The City of Waltham

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

Ash Street & Lowell Street
Drainage Improvement Projects

The GENERAL BID is due: 1.00 PM Wednesday May 13 2020

LAST DAY FOR WRITTEN QUESTIONS: 12 Noon May 7, 2020

(To Jpedulla@city.waltham.ma.us)

TABLE OF CONTENTS

Ash Street & Lowell Street Drainage Improvement Projects

SECTION 00010

INVITATION TO BID

Ash Street & Lowell Street Drainage Improvement Projects

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the **Ash Street & Lowell Street Drainage Improvement Projects** will be received by Joseph Pedulla, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **1.00 p.m., May 13, 2020** at which time and place all bids will be publicly opened and bids read aloud. Bids submitted after this time will not be accepted

The purpose of this Contract shall consist of drainage replacement of existing trunk line pipes, catch basin lateral pipes, manholes and catch basins with new RCP, precast manholes and catch basins and associated work including but not limited to trench paving and pavement markings in Lowell and Ash Streets in the City of Waltham, Massachusetts. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.

Contract Documents may be obtained by visiting the City's web site: www.city.waltham.ma.us/bids as soon as the social emergency is lifted

Last Day for written question is 12.00 noon May 7, 2020 via e-mail ONLY to jpedulla@city.waltham.ma.us

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

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

END OF SECTION

SECTION 00 10 00 - INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.01 SCHEDULE OF DATES

A. Advertisement appears in Central Register, Plans and Specifications ready for Bidders at www.city.waltham.ma.us/bids.

B. **Questions** and requests for interpretations may be submitted in writing via e-mail ONLY to Jpedulla@city.waltham.ma.us up to **12:00 noon May 7, 2020**

C. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the web site.

D. **General Bids Deadline**: **1.00 P.M. May 13, 2020** in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: J. Pedulla, CPO, where the bids will be publicly open and read.

1.02 BIDDING PROCEDURE

A. Bids for the work are subject to the provisions of Massachusetts General Laws, Chapter 30, 39M, as amended. Regulations governing the bidding procedures as set forth in the above mentioned amended General Laws must be followed.

B. In the event of any inconsistencies between any of the provisions of these Contract Documents and of the cited statute, anything herein to the contrary notwithstanding, the provisions of the said statute shall control.

C. No General Bid received by the Awarding Authority after the time respectively established herein for the opening of General Bids will be considered, regardless of the cause for the delay in the receipt of any such bid.

1.03 WITHDRAWAL OF BIDS

A. Bids may be withdrawn prior to the time respectively established for the opening of General Bids only on written request to the Awarding Authority.

1.04 INTERPRETATION OF CONTRACT DOCUMENTS

A. No oral interpretation will be made to any bidder. All questions or requests for interpretations must be made in writing ONLY to jpedulla@city.waltham.ma.us.

B. Every interpretation made to a bidder will be in the form of an Addendum to the drawings and/or specifications, which will be made available to all persons to whom Contract Documents have been issued.

C. Failure of the Awarding Authority to send or of any bidder to receive any such Addendum shall not relieve any bidder form obligation under his bid as submitted.

D. All such Addenda shall become a part of the Contract Documents.

1.05 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Each bidder may visit the site of the proposed work and fully acquaint himself with conditions as they exist, and may also thoroughly examine the Contract Documents. Failure of any bidder to visit the site and acquaint himself with the Contract Documents shall not relieve any bidder from any obligation with respect to his bid.

B. By submitting a bid, the bidder agrees that the Contract Documents are adequate and that the required result for a full and complete installation can be produced. The successful bidder shall furnish any and all labor, materials, insurance, permits and all other items needed to produce the required result to the satisfaction of the Awarding Authority.

1.06 BID SECURITY

A. The General Contractor's bid must be accompanied by bid security in the amount of five percent (5%) of the bid.

B. At the option of the bidder, the security may be bid bond, certified, treasurer's or cashier's check issued by a responsible bank or trust company. No other type of bid security is acceptable.

Bid Bonds shall be issued by a Surety Company qualified to do business under the laws of the Commonwealth of Massachusetts.

