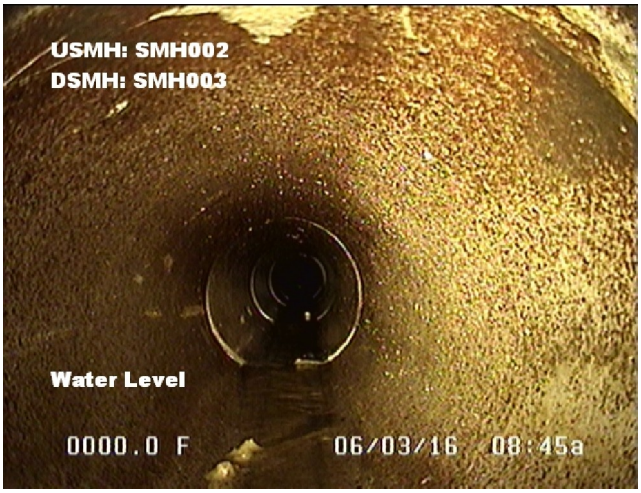
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH003	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	105		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	49		6	6	3	



Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH002



Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 3.0 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 33.3 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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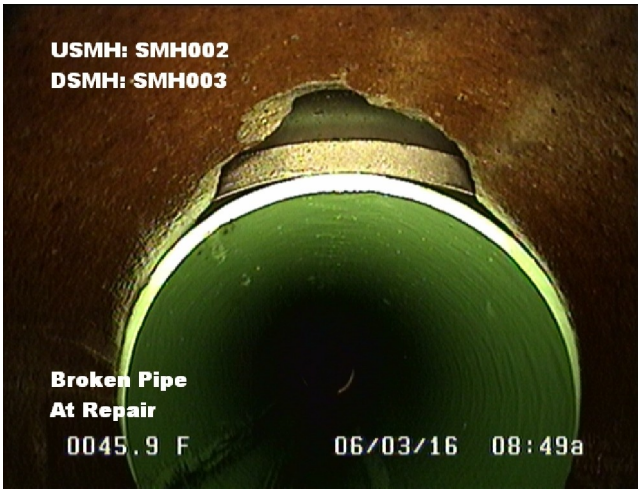
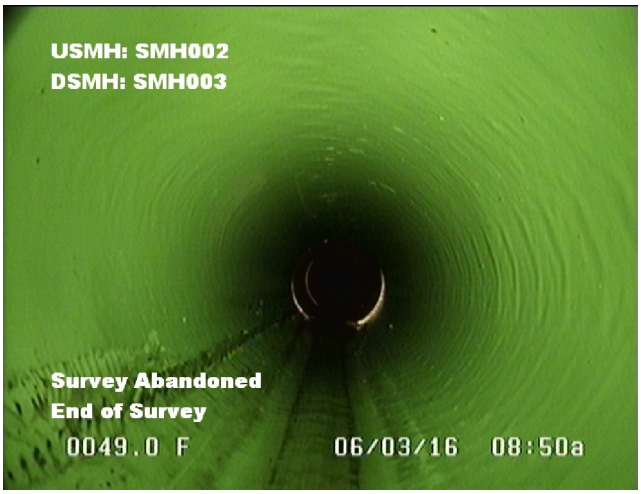
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH002_SMH003	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH002	105		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH003	49		6	6	3	

Distance: 39.3 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A



Distance: 45.9 ft. Grade: 3
Condition: Broken Pipe
Remarks: At Repair

Distance: 46.1 ft. Grade: 0
Condition: Repair Point Pipe Replaced
Remarks: PVC



Distance: 49.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: End of Survey

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH002	SMH003	SMH003_SMH002REV	6/3/2016	Russel St.	Vitrified Clay Pipe	6	0	56

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 56

Project Total Ln.: 0.0 Project Inspected Ln.: 56.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH002	N/A		Circular	

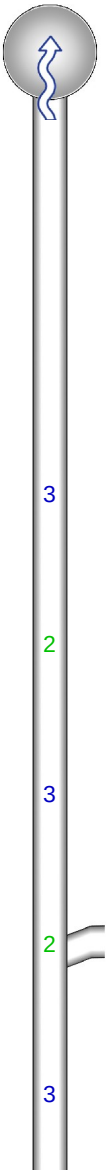
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH003	56		6	6	3

SPR	14	MPR	23	PO Number	Customer
SPRI	2.8	MPRI	1.9		
QSR	3421	QMR	2A11	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
37	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.2	U-510-10732	Jetting	10:38	Dry

Date Cleaned	End Time	Additional Info
20160603	10:52	



0.0 ft. Access Point Manhole

SMH003

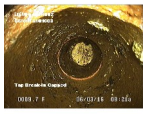
0.0 ft. Water Level

5.0 ft. Fracture Longitudinal

6.2 ft. Deposits Attached Grease

8.9 ft. Fracture Longitudinal

9.7 ft. Tap Break-In Capped



10.9 ft. Fracture Longitudinal

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	56		6	6	3	

SPR	14	MPR	23	PO Number	Customer
SPRI	2.8	MPRI	1.9		
QSR	3421	QMR	2A11	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
37	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.2	U-510-10732	Jetting	10:38	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			10:52	

15.0 ft. Crack Multiple

16.1 ft. Deposits Attached Grease - S01

20.9 ft. Roots Fine Joint

23.8 ft. Tap Factory Made

26.7 ft. Tap Factory Made

28.6 ft. Tap Factory Made Capped

39.4 ft. Fracture Circumferential

40.2 ft. Deposits Settled Other

Unknown

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	56		6	6	3	

SPR	14	MPR	23	PO Number	Customer
SPRI	2.8	MPRI	1.9		
QSR	3421	QMR	2A11	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
37	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.2	U-510-10732	Jetting	10:38	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			10:52	

46.7 ft. Repair Point Pipe Replaced

PVC

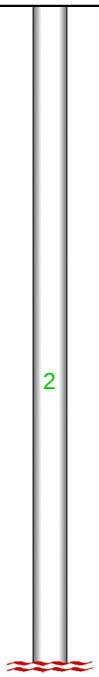
52.9 ft. Material Change

PVC/VCP End of Repair

55.0 ft. Deposits Attached Grease - F01

56.0 ft. Survey Abandoned

Rock/Cannot Pass



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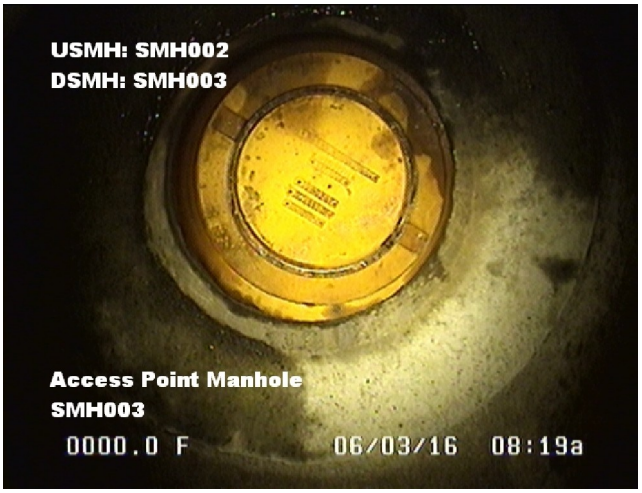
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH002	N/A		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH003	56		6	6	3	



Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH003

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 5.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 6.2 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

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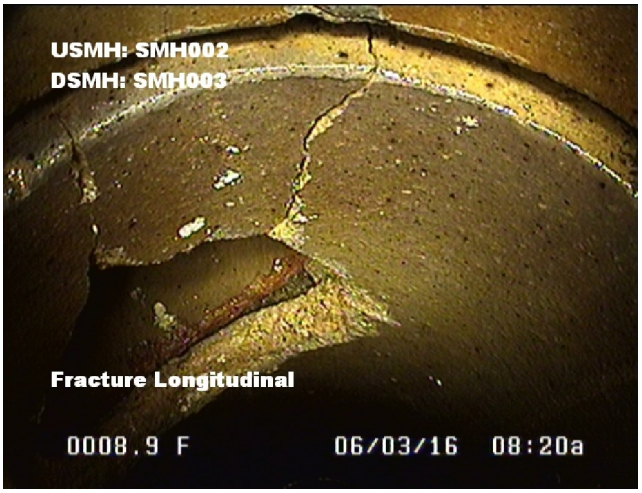
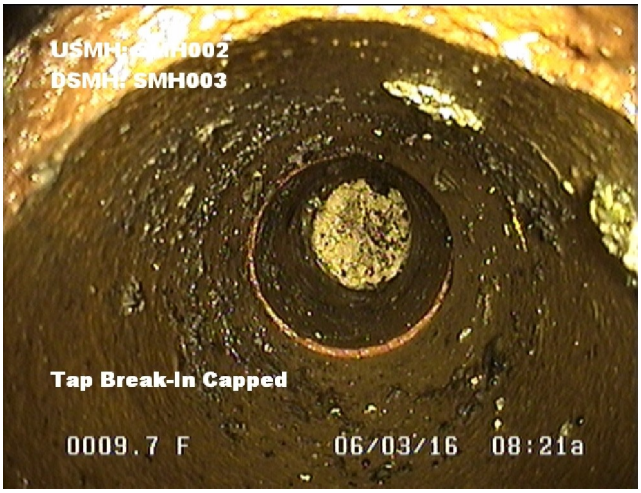
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH002	N/A		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH003	56		6	6	3	



Distance: 8.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 9.7 ft. Grade: 2
Condition: Tap Break-In Capped
Remarks: N/A

Distance: 10.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 15.0 ft. Grade: 3
Condition: Crack Multiple
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	56		6	6	3	

Distance: 16.1 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 20.9 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 23.8 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 26.7 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	56		6	6	3	

Distance:	28.6 ft.	Grade:	0
Condition:	Tap Factory Made Capped		
Remarks:	N/A		

Distance:	39.4 ft.	Grade:	2
Condition:	Fracture Circumferential		
Remarks:	N/A		

Distance:	40.2 ft.	Grade:	2
Condition:	Deposits Settled Other		
Remarks:	Unknown		

Distance:	46.7 ft.	Grade:	0
Condition:	Repair Point Pipe Replaced		
Remarks:	PVC		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH003_SMH002REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH002	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH003	56		6	6	3	

Distance:	52.9 ft.	Grade:	0
Condition:	Material Change		
Remarks:	PVC/VCP End of Repair		

Distance:	55.0 ft.	Grade:	2
Condition:	Deposits Attached Grease		
Remarks:	N/A		

Distance:	56.0 ft.	Grade:	0
Condition:	Survey Abandoned		
Remarks:	Rock/Cannot Pass		

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH003	SMH004	SMH004_SMH003REV	6/3/2016	Russel St.	Vitrified Clay Pipe	6	101	101

Pipe Size: 6 Total Ln.: 101 Inspected Ln.: 101

Project Total Ln.: 101.0 Project Inspected Ln.: 101.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH003	101		Circular	

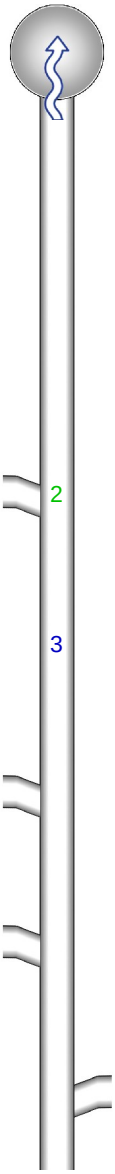
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH004	101		6	6	3

				PO Number	Customer
SPR	11	MPR	10		
SPRI	2.8	MPRI	2	Work Order	Purpose
QSR	3321	QMR	2500		Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
21	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.3	U-510-10732	Jetting	10:25	Dry

Date Cleaned	End Time	Additional Info
20160603	10:37	



0.0 ft.	Access Point Manhole		SMH004
0.0 ft.	Water Level		
0.0 ft.	Tap Factory Made Defective		Debris in Lateral
0.0 ft.	Broken Pipe		
12.4 ft.	Tap Factory Made Capped		
52.9 ft.	Tap Factory Made Capped		
65.4 ft.	Tap Break-In		

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH003	101		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH004	101		6	6	3

SPR	11	MPR	10	PO Number	Customer
SPRI	2.8	MPRI	2	Work Order	Purpose: Pre-Acceptance
QSR	3321	QMR	2500		

OPR	Surveyed By	Direction	Date	Media label
21	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.3	U-510-10732	Jetting	10:25	Dry

Date Cleaned	End Time	Additional Info
20160603	10:37	

67.4 ft. Fracture Longitudinal

3

75.5 ft. Fracture Longitudinal

3

82.0 ft. Deposits Attached Grease - S01

2

89.9 ft. Crack Longitudinal

2

97.3 ft. Tap Factory Made Defective

2

Debris in Lateral

98.6 ft. Deposits Attached Grease - F01

2

101.0 ft. Access Point Manhole

SMH003

SMH003

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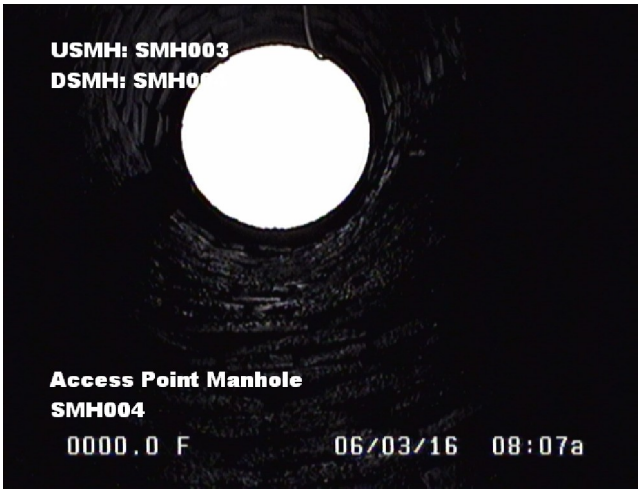
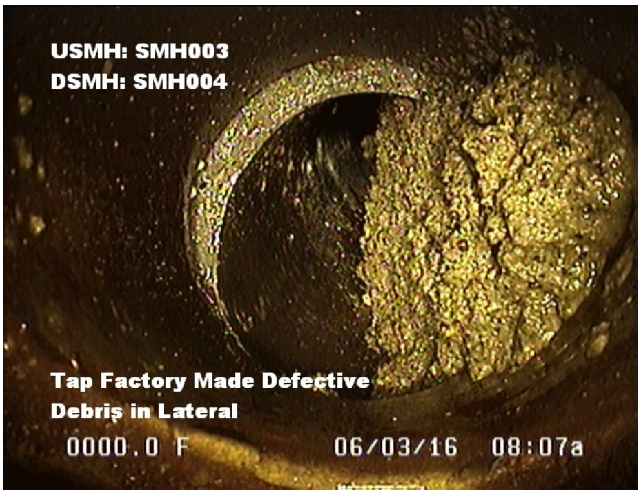
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH003	101		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH004	101		6	6	3	

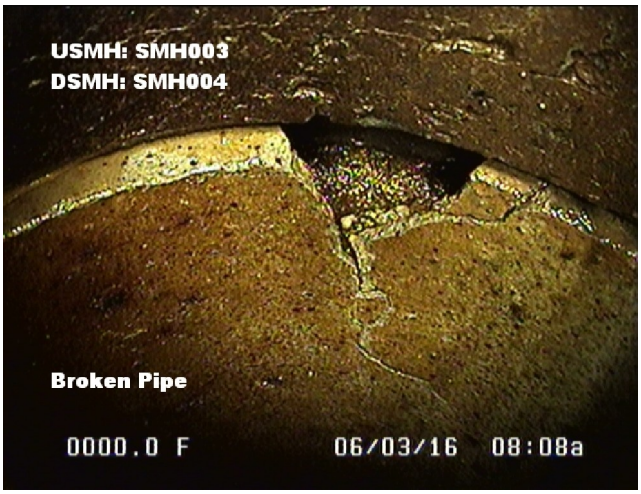


Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	SMH004		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		



Distance:	0.0 ft.	Grade:	2
Condition:	Tap Factory Made Defective		
Remarks:	Debris in Lateral		



Distance:	0.0 ft.	Grade:	3
Condition:	Broken Pipe		
Remarks:	N/A		

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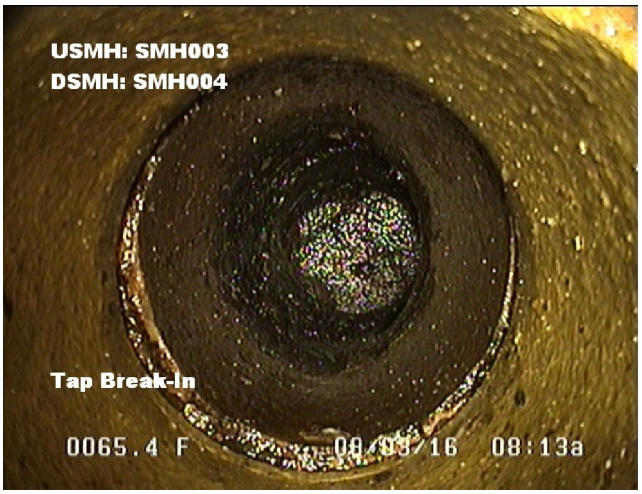
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH003	101		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH004	101		6	6	3	

Distance: 12.4 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 52.9 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A



Distance: 65.4 ft. Grade: 0
Condition: Tap Break-In
Remarks: N/A

Distance: 67.4 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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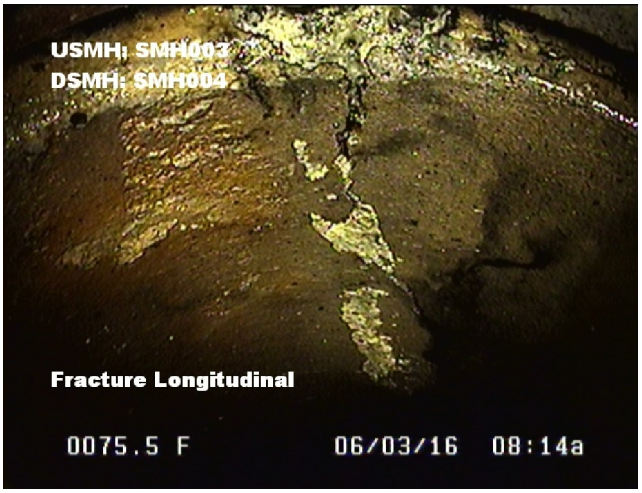
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH003	101		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH004	101		6	6	3	



Distance: 75.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 82.0 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 89.9 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 97.3 ft. Grade: 2
Condition: Tap Factory Made Defective
Remarks: Debris in Lateral

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH003REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH003	101		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH004	101		6	6	3	

Distance: 98.6 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 101.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH003

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH004A	SMH005	SMH004A_SMH005	6/3/2016	Russel St.	Vitrified Clay Pipe	8	197	197

Pipe Size: 8 Total Ln.: 197 Inspected Ln.: 197

Project Total Ln.: 197.0 Project Inspected Ln.: 197.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH004A	197		Circular	

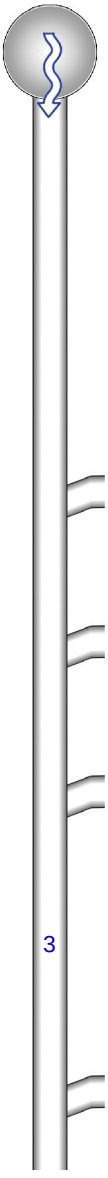
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH005	197		8	8	3

SPR	7	MPR	50	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	3122	QMR	2D00	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
57	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2	U-510-10732	Jetting	12:10	Dry

Date Cleaned	End Time	Additional Info
20160603	12:25	



0.0 ft. Access Point Manhole

SMH004A

0.0 ft. Water Level

14.0 ft. Tap Factory Made

18.1 ft. Tap Factory Made Capped

27.9 ft. Tap Break-In

Chimney

27.9 ft. Fracture Longitudinal

32.0 ft. Tap Break-In Active

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH004A	197		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH005	197		8	8	3

SPR	7	MPR	50	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	3122	QMR	2D00	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
57	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2	U-510-10732	Jetting	12:10	Dry

Date Cleaned	End Time	Additional Info
20160603	12:25	

36.0 ft. Water Level Sag

43.6 ft. Deposits Settled Fine

58.6 ft. Tap Factory Made Capped

64.4 ft. Deposits Attached Grease

81.5 ft. Deposits Attached Grease

84.1 ft. Water Level Sag

97.9 ft. Deposits Attached Grease - S01

107.5 ft. Fracture Circumferential

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH004A	197		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH005	197		8	8	3

SPR	7	MPR	50	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	3122	QMR	2D00	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
57	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2	U-510-10732	Jetting	12:10	Dry

Date Cleaned	End Time	Additional Info
20160603	12:25	

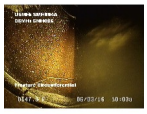
116.8 ft. Tap Factory Made

122.9 ft. Tap Factory Made Capped

145.5 ft. Water Level Sag

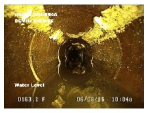
2

147.9 ft. Fracture Circumferential



2

163.0 ft. Water Level



183.2 ft. Water Level

194.2 ft. Deposits Attached Grease - F01

2

197.0 ft. Access Point Manhole

SMH005

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004A	197		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	197		8	8	3	

SPR	7	MPR	50	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	3122	QMR	2D00	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
57	A_Morris	Downstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2	U-510-10732	Jetting	12:10	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			12:25	

SMH005

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004A	197		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	197		8	8	3	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	SMH004A		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	14.0 ft.	Grade:	0
Condition:	Tap Factory Made		
Remarks:	N/A		