C. Certified, Treasurer's or Cashier's check shall be made payable to the City of Waltham, Massachusetts.

D. The bid security shall secure the execution of the Contract and the furnishing of a Performance and Payment Bond by the successful General Bidder for 100% of the contract value.

E. Should any General Bidder to whom an award is made fail to enter into a contract therefore within five (5) days, Saturdays, Sundays and Legal Holidays, excluded, after notice of award has been mailed to him or fail within such time to furnish a Performance Bond and also a Labor and Materials or Payment Bond as required, the amount so received from such General Bidder through his Bid Bond, Certified, Treasurer's or Cashier's check as bid deposit shall become the property of the City of

Waltham, Massachusetts as liquidated damages; provided that the amount of the bid deposit, which becomes the property of the City of Waltham, Massachusetts, shall not in any event exceed the difference between his bid price and the bid price of the next lowest responsible and eligible bidder; and provided further that, in case of death, disability, bona fide clerical error or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder, his deposit shall be returned to him.

1.07 BID FORM

A. General Bids shall be submitted on the "FORM FOR GENERAL BID" enclosed. Erasures or other changes must be explained or noted over the signature of the bidder.

B. Bid forms must be completely filled in. Bids which are incomplete, conditional, or obscure, or which contain additions not called for will be rejected.

C. General Bidders shall submit one set of executed bid forms to the Awarding Authority.

1.08 SUBMISSION OF BIDS AND BID SECURITIES

A. Each bid submitted by a General Contractor shall be enclosed in a sealed envelope that shall be placed with the bid security in an outer envelope. The outer envelope shall be sealed and clearly marked as follows:

(Firm Name): _____

Ash Street & Lowell Street Drainage Improvement Projects,

1.09 AWARD OF CONTRACT

A. The Contract shall be awarded to the lowest responsible and eligible General Bidder on the basis of competitive bids in accordance with the procedure set forth in the provision of Chapter 30, §39M of the General Laws of the Commonwealth of Massachusetts.

B. If the bidder selected as the General Contractor fails to perform his agreement to execute a contract in accordance with the terms of his General Bid, and furnish a Performance Bond and also a Labor and Materials or Payment Bond, as stated in his General Bid an award shall be made to the next lowest responsible and eligible bidder.

C. The words "lowest responsible and eligible bidder" shall be the bidder whose name is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, on the work. Essential information in regard to such qualifications shall be submitted in such form as the Awarding Authority may require.

D. Action on the award will be taken within sixty (60) days, Saturdays, Sundays and Legal Holidays excluded after the opening of the bids.

1.10 SECURITY FOR FAITHFUL PERFORMANCE

A. The successful bidder must deliver to the Awarding Authority simultaneously with his delivery of the executed contract, an executed Performance Bond, and also a Labor and materials or Payment Bond, each issued by a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of One Hundred Percent (100%) of the Contract Price, as surety for the faithful performance of his contract, and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds shall provide that, if the General Contractor fails or refuses to complete the Contract, the Surety Company will be obligated to do so.

B. Premiums are to be paid by the General Contractor, and are to be included in the Contract Price.

1.11 EQUAL OPPORTUNITY

A. The City of Waltham is an Equal Opportunity employer and will require compliance with the minority business enterprise plan (MBE) on file in the Purchasing Department

1.12 PRE-BID WALK-THRU

A. In accordance with COVID 19 declared emergency no pre-bid walk-thru or briefing will be held at this time. However, interested parties are encouraged to become familiar with the site by visiting on their own schedule as long as the visit does not interfere with the privacy of abutting neighbors

1.13 SITE VISITS

A. Prospective bidders are encouraged to visit the site at their own schedule prior to the Bid Opening.

1.14 CONTRACT DOCUMENTS

A. The Awarding Authority shall make available the bid documents and addenda in the City Web site at www.city.waltham.ma.us/bids. No plans will be mailed.

1.15 EQUALITY

A. Except where otherwise specifically provided to the contrary, the words “or approved equal” are hereby inserted immediately following the name or description of each article, assembly, system, or any component part thereof in the Contract Documents. It is the Contractor’s responsibility to provide all the research and documentation that would prove a product or assembly is “equal”. Failure to provide research or documentation does not alleviate the Contractor’s responsibility to meet the schedule.

1.16 TAX FREE NUMBER

A. The City of Waltham has a tax-free number.

1.17 SCHEDULE

A. The work of the Contract shall be Substantially Complete in **120 calendar days** after the date of the Notice-to-Proceed and **not including weather-related shut-downs**.

1.18 INTENTIONALLY LEFT BLANK

1.19 WEEKLY JOB MEETINGS

A. There will be a weekly job meeting at the site on the same agreed-upon day and time. Time will be provided to discuss and view the progress of the work and to answer questions. The Contractor's job Superintendent and Project Manager shall attend each meeting. The City reserves the right to have job meetings conducted in the location of its choosing.

1.20 PROJECT SUPERINTENDENT

A. The Contractor shall provide the same person as Superintendent for the entire duration of the project. Failure to maintain the same person in this position shall result in a One Thousand Dollar ($1,000.00) penalty per incident which shall cover the Architect's time to re-orient new personnel.

1.21 AWARD

A. The Awarding Authority reserves the right to reject any or all bids if it be in the public interest to do so, and to act upon the bids and make its award in any lawful manner. An award shall be made no less than 90 days from the Bid Opening Date.

1.22 PREVAILING WAGE SCHEDULE

A. Bids shall be made on the basis of the Prevailing Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provision of the Massachusetts General Laws. The Prevailing wage Schedule for this project can be found in the City's web Site at www.city.waltham.ma.us/bids

1.23 CONFLICT OF INTEREST

A. A bidder filing a proposal thereby certifies that the proposal is made in good faith, without fraud, collusion, or connection of any kind with any other bidder for the same work, and that the bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

1.24 PROCEED ORDERS

A. No bidder is to proceed without a proceed order as set out in the contract.

1.25 INTENTIONALLY LEFT BLANK

1.26 COMPLIANCE WITH MASSACHUSETTS GENERAL LAWS

A. Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A, I certify under the penalty of perjury that I, to the best of my knowledge and belief have filed all state tax returns and paid all the state taxes required under law.

1.27 CONSTRUCTION BARRICADES

A. The General Contractor shall provide all barricades to enclose the work area to prevent unauthorized access to the site.

1. The barricades shall provide enough room for all construction activities to be performed while separated from pedestrians, students, and staff on site.

2. Safety is the sole responsibility of the Contractor and any barricades necessary to protect the work and the public shall be provided.

3. Provide entrance protection.

1.28 INSURANCE

A. The contractor shall purchase and maintain, at his expense all insurance required by the Contract. Documents and all insurance required by the applicable laws of Massachusetts, including but not limited to, General Laws, Chapter 146, in connection with all hoisting equipment.

B. The Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation acts and from claims for damages because of bodily injury, including death and all property damage including, without limitation, damage to buildings and adjoining the site of construction which might arise from and during operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them including:

1. Statutory Worker's Compensation and Employer's Liability

The contractor shall provide insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws (so-called Worker's Compensation Act) to all persons to be employed under this contract and shall continue in force such insurance as aforesaid shall be deemed a material breach of this Contract and shall operate as an immediate termination thereof. The contractor shall, without limiting the generality of the

foregoing, conform to the provisions of Section 34A of Chapter 149 of the General Laws, which Section is incorporated herein by reference and made a part of hereof.

2. Comprehensive General Liability Insurance

Minimum bodily injury limits of $ 1,000,000 per person and $ 1,000,000 per accident, and property damage limits of $ 500,000 per accident and $ 1,000,000 aggregate during any 12-month period, shall include the following:

a. Public liability (bodily injury and property damage)
b. X.C.U. (explosion, collapse, and underground utilities)
c. Independent contractor's protective liability.
d. Products and completed operations.
e. Save harmless agreement for Owner and Architects set forth in ARTICLE 10.11 of the GENERAL CONDITIONS.

3. Comprehensive All Risk Motor Vehicle Liability Insurance

Minimum bodily injury limits of $ 500,000 per person, $ 1,000,000 per accident, and property damage limit of $ 1,000,000 per accident.