Distance:	18.1 ft.	Grade:	0
Condition:	Tap Factory Made Capped		
Remarks:	N/A		

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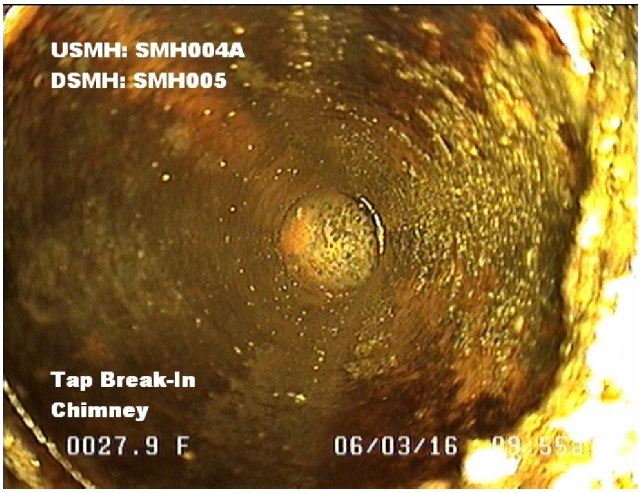
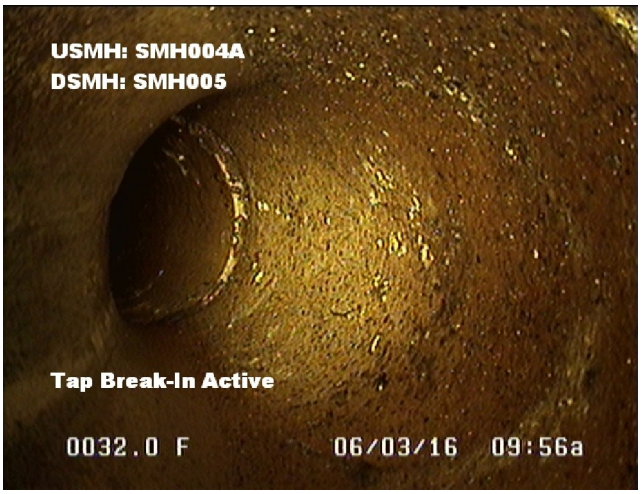
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004A	197		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	197		8	8	3	



Distance: 27.9 ft. Grade: 0
Condition: Tap Break-In
Remarks: Chimney

Distance: 27.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 32.0 ft. Grade: 0
Condition: Tap Break-In Active
Remarks: N/A

Distance: 36.0 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004A	197		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	197		8	8	3	

Distance: 43.6 ft. Grade: 2
Condition: Deposits Settled Fine
Remarks: N/A

Distance: 58.6 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 64.4 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 81.5 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004A	197		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	197		8	8	3	

Distance: 84.1 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 97.9 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 107.5 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 116.8 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

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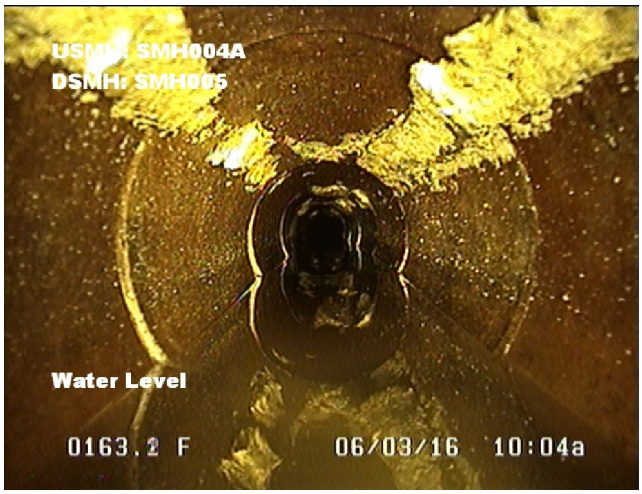
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004A	197		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	197		8	8	3	

Distance: 122.9 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 145.5 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 147.9 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



Distance: 163.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

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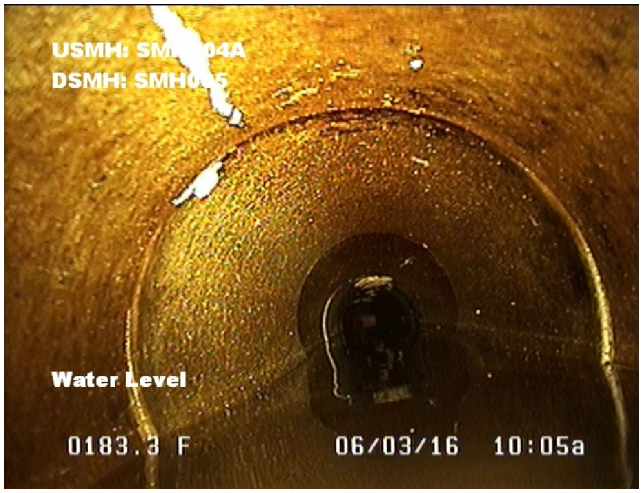
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004A_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004A	197		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	197		8	8	3	



Distance: 183.2 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 194.2 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

Distance: 197.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH005

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH004	SMH004A	SMH004_SMH004A	6/3/2016	Russel St.	Vitrified Clay Pipe	8	179	179

Pipe Size: 8 Total Ln.: 179 Inspected Ln.: 179

Project Total Ln.: 179.0 Project Inspected Ln.: 179.0

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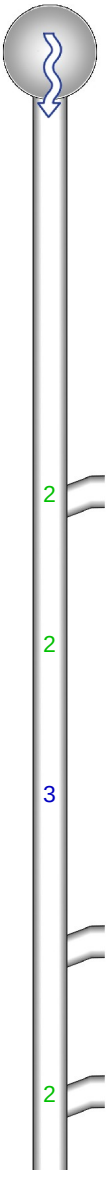
Defect Listing Plot with Images

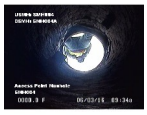
Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**	**Location Details**	
SMH004	179		Circular		
DS Manhole	**Length surveyed**	**Year Renewed**	**Height / Width**	**Pipe Joint...**	
SMH004A	179		8 / 8	3	

SPR	9	MPR	6	PO Number	Customer
SPRI	3	MPRI	2	Work Order	Purpose: Pre-Acceptance
QSR	3300	QMR	2300		

OPR	Surveyed By	Direction	Date	Media label
15	A_Morris	Downstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.5	U-510-10732	Jetting	11:53	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			12:08	



0.0 ft. Access Point Manhole

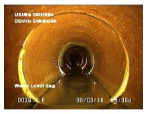


0.0 ft. Water Level

12.2 ft. Tap Factory Made Defective

Debris in Lateral

36.4 ft. Water Level Sag



53.6 ft. Fracture Longitudinal

54.7 ft. Tap Factory Made

55.1 ft. Tap Break-In Capped

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH004	179		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH004A	179		8	8	3

SPR	9	MPR	6	PO Number	Customer
SPRI	3	MPRI	2	Work Order	Purpose: Pre-Acceptance
QSR	3300	QMR	2300		

OPR	Surveyed By	Direction	Date	Media label
15	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.5	U-510-10732	Jetting	11:53	Dry

Date Cleaned	End Time	Additional Info
20160603	12:08	

55.1 ft. Fracture Longitudinal 3

55.5 ft. Broken Pipe 3

58.8 ft. Tap Factory Made Capped

85.1 ft. Tap Factory Made Capped

105.5 ft. Tap Factory Made

143.5 ft. Tap Factory Made

154.6 ft. Tap Factory Made

179.0 ft. Access Point Manhole SMH004A

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004	179		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH004A	179		8	8	3	

SPR	9	MPR	6	PO Number	Customer
SPRI	3	MPRI	2	Work Order	**Purpose**
QSR	3300	QMR	2300		Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label	
15	A_Morris	Downstream	20160603		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
2.5	U-510-10732	Jetting	11:53	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20160603			12:08		

SMH004A

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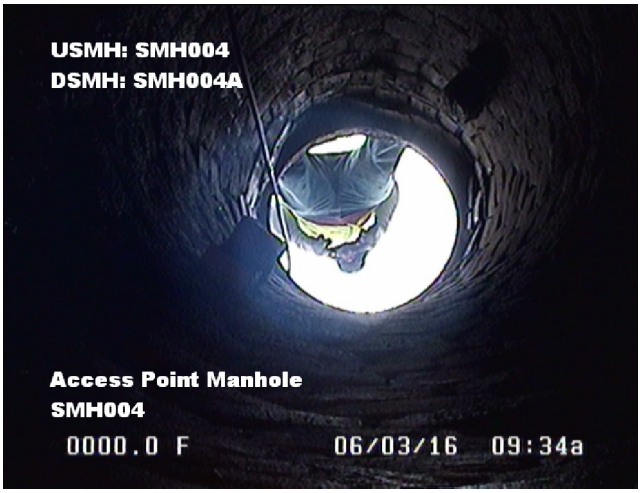
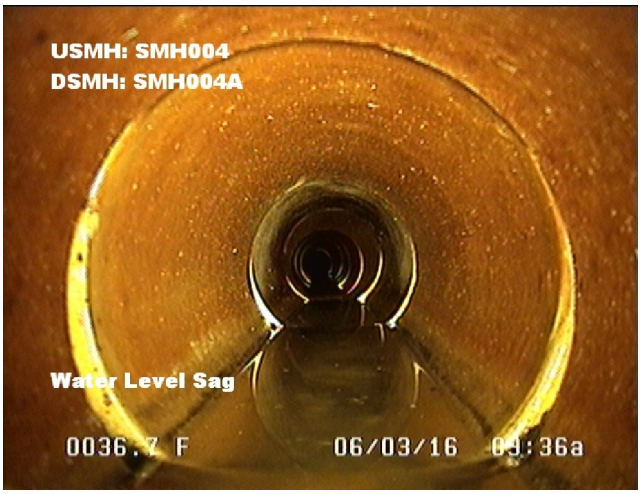
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004	179		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH004A	179		8	8	3	



Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH004

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 12.2 ft. Grade: 2
Condition: Tap Factory Made Defective
Remarks: Debris in Lateral



Distance: 36.4 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

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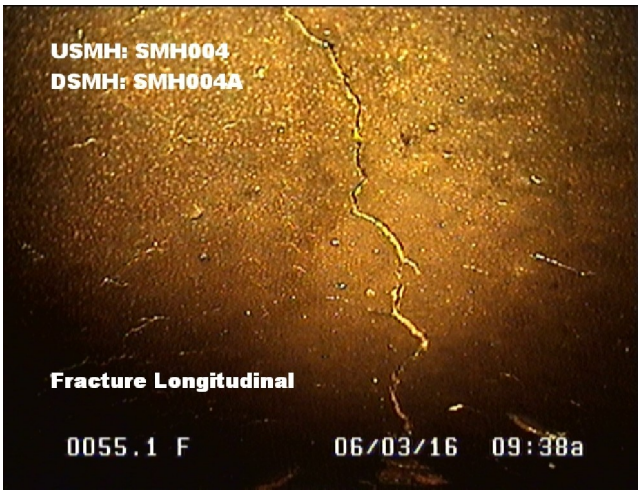
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004	179		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH004A	179		8	8	3	