4. All Risk Insurance

Covering all Contractors' equipment with a provision for Waiver of Subrogation against the Owner.

5. Excess Liability Insurance in Umbrella Form with combined Bodily Injury and Property Damage Limit of $ 1,000,000.

6. **City of Waltham shall be a Named Additional Insured with a Waiver of Subrogation on the insurance policy for this project.**

1.29 SITE ACCESS

A. The General Contractor shall gain access to the site via routes approved by the Owner.

1. The General Contractor as part of the bid price will restore all roads, curbs, driveways, walks and grassed or landscaped areas damaged during construction.

1.30 CONSTRUCTION TRAILER

A. The General Contractor shall locate the construction trailer at locations approved by the Owner.

B. The General Contractor shall locate all on site stored or staged materials within the enclosed area designated by the Owner.

1.31 INTENTIONALLY LEFT BLANK

1.32 COMPLETE BID FORMS

A. Please Note: Each bidder must fill in all the blanks on all the bid forms, even if the information is "zero dollars" or "not applicable". Also, please acknowledge all Addenda issued by the Awarding Authority.

2.00 FUNDS APPROPRIATION and LOAN AUTHORIZATION**.**

A THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

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

A 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

Signature of Individual or Corporate Name

By:

_____

(Signature of Corporate Officer if applicable)

Title:_____

Social Security Number or Federal Identification Number: _____

END OF SECTION

Section 00 20 00

Compliance

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

Compliance

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

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

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

Section Index

Check when Complete

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

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

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

Your Company's Name: _____

Service or Product Bid_____

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

Wet Signature Required

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

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

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

_____
(Name of business)

Wet Signature Required

TAX COMPLIANCE CERTIFICATION

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

_____, _____
Signature of person submitting bid or proposal Date

_____
Name of business

NOTE

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

Wet Signature Required

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

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

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

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

SIGNED:

(Corporate Seal)

_____

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of_____ **Date:**

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

Notary Public;

My Commission expires: _____

Wet Signature Required

CORPORATION IDENTIFICATION

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

If a Corporation:

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

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

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

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

If an Individual:
Name _____
Residence _____

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

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

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

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

   Dollar value of service provided to this Company:

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

   Dollar value of service provided to this Company:

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

   Dollar value of service provided to this Company:

NOTE

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

WEEKLY PAYROLL RECORDS REPORT &
STATEMENT OF COMPLIANCE

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

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

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

_____

STATEMENT OF COMPLIANCE

_____, 200____

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

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

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

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

Signature_____, Title _____

Print_____

WEEKLY PAYROLL REPORT FORM

Company Name: _____

Project Name: _____

Awarding Auth.: _____

Work Week Ending: _____

☐ Final Report

☐ Prime Contractor

☐ Subcontractor
List Prime Contractor: _____

Employer Signature: _____

Print Name & Title: _____

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

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

Wet Signature Required

RIGHT TO KNOW LAW

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

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

Signature **Date**

Print Name

NOTE

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

Wet Signature Required

DEBARMENT CERTIFICATION

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

Company Name _____

Address _____

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

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

_____

Print name _____,

Date _____

Wet Signature Required

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

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

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date_____

See Chapter 306 of the Acts of 2004

NOTE

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

SECTION 00301

BID FORM

To the City of Waltham, Massachusetts, acting through its Mayor:

The Undersigned, as Bidder, declares as follows:

- The only parties interested in this BID as Principals are named herein;
- this BID is made without collusion with any other person, firm, or corporation;
- no officer, agent, or employee of the Owner is directly or indirectly interested in this BID;
- the Bidder has carefully examined the site of 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 Drawings, 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 on the Drawings or in any of the other Contract Documents and agrees that the Bidder shall not use or be entitled to use any such information made available to him through the 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 or 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;
- and the Bidder understands that the quantities of work tabulated in this BID or indicated on the Drawings or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer;
- and agrees that, if this is accepted will contract with the Owner, as provided the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Documents, that the will perform all work and all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies all other required by Contract Documents the manner within the therein prescribed according to the requirements the

Engineer as therein set forth, and that the Bidder will take in full payment therefore the lump sum or unit price applicable to each item of the Work as stated in the following schedule:

Bidders must bid on each item of the Base Bid. All entries in the entire BID must be made clearly and in ink; prices bid must be written in both words and figures. In case of discrepancy, the amount shown in words will govern.