Distance: 53.6 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 54.7 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 55.1 ft. Grade: 2
Condition: Tap Break-In Capped
Remarks: N/A



Distance: 55.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH004	179		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH004A	179		8	8	3	

Distance: 55.5 ft. Grade: 3
Condition: Broken Pipe
Remarks: N/A

Distance: 58.8 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 85.1 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 105.5 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH004_SMH004A	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH004	179		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH004A	179		8	8	3	

Distance: 143.5 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 154.6 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 179.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH004A

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH006	SMH005	SMH006_SMH005	6/3/2016	Russel St.	Vitrified Clay Pipe	6	194	194

Pipe Size: 6 Total Ln.: 194 Inspected Ln.: 194

Project Total Ln.: 194.0 Project Inspected Ln.: 194.0

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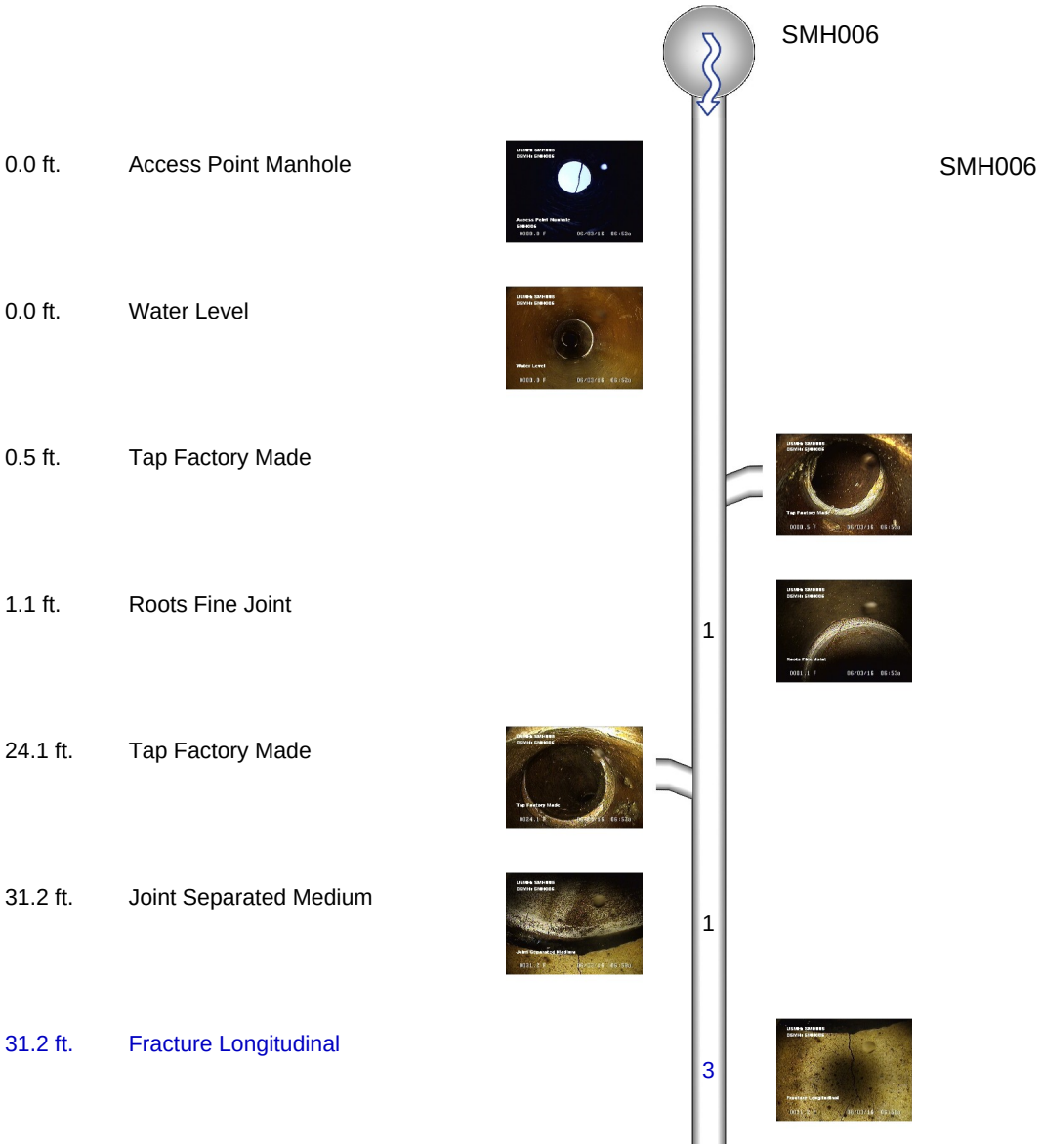
Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH006	194		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	194		6	6	3	

SPR	21	MPR	11	PO Number	Customer
SPRI	1.8	MPRI	1.8		
QSR	3421	QMR	2511	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
32	A_Morris	Downstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
1.8	U-510-10732	Jetting	09:11	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			09:35	



0.0 ft.	Access Point Manhole	
0.0 ft.	Water Level	
0.5 ft.	Tap Factory Made	
1.1 ft.	Roots Fine Joint	
24.1 ft.	Tap Factory Made	
31.2 ft.	Joint Separated Medium	
31.2 ft.	Fracture Longitudinal	

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH006	194		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	194		6	6	3	

SPR	21	MPR	11	PO Number	Customer
SPRI	1.8	MPRI	1.8		
QSR	3421	QMR	2511	Work Order	**Purpose**: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label	
32	A_Morris	Downstream	20160603		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1.8	U-510-10732	Jetting	09:11	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20160603			09:35		

32.1 ft. Tap Factory Made Capped

34.7 ft. Joint Offset Medium

38.0 ft. Tap Factory Made Capped

38.6 ft. Joint Offset Medium

56.1 ft. Tap Factory Made Capped

56.8 ft. Joint Offset Medium

71.2 ft. Joint Separated Medium

74.2 ft. Tap Factory Made Capped

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH006	194		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	194		6	6	3	

SPR	21	MPR	11	PO Number	Customer
SPRI	1.8	MPRI	1.8		
QSR	3421	QMR	2511	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
32	A_Morris	Downstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
1.8	U-510-10732	Jetting	09:11	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			09:35	

112.0 ft. Tap Factory Made Capped

125.2 ft. Joint Separated Large

2

129.4 ft. Joint Separated Medium

1

131.1 ft. Fracture Longitudinal

3

133.4 ft. Joint Offset Medium

1

134.3 ft. Tap Factory Made

137.2 ft. Fracture Longitudinal

3

157.3 ft. Obstacle In Joint

2

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH006	194		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH005	194		6	6	3

SPR	21	MPR	11	PO Number	Customer
SPRI	1.8	MPRI	1.8		
QSR	3421	QMR	2511	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
32	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
1.8	U-510-10732	Jetting	09:11	Dry

Date Cleaned	End Time	Additional Info
20160603	09:35	

161.4 ft. Deposits Attached Encrustation 2

185.7 ft. Deposits Attached Grease 2

187.2 ft. Fracture Longitudinal 3

187.6 ft. Deposits Attached Grease 2

191.5 ft. Deposits Attached Grease 2

194.0 ft. Access Point Manhole

SMH005

SMH005

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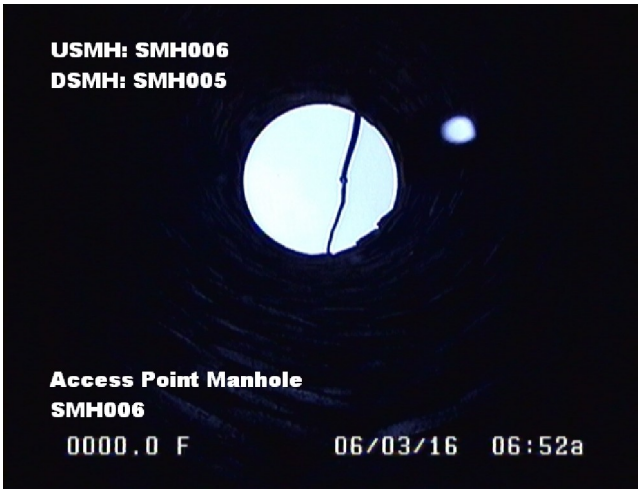
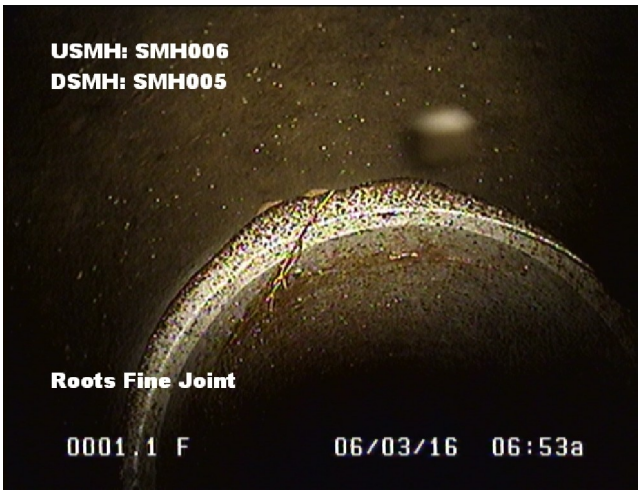
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	



Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	SMH006		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	0.5 ft.	Grade:	0
Condition:	Tap Factory Made		
Remarks:	N/A		



Distance:	1.1 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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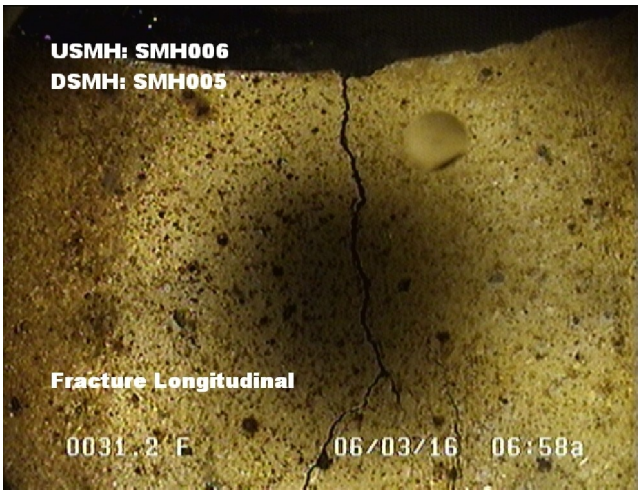
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

Distance: 24.1 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A

Distance: 31.2 ft. Grade: 1
Condition: Joint Separated Medium
Remarks: N/A



Distance: 31.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 32.1 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