Bidders shall insert extended item prices obtained from quantities and unit prices. In case of discrepancy between the product obtained by multiplying the estimated quantity by the unit price, the actual product shall apply. In case of discrepancy between the sum of the total figure of the items and the total amount listed, the actual sum shall apply.

Contractor acknowledges Receipt of Addenda numbered: _____, _____, _____, _____, _____.

(Bidder) _____

(by) _____

(Title) _____

BASE BID

Storm Drain Improvements Project – Lowell Street and Ash Street

Refer to Section 01024 - Measurement and Payment for Item Descriptions. The work of the General Bidder, being all work covered by items 1 through 16, inclusive.

Item No.	Item Description Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
1	Mobilization and Demobilization _____ Dollars and Cents	LS	1		
2	Traffic Management _____ Dollars and Cents	LS	1		
3	Storm Drain Piping (15" RCP), & Appurtenances _____ Dollars and Cents	LF	320		
4	4-foot Diameter Precast Concrete Manhole _____ Dollars and Cents	ea	3		
5	5-foot Diameter Precast Concrete Manhole _____ Dollars and Cents	ea	1		
6	Double Grate Precast Concrete Catch basins _____ Dollars and Cents	ea	3		
7	Heavy Cleaning and CCTV – 12-inch Clay _____ Dollars and Cents	lf	600		
8	Light Cleaning and CCTV – 15-inch Clay _____ Dollars and Cents	lf	300		
9	Catch Basin Sump and Lateral Connection Cleaning _____ Dollars and Cents	ea	7		
10	Bituminous Concrete Binder Course _____ Dollars and Cents	TON	100		
11	Bituminous Concrete Wearing Course _____ Dollars and Cents	TON	60		
12	4 Inch Reflectorized White Line Thermoplastic (MassDOT 866.040) _____ Dollars and Cents	LF	750		
13	4 Inch Reflectorized Yellow Line Thermoplastic (MassDOT 867.040) _____ Dollars and Cents	LF	200		
14	Police Detail Allowance _____ Dollars and Cents	hr	450	$50/hr	$22,500

15	Miscellaneous Work and Cleanup _____ Dollars and Cents	LS	1		
16	Erosion and Sedimentation Control _____ Dollars and Cents	LS	1		

TOTAL FOR BASE BID

Total Amount of Base Bid (**Basis of Award**) (Items 1 through 16 inclusive).
$_____
(Amount in figures)

_____
(Amount in words)

The bidder understands that the Owner reserves the right to reject any and all bids and to waive any informality in the bidding.

The undersigned agrees that for extra work, if any, will be performed in accordance with Article 10 of the General Conditions of the Contract and will be paid for in accordance with Article 11 of the General Conditions of the Contract.

The bid security accompanying this BID shall be in the amount of 5 percent of the BID payable to the City of Waltham.

The time for completion of this contract is 120 calendar days. Liquidated damages specified in this contract are $1,000 per day for each calendar day beyond the contract completion date that work remains uncompleted.

Bids shall be valid for ninety (90) days and cannot be withdrawn until after the 90-day period has expired.

The undersigned agrees that if the Owner accepts this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within ten (10) days, Saturdays, Sundays, and legal holidays excluded, after notification that the AGREEMENT and other Contract Documents are ready for signature.

A performance bond in an amount equal to 100 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 100 percent of the total bid amount.

Should the bidder fail to fulfill any of his agreements as hereinabove set forth, the Owner shall have the right to retain as liquidated damages the amount of the bid check or cash which shall become the Owner's property. If a bid bond was given, it is agreed that the amount thereof shall be paid as liquidated damages to the Owner by the Surety.

The bidder, by submittal of this BID, agrees with the Owner that the amount of the bid security deposited with this BID fairly and reasonably represents the amount of damages the Owner will suffer due to the failure of the bidder to fulfill his agreements as above provided.

The undersigned bidder hereby certifies he/she will comply with the minority workforce percentage ratio and specific affirmative action steps contained in the EEO/AA provisions of this Contract, including compliance with the Minority/Woman Business Enterprise as required under these contract provisions. The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors a copy of the certification by said subcontractor, regardless of tier, that it will comply with the minority workforce ratio and specific affirmative action steps contained in these contract provisions and submit it to the contracting agency prior to the award of such subcontract.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.
Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

The attached Minority Business Participation and Women Business Participation Form (Form EEO-BMF-190) and the attached Minority Business Participation and the Women Business Participation Letters of Intent (Form EEO-BMF-191) must be completed and submitted as part of the Bid Proposal.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to MOL Ch. 30, Section 39M. The bidding and award of the contract will be in full compliance with Section 39M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The attached CERTIFICATE OF NON-COLLUSION must be signed and submitted as part of the Bid Proposal.

_____
(Name of General Bidder)

By_____ Date_____
(Signature and title of authorized representative)

SEAL

_____ _____

(Telephone) (Business address)

_____ _____

(Fax Number) (City, State, Zip)

The following documents are attached to and made a condition of the bid, and shall be filed with the bid:

- Bid Security (5%)
- Completed and signed Bid Proposal Section 00301
- Compliance Section 00200

The Bidder is requested to list four or more of your firm's recent projects of a similar character as required for acceptable bid. References will enable the Owner to judge his experience, skill, and business standing.

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Add supplementary page if necessary.

END OF SECTION 00301

SECTION 00500
AGREEMENT
CITY OF WALTHAM

This agreement, made this _____ day of _____, 2020 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and _____ hereinafter called the CONTRACTOR.

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

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

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

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

_____
Stephen Casazza, City Engineer
Date: _____

_____
Joseph Pedulla, Purchasing Agent
Date: _____

_____
Paul Centofanti, Auditor
Date:_____

I CERTIFY THAT SUFFICIENT FUNDS ARE AVAILABLE FOR THIS CONTRACT

FOR THE COMPANY

_____
CONTRACTOR (Signature),
Date: _____

_____
Company

_____
Address

SECTION 00 06 10

PERFORMANCE BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,
_____ as

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

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

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

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

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

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

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

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

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

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

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

SECTION 00 61 15

PAYMENT BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,
_____ as

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

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

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

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

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

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

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

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

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

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

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

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

SECTION 00 71 00

PREVAILING WAGES

Bids shall be made on the basis of the Prevailing Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provision of the Massachusetts General Laws. The Prevailing wage Schedule for this project can be found in the City's web Site at www.city.waltham.ma.us/bids

SECTION 00821

PERMITS

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

A. The general provisions of the Contract, including General and Supplemental Conditions and General Requirements, apply to the work specified in this section.

1.02 PERMITS

A. The Contractor shall be responsible for obtaining and complying with all permits required of his equipment, work force, or particular operations (such as blasting and fuel storage permits, etc.) in the performance of the Contract. All costs associated with obtaining permits will be included in the price of the work.

B. If included as part of this project, The Contractor shall be responsible for complying with requirements of the Local Conservation Commission and the Cambridge Watershed Protection District. All costs associated with complying with the conditions will be included in the price of the work.

C. The Contractor shall be responsible for obtaining and complying with the requirements of the Street Opening and Trench Permits required by the City Department of Public Works in the performance of the Contract. All costs associated with obtaining permits will be waived by the City.

END OF SECTION

COVID-19 BID OPENING (TEMPORARY).