Distance: 34.7 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 38.0 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 38.6 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 56.1 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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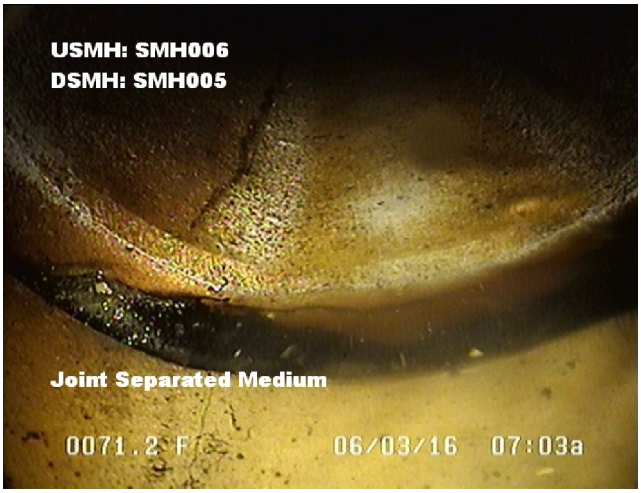
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

Distance: 56.8 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 71.2 ft. Grade: 1
Condition: Joint Separated Medium
Remarks: N/A

Distance: 74.2 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 112.0 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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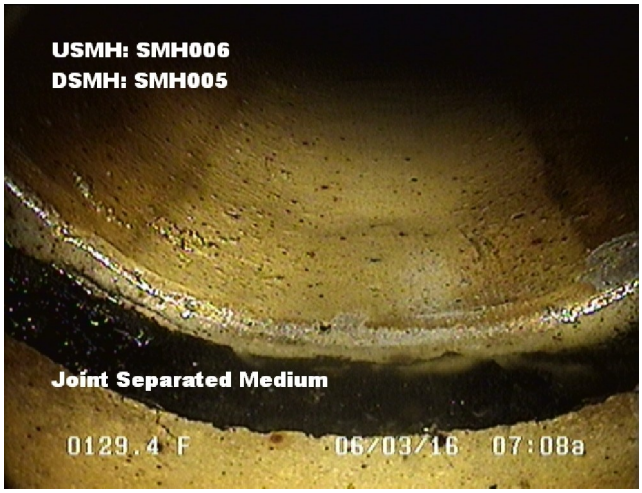
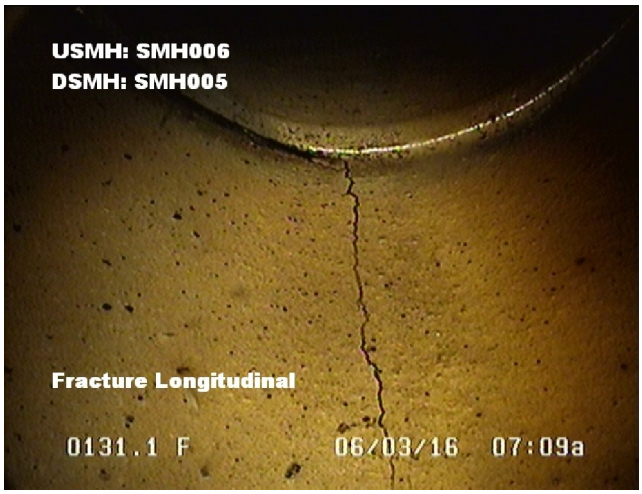
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH006	194		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH005	194		6	6	3	

Distance: 125.2 ft. Grade: 2
Condition: Joint Separated Large
Remarks: N/A



Distance: 129.4 ft. Grade: 1
Condition: Joint Separated Medium
Remarks: N/A



Distance: 131.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 133.4 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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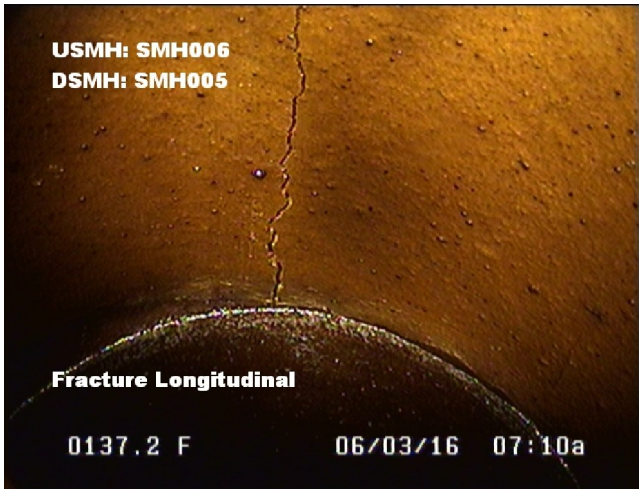
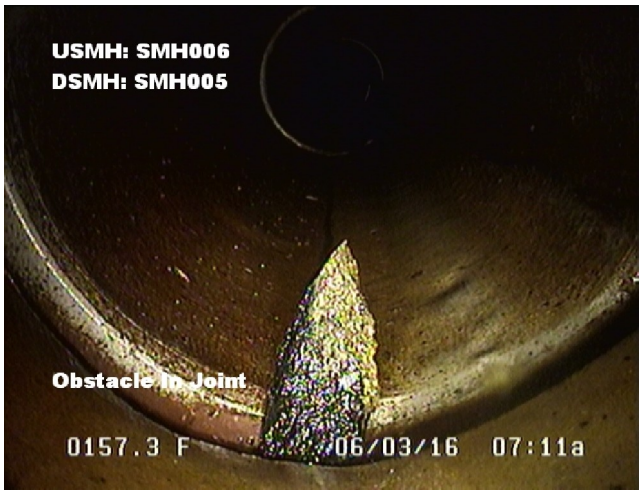
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

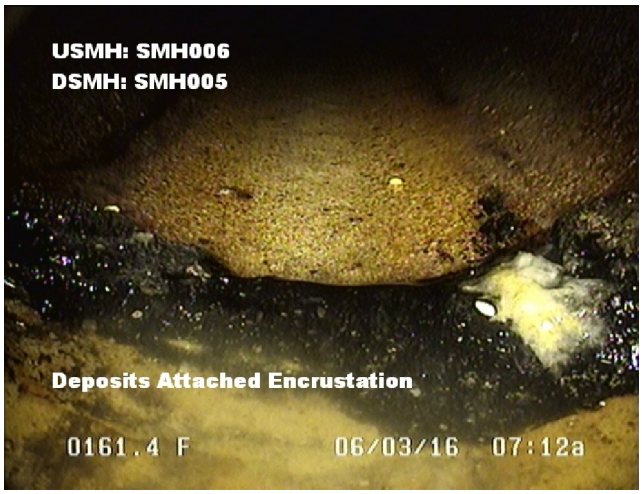
Distance: 134.3 ft. Grade: 0
Condition: Tap Factory Made
Remarks: N/A



Distance: 137.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 157.3 ft. Grade: 2
Condition: Obstacle In Joint
Remarks: N/A



Distance: 161.4 ft. Grade: 2
Condition: Deposits Attached Encrustation
Remarks: N/A

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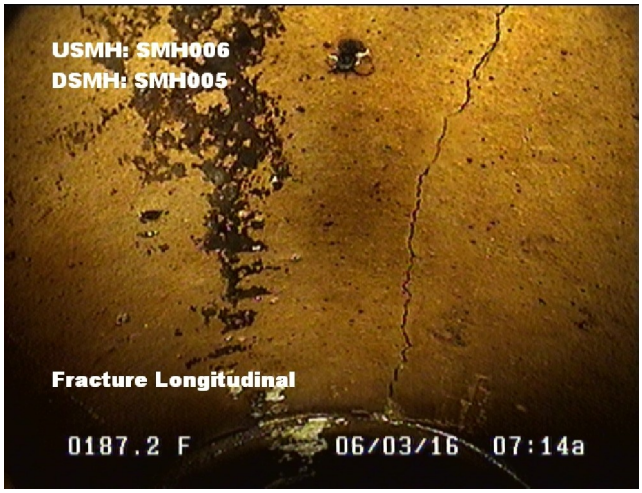
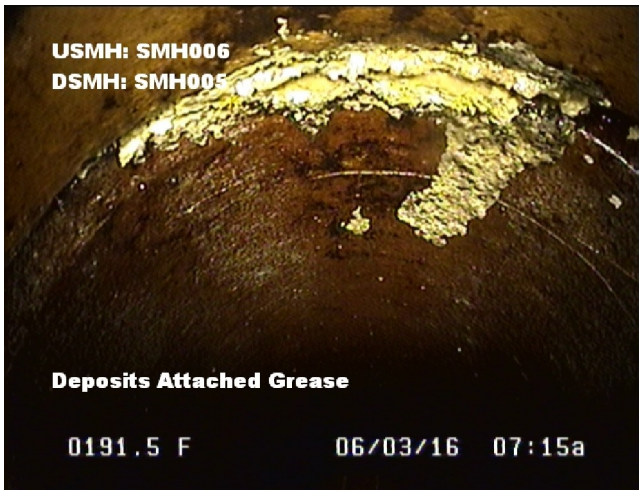
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

Distance: 185.7 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A



Distance: 187.2 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 187.6 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A



Distance: 191.5 ft. Grade: 2
Condition: Deposits Attached Grease
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH005	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH006	194		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH005	194		6	6	3	

Distance:	194.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	SMH005		

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH007	SMH006	SMH006_SMH007REV	6/3/2016	Russel St.	Vitrified Clay Pipe	6	191	165

Pipe Size: 6 Total Ln.: 191 Inspected Ln.: 165

Project Total Ln.: 191.0 Project Inspected Ln.: 165.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH007	191		Circular	

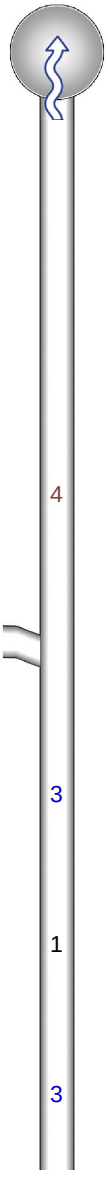
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH006	165		6	6	3

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.2	U-510-10732	Jetting	08:24	Dry

Date Cleaned	End Time	Additional Info
20160603	08:56	



0.0 ft.	Access Point Manhole		SMH006
0.0 ft.	Water Level		
0.0 ft.	Fracture Multiple		
8.0 ft.	Tap Factory Made Capped		
12.0 ft.	Fracture Longitudinal		
15.8 ft.	Joint Offset Medium		
18.1 ft.	Fracture Longitudinal		

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**	**Location Details**	
SMH007	191		Circular		
DS Manhole	**Length surveyed**	**Year Renewed**	**Height / Width**	**Pipe Joint...**	
SMH006	165		6 / 6	3	

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.2	U-510-10732	Jetting	08:24	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			08:56	

21.5 ft.	Tap Factory Made Capped			
21.9 ft.	Joint Offset Medium		1	
29.7 ft.	Tap Factory Made Capped			
30.9 ft.	Tap Break-In			Chimney
32.0 ft.	Fracture Longitudinal		3	
49.5 ft.	Joint Offset Large		2	At Repair
49.5 ft.	Repair Point Pipe Replaced			PVC
49.8 ft.	Broken Pipe Void Visible		5	