Based on Governor Baker's declared state of emergency, in-person bid or proposal openings are not required at the present time to satisfy Chapter 30B. If a bid is not opened at a public meeting, Chapter 30B requires that the opening be in the presence of a witness or witnesses. Under the current emergency, the opening does not need to be witnessed in person. The opening can be livestreamed for the witnesses and recorded for public record purposes. For the present time and until the emergency is lifted by Governor Baker, the City of Waltham will not hold in-person bid openings or proposals. However, the city will continue to record and prepare a spreadsheet showing all of the prices received and distribute the same to all interested parties. Copies of the same bid results will also be posted in the City web site at www.city.waltham.ma.us/bids

SITE VISIT

For the time being and while the COVID-19 Emergency is in effect, site visits will not be organized, held or required by the City. However, interested parties may, at their own discretion visit the project site assuming that the visit does not interfere with the privacy of abutting residents and that it complies with the Governor's COVID-19 Guidelines. Interested contractors are encouraged to ask clarification questions via email only to Jpedulla@city.waltham.ma.us. Written questions must be received by the City's Purchasing Department no later than 5 working days prior to the bid opening date. All questions will be answered formally via an addendum a copy of which will be emailed to all vendors of record and a copy posted in the city web site.

TECHNICAL SPECIFICATIONS

CITY OF WALTHAM
MASSACHUSETTS

SPECIFICATIONS

FOR

STORM DRAINAGE IMPROVEMENTS PROJECT
LOWELL STREET AND ASH STREET

January 2020

City Engineer
Stephen A. Casazza, P.E.

Prepared by:

SSV ENGINEERING INC.
609 Winter Street
Framingham. MA 01702

COMMONWEALTH OF MASSACHUSETTS
REGISTERED
PROFESSIONAL ENGINEER

11/10/2020

TABLE OF CONTENTS

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE WORK

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. The purpose of this Contract shall consist of drainage replacement of existing trunk line pipes, catch basin lateral pipes, manholes and catch basins with new RCP, precast manholes and catch basins and associated work including but not limited to trench paving and pavement markings in Lowell and Ash Streets in the City of Waltham, Massachusetts. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.

B. The Contractor shall comply with all applicable performance and safety requirements specifically related to the work under this Contract. In addition, all things not expressly mentioned in these Specifications but involved in carrying out their intent are required by these Specifications, and the Contractor shall perform the same as though they were specifically delineated and described.

C. It is the Contractor's responsibility to verify physical conditions and components of the work at each specific location of Work.

D. Work performed under this contract is located on property owned by the City of Waltham, Massachusetts.

1.2 VISITS TO THE SITE

Before submitting a bid, the Contractor shall visit the various sites, examine their conditions and thoroughly acquaint himself with the conditions for performing the work. He shall also study the drawings and compare the same with the information gathered during his examination of the sites, as no extra compensation will be authorized for extra work caused by his unfamiliarity with the sites and/or drawings or the conditions peculiar to this job.

1.3 PERSONNEL REQUIREMENTS

A. The Contractor (and any subcontractor) shall furnish sufficiently trained and competent personnel to perform the Work required of the Contractor under this Contract.

B. The Contractor shall provide adequate contract orientation for all staff to be assigned on a permanent, temporary, or call-in basis. This shall include familiarization of equipment type and the respective locations of work. All staff involved in executing this Contract should be familiar with their contractual responsibilities pertaining to security, safety, inspection guidelines, and activities around all work locations.

C. If any Contractor's personnel is deemed unsatisfactory or does not perform the services to be furnished hereunder in a proper manner and satisfactory to the City, or in the determination of the City has taken action which constitutes a conflict of interest or which is inconsistent with the highest level of honesty, ethical conduct or public trust or which the City determines is adverse to the public interest or to the

best interest of the City, the Contractor shall remove any such personnel and replace them with personnel satisfactory to the City within twenty-four (24) hours following the Contractor's receipt of a request for such replacement.

1.4 PERMITS, FEES AND BONDS

A. The Contractor shall obtain and comply with all required permits, pay all fees and provide all bonds necessary to complete the work as specified.
B. A City of Waltham Street Opening Permit must be issued before work is started.

1.5 FIELD LAYOUT

The Engineer shall be responsible for the initial layout of control (if required). The Contractor shall be responsible for layout of the proposed work and appurtenances as shown on the drawings. Site and grading adjustments may be made in the field, subject to review and approval by the Engineer.

1.6 SAFETY

The Contractor shall be responsible for compliance with all applicable regulations of OSHA.

1.7 TRAFFIC DETOURS AND ROAD ACCESSIBILITY

A. Traffic Management Plan - The Contractor shall prepare, and submit a plan that shows the routing of traffic during construction. The plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates. The plan shall include all the requirements contained in the City of Waltham Policy on Street Opening Permits.
B. The Contractor shall contact the responsible heads of the Fire, Police, Highway, Sewer, School, Parks and Recreation and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, etc. Wherever detours are permitted the size, construction and location of signs shall conform to local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to his route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.
C. When Work is performed along roadways, all operations shall be planned so as to cause minimum interference with traffic and with maximum precautions at all times.
D. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic, and shall not open up Work to the prejudice or detriment of Work already started. When it is required under the Contract that traffic be detoured around the Work, the Contractor shall provide and maintain suitable detours in accordance with the Contract Documents, and as approved by the City.
E. The Contractor shall be responsible for the maintenance of traffic over, through or around the Work during the life of the Contract, and whether or not work thereon has been suspended temporarily. The Contractor shall take all precautions for preventing injuries to persons or damage to property in or about the Work. The Contractor shall provide and maintain temporary bypasses as may be necessary to accommodate

traffic on the roadway under construction or repair.

F. All Work sites and adjacent areas shall be adequately protected. Roadways shall be closed to traffic only as approved by the City. Whenever the closing of any lane is permitted by the City, the Contractor shall comply with all pertinent provisions of the Contract Documents.

All personnel shall observe safety rules and regulations and shall wear suitable safety equipment, at all times. Personnel who disregard safety regulations will be barred from the Work by the City and the Contractor shall be without recourse.

G. All vehicles and construction equipment shall be properly registered and comply with the City's Rules and Regulations. All vehicles shall be equipped with such safety devices as flags, markings, beacons, strobes, and lights, in good working order. No separate compensation will be allowed for this work or equipment.

H. At the end of each work day, the Contractor shall remove its equipment from the roadway, and if applicable, shall store such equipment in areas as approved by the City. No equipment shall be stored on the roadway during non-work periods. Construction or repair materials shall not be stored on the roadway except as approved by the City.

1.8 PUBLIC SAFETY - POLICE DETAILS AND FLAGGERS

A. In general, local police details or certified traffic flaggers will be required on all local streets for public safety and for maintaining two-way traffic during construction.

B. The use of police details or flaggers shall be at the sole discretion of the City. The need for uniformed police officers will be made by the City prior to the start of work.

C. Flaggers will be used in accordance with Mass regulation 701 CMR 7.00.

1.9 HOURS of WORK

A. The Contractor may preform work within this Contract between the hours of 7:30AM and 4:30PM. The Contractor may not deviate from these hours without express written permission from the City. Also, no construction vehicles shall be parked waiting to perform work during these hours on restricted roads.

B. No work shall be done on Saturday or Sunday or Holidays observed by the City of Waltham.

C. All work shall be completed by the time stipulated by the City. **These hours include the time for clean-up of the site and restoration of the roads to normal traffic flow.**

D. The work areas are located in close proximity to private homes. The Contractor will need to pay particular attention to noise generation during early and late times of day, traffic flow, erosion control and dust generation to abutting properties, and the removal of soils, placement of stockpiles, etc. in order to maintain access through the work area. Any detours, if required, must be arranged through the local Police and Fire Departments and the Massachusetts Department of Transportation.

1.10 SCHEDULE

A. This project is being bid with an anticipated start date of June 1, 2020.

B. Prior to beginning operations, the Contractor shall submit a schedule of the proposed work for review and approval. The schedule shall show the work broken down into logical and specifically executable tasks necessary to meet the completion date.

C. All tasks shall include estimated time duration and be shown on a timeline type chart. In addition, tasks shall be depicted in terms of their relationship to tasks before and after.

D. The schedule shall be developed in Microsoft Project format or other approved schedule software and shall be submitted in either electronic or hardcopy form. The schedule shall be updated bi-monthly and updated more frequently whenever the project schedule changes. In addition, the schedule shall be submitted with the monthly payment requisition.

E. The Contractor may deviate from the above sequence provided he can demonstrate to the Engineer that the continuity of the project will not be adversely affected.

1.11 DIG SAFE

Prior to commencing excavation work, the