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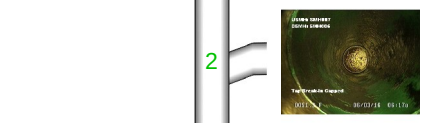
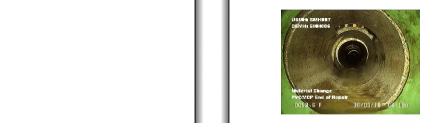
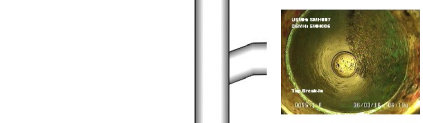
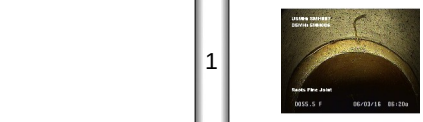
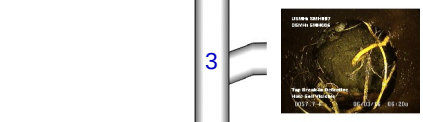
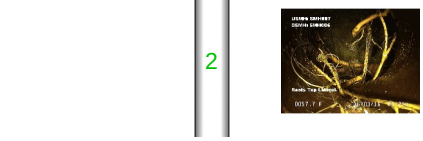
Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH007	191		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH006	165		6	6	3	

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.2	U-510-10732	Jetting	08:24	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			08:56	

51.3 ft.	Tap Break-In Capped		2	
53.6 ft.	Material Change			PVC/VCP End of Repair
55.1 ft.	Tap Break-In			
55.5 ft.	Tap Factory Made Capped			
55.5 ft.	Joint Offset Medium		1	
55.5 ft.	Roots Fine Joint		1	
57.7 ft.	Tap Break-In Defective		3	Hole Soil Visiable
57.7 ft.	Roots Tap Lateral		2	

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH007	191		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH006	165		6	6	3

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.2	U-510-10732	Jetting	08:24	Dry

Date Cleaned	End Time	Additional Info
20160603	08:56	

57.9 ft. Fracture Longitudinal

3

58.6 ft. Tap Break-In Abandoned

Patch over Lateral

63.5 ft. Fracture Multiple

4

67.9 ft. Fracture Longitudinal

3

69.8 ft. Crack Longitudinal

2

71.7 ft. Crack Longitudinal

2

85.7 ft. Water Level Sag

2

87.3 ft. Tap Factory Made Active

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH007	191		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH006	165		6	6	3	

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.2	U-510-10732	Jetting	08:24	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			08:56	

87.3 ft. Joint Offset Medium

95.3 ft. Tap Factory Made Capped

95.5 ft. Joint Offset Medium

109.9 ft. Crack Longitudinal

115.8 ft. Fracture Longitudinal

117.7 ft. Crack Longitudinal

131.6 ft. Crack Longitudinal

139.8 ft. Fracture Longitudinal

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH007	191		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH006	165		6	6	3

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.2	U-510-10732	Jetting	08:24	Dry

Date Cleaned	End Time	Additional Info
20160603	08:56	

141.6 ft. Crack Longitudinal

145.7 ft. Joint Offset Large

At Repair

145.8 ft. Repair Point Pipe Replaced

PVC

146.8 ft. Water Level Sag

148.2 ft. Tap Factory Made Capped

151.1 ft. Material Change

PVC/VCP End of Repair

151.4 ft. Crack Circumferential

155.1 ft. Tap Factory Made Capped

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH007	191		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

SPR	62	MPR	12	PO Number	Customer
SPRI	2.3	MPRI	2		
QSR	5142	QMR	3124	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
74	A_Morris	Upstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
2.2	U-510-10732	Jetting	08:24	Dry	

Date Cleaned	End Time	Additional Info
20160603	08:56	

155.1 ft. Joint Offset Medium

159.5 ft. Fracture Longitudinal

164.3 ft. Joint Offset Large

At Repair

165.0 ft. Survey Abandoned

End of Reversal

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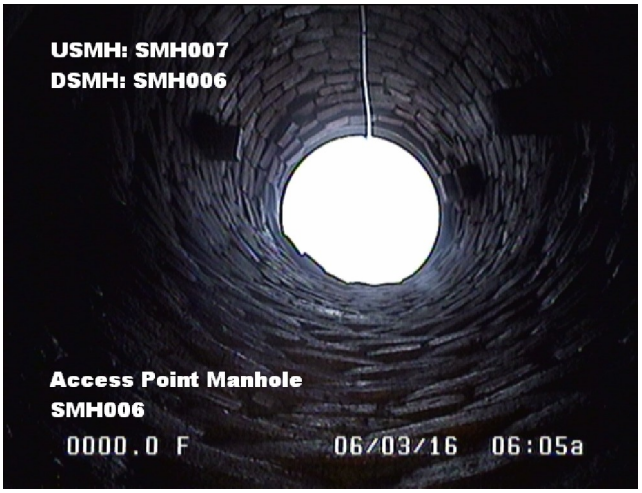
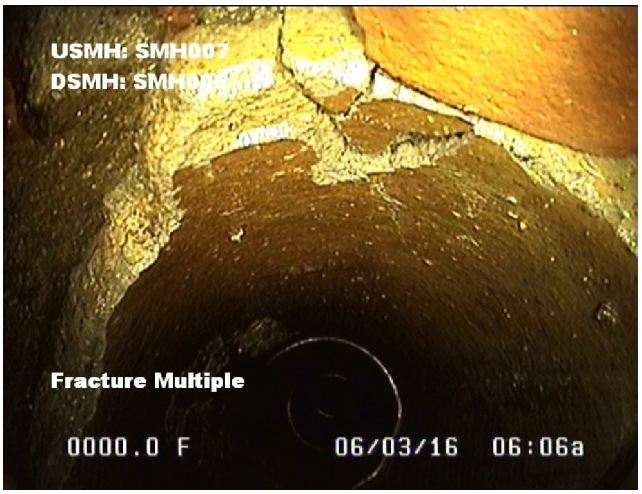
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	



Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	SMH006		

Distance:	0.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		



Distance:	0.0 ft.	Grade:	4
Condition:	Fracture Multiple		
Remarks:	N/A		

Distance:	8.0 ft.	Grade:	0
Condition:	Tap Factory Made Capped		
Remarks:	N/A		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 12.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 15.8 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 18.1 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 21.5 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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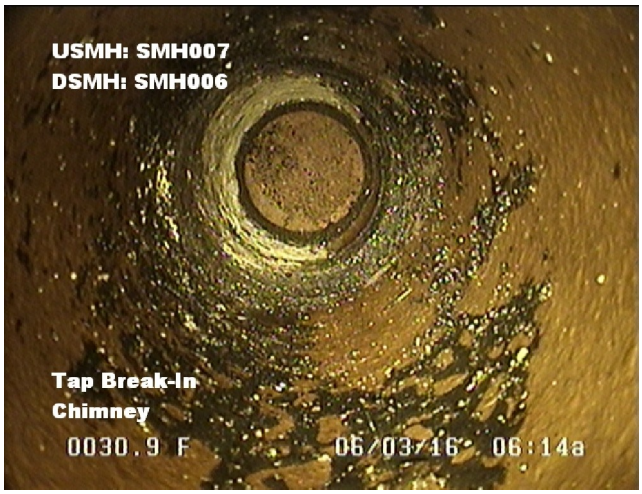
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 21.9 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 29.7 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A



Distance: 30.9 ft. Grade: 0
Condition: Tap Break-In
Remarks: Chimney

Distance: 32.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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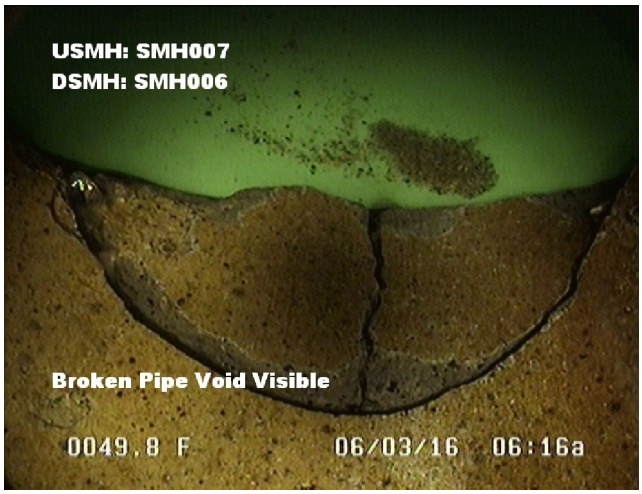
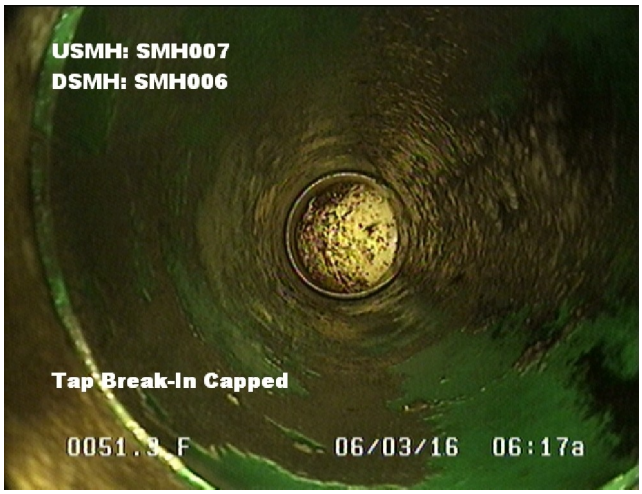
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 49.5 ft. Grade: 2
Condition: Joint Offset Large
Remarks: At Repair

Distance: 49.5 ft. Grade: 0
Condition: Repair Point Pipe Replaced
Remarks: PVC



Distance: 49.8 ft. Grade: 5
Condition: Broken Pipe Void Visible
Remarks: N/A



Distance: 51.3 ft. Grade: 2
Condition: Tap Break-In Capped
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 53.6 ft. Grade: 0
Condition: Material Change
Remarks: PVC/VCP End of Repair

Distance: 55.1 ft. Grade: 0
Condition: Tap Break-In
Remarks: N/A

Distance: 55.5 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 55.5 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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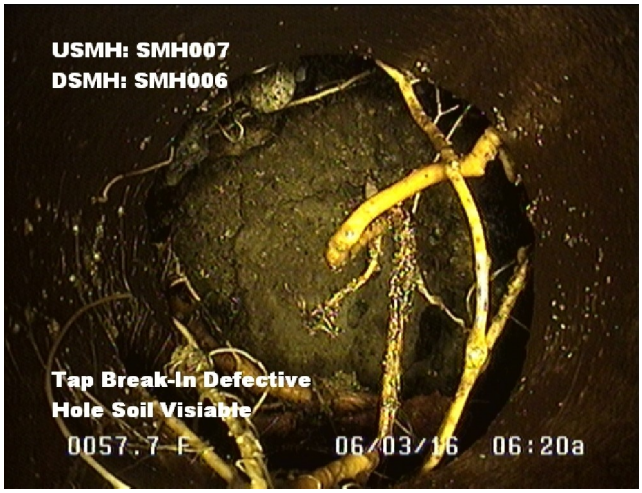
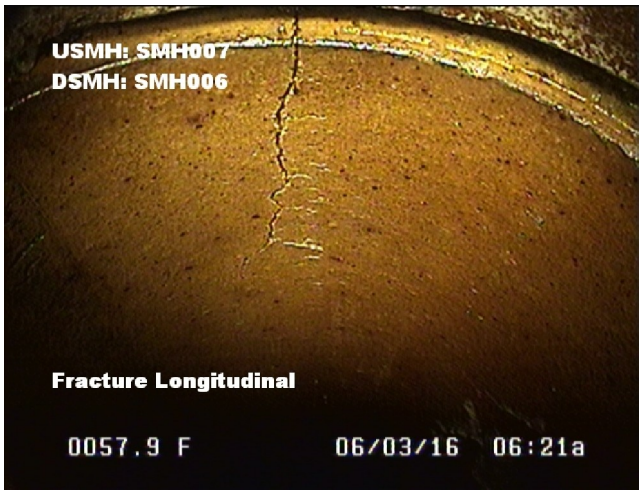
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 55.5 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 57.7 ft. Grade: 3
Condition: Tap Break-In Defective
Remarks: Hole Soil Visiable

Distance: 57.7 ft. Grade: 2
Condition: Roots Tap Lateral
Remarks: N/A



Distance: 57.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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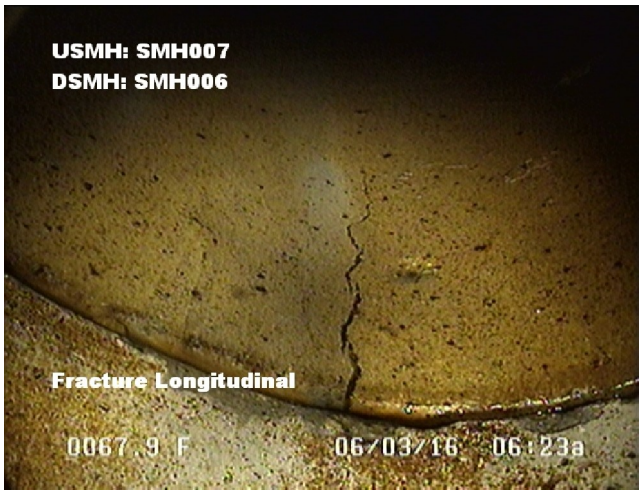
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 58.6 ft. Grade: 0
Condition: Tap Break-In Abandoned
Remarks: Patch over Lateral

Distance: 63.5 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A



Distance: 67.9 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 69.8 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 71.7 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 85.7 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 87.3 ft. Grade: 0
Condition: Tap Factory Made Active
Remarks: N/A

Distance: 87.3 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 95.3 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 95.5 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 109.9 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 115.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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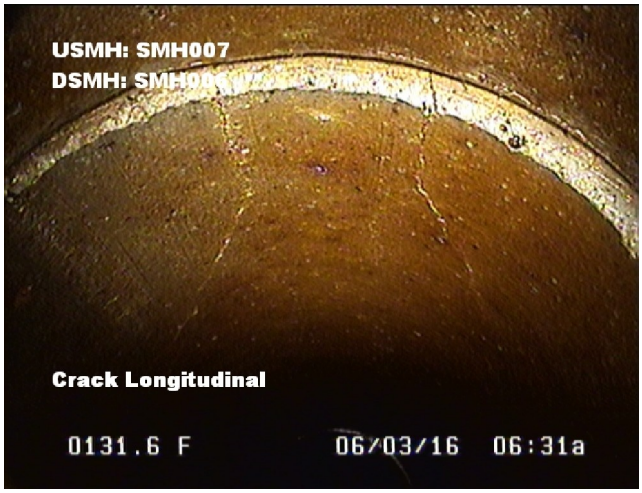
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 117.7 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A



Distance: 131.6 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

Distance: 139.8 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

Distance: 141.6 ft. Grade: 2
Condition: Crack Longitudinal
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 145.7 ft. Grade: 2
Condition: Joint Offset Large
Remarks: At Repair

Distance: 145.8 ft. Grade: 0
Condition: Repair Point Pipe Replaced
Remarks: PVC

Distance: 146.8 ft. Grade: 2
Condition: Water Level Sag
Remarks: N/A

Distance: 148.2 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 151.1 ft. Grade: 0
Condition: Material Change
Remarks: PVC/VCP End of Repair

Distance: 151.4 ft. Grade: 1
Condition: Crack Circumferential
Remarks: N/A

Distance: 155.1 ft. Grade: 0
Condition: Tap Factory Made Capped
Remarks: N/A

Distance: 155.1 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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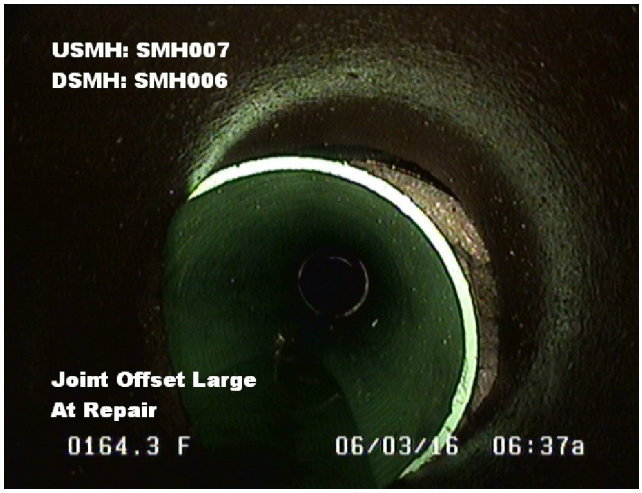
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH006_SMH007REV	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	191		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	165		6	6	3	

Distance: 159.5 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A



Distance: 164.3 ft. Grade: 2
Condition: Joint Offset Large
Remarks: At Repair

Distance: 165.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: End of Reversal

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Project Summary

Project Name:	City of Waltham Russel St. CCTV 6-3-16							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
SMH007	SMH006	SMH007_SMH006	6/3/2016	Russel St.	Vitrified Clay Pipe	6	0	26

Pipe Size: 6 Total Ln.: 0 Inspected Ln.: 26

Project Total Ln.: 0.0 Project Inspected Ln.: 26.0

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH007_SMH006	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH007	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH006	26		6	6	3	

SPR	6	MPR	2	PO Number	Customer
SPRI	2	MPRI	2		
QSR	3121	QMR	2100	Work Order	Purpose: Pre-Acceptance

OPR	Surveyed By	Direction	Date	Media label
8	A_Morris	Downstream	20160603	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2	U-510-10732	Jetting	08:06	Dry
Date Cleaned			**End Time**	**Additional Info**
20160603			08:14	

SMH007

0.0 ft.	Access Point Manhole		SMH007
0.0 ft.	Water Level		
0.0 ft.	Repair Point Pipe Replaced		PVC
3.0 ft.	Joint Separated Medium		
9.3 ft.	Water Level Sag		
10.0 ft.	Material Change		PVC/VCP End of Repair
10.3 ft.	Broken Pipe		

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Defect Listing Plot with Images

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
SMH007_SMH006	Waltham	Russel St.	Vitrified Clay Pipe		Sanitary

Upstream MH	Total Length	Year Laid	Shape	Location Details
SMH007	N/A		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
SMH006	26		6	6	3

SPR	6	MPR	2	PO Number	Customer
SPRI	2	MPRI	2	Work Order	Purpose: Pre-Acceptance
QSR	3121	QMR	2100		

OPR	Surveyed By	Direction	Date	Media label
8	A_Morris	Downstream	20160603	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2	U-510-10732	Jetting	08:06	Dry

Date Cleaned	End Time	Additional Info
20160603	08:14	

21.1 ft. Repair Point Pipe Replaced

PVC

25.5 ft. Joint Offset Large

2

26.0 ft. Survey Abandoned

Large Offset/Cannot Pass

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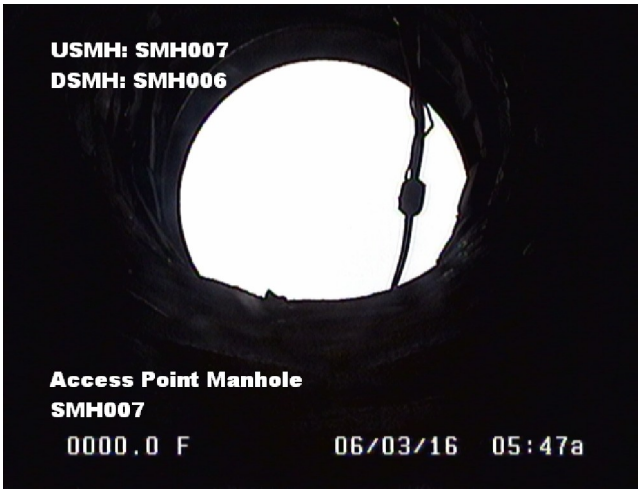
Albuquerque, NM
505-341-0109

Image Report 4/Page

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH007_SMH006	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	N/A		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	26		6	6	3	



Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: SMH007

Distance: 0.0 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 0.0 ft. Grade: 0
Condition: Repair Point Pipe Replaced
Remarks: PVC

Distance: 3.0 ft. Grade: 1
Condition: Joint Separated Medium
Remarks: N/A

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Image Report 4/Page

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH007_SMH006	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
SMH007	N/A		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
SMH006	26		6	6	3	

Distance:	9.3 ft.	Grade:	2
Condition:	Water Level Sag		
Remarks:	N/A		

Distance:	10.0 ft.	Grade:	0
Condition:	Material Change		
Remarks:	PVC/VCP End of Repair		

Distance:	10.3 ft.	Grade:	3
Condition:	Broken Pipe		
Remarks:	N/A		

Distance:	21.1 ft.	Grade:	0
Condition:	Repair Point Pipe Replaced		
Remarks:	PVC		

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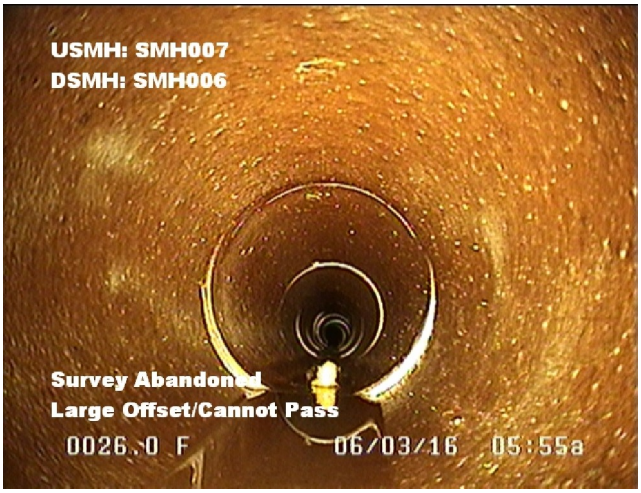
Albuquerque, NM
505-341-0109

Image Report 4/Page

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
SMH007_SMH006	Waltham	Russel St.	Vitrified Clay Pipe			Sanitary
Upstream MH	Total Length	Year Laid	Shape		Location Details	
SMH007	N/A		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
SMH006	26		6	6	3	

Distance: 25.5 ft. Grade: 2
Condition: Joint Offset Large
Remarks: N/A



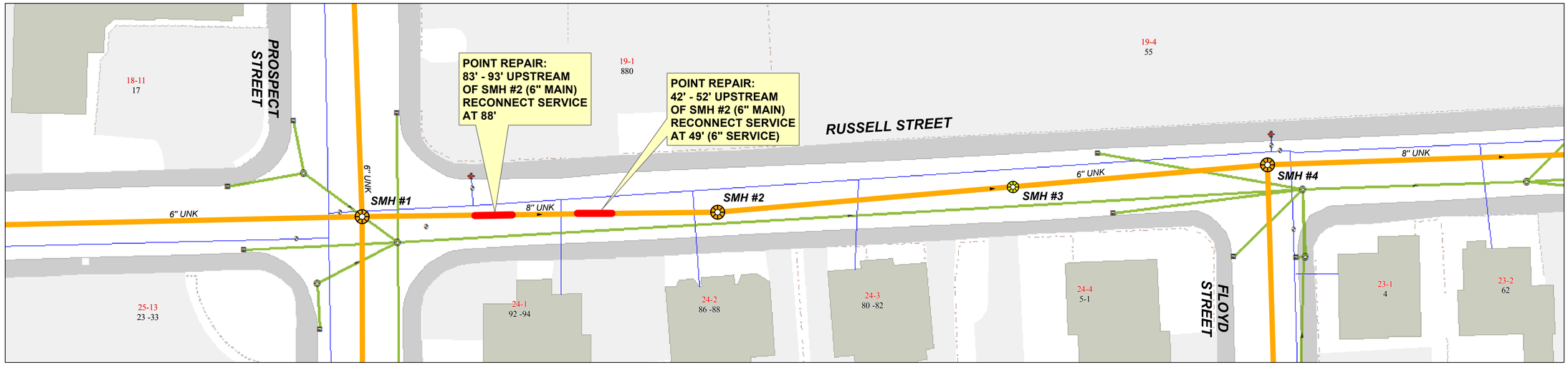
Distance: 26.0 ft. Grade: 0
Condition: Survey Abandoned
Remarks: Large Offset/Cannot Pass

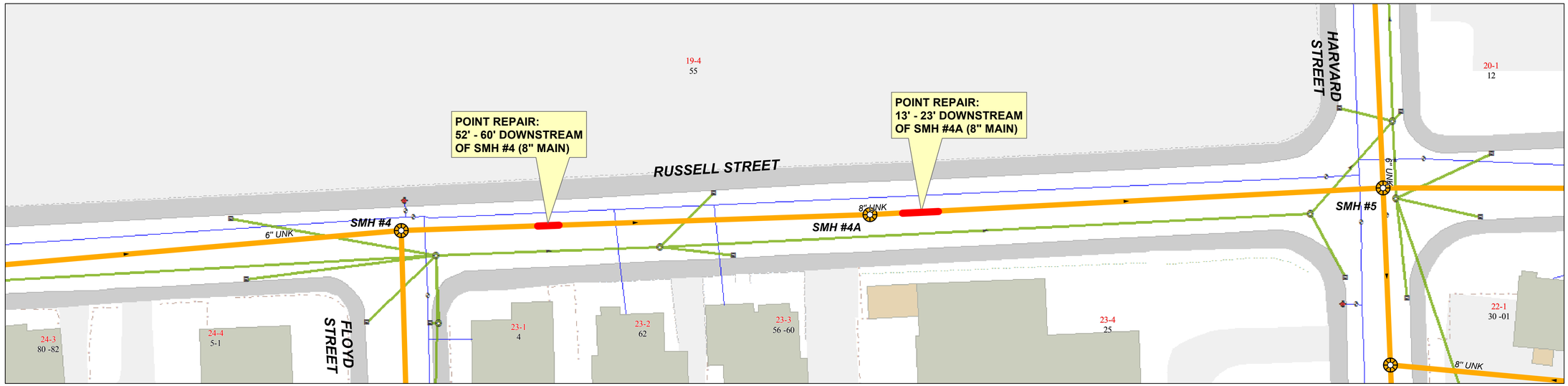
REPAIR PLANS

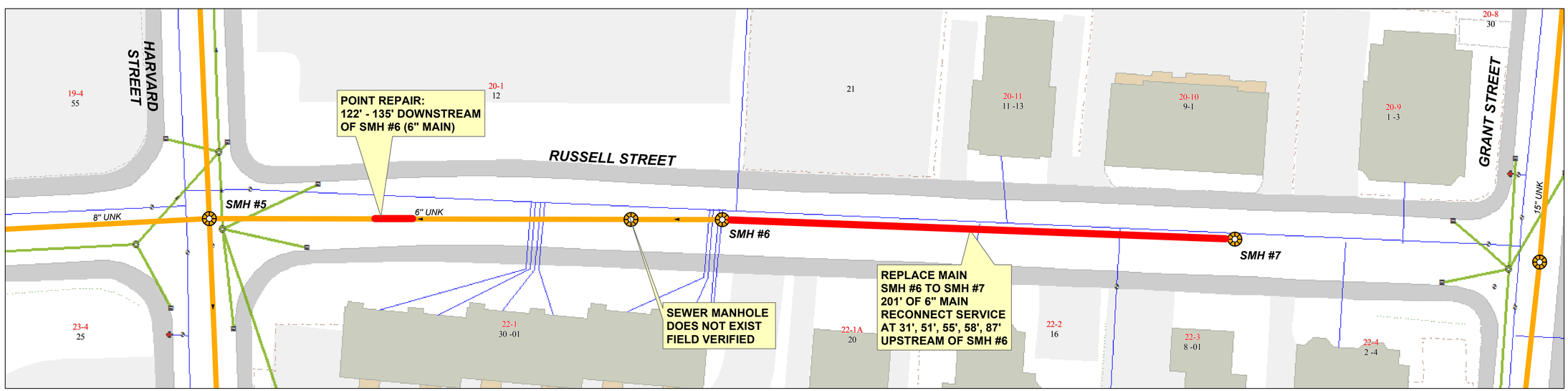
CITY OF WALTHAM

ENGINEERING DEPARTMENT

RUSSELL STREET SEWER REPAIRS JUNE 2016







Legend

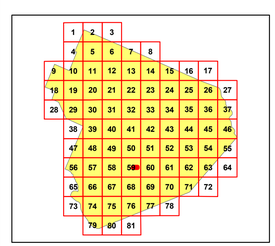
- Sewer Manhole
- Gravity Sewer
- Drain Manhole
- Gravity Main
- Catch Basin Lateral
- Hydrant
- Water Main
- Hydrant Lateral
- Force Main
- Building Footprint
- Deck
- Railroad Lines
- Sewer Point Repair

N W E S

1 inch = 20 feet

20 10 0 20 40 Feet

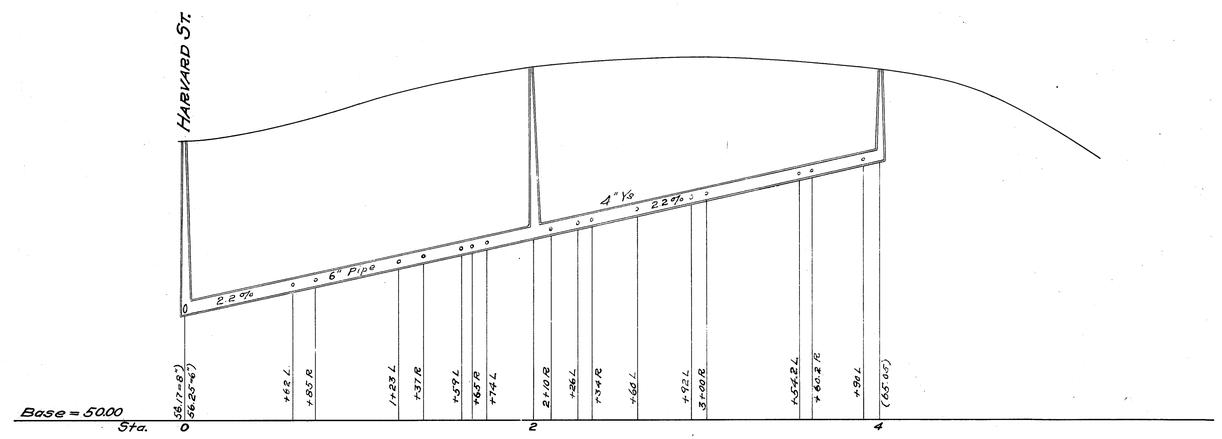
This map is for reference and planning purposes only. It is prepared for the inventory of real property within the City of Waltham and is compiled from tax maps, recorded deeds and plats. Users of this tax map are hereby notified that the aforementioned public primary information sources should be consulted for the verification of the information contained on this map. The City of Waltham and its mapping contractors assume no legal responsibility for the information contained herein.



DRAWINGS

RUSSELL STREET

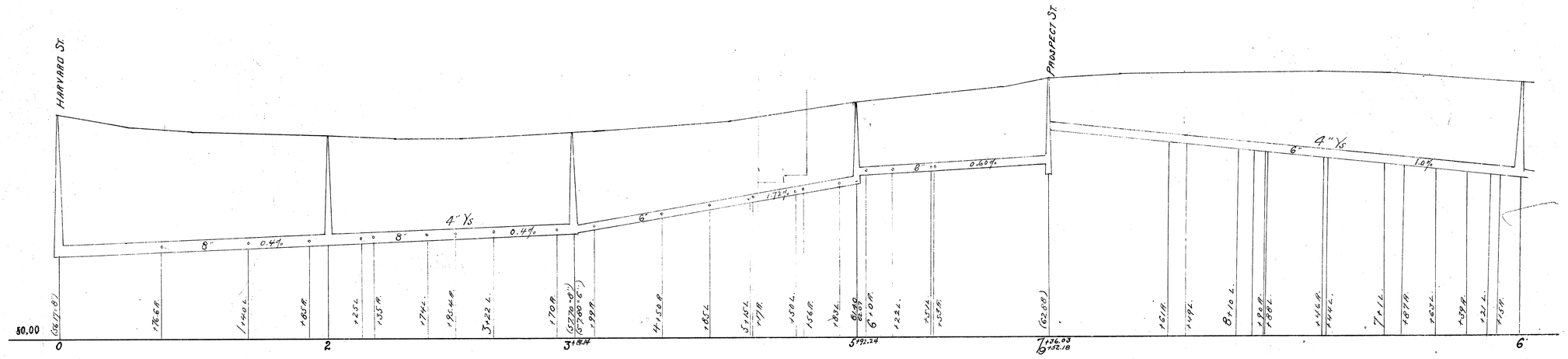
Scales: 40 Ft. Hor. & 4 Ft. Vert. Per Inch



Note:- Property owners names corrected to Apr. 1931.

W.H.B.

RUSSELL ST.
A



RUSSELL STREET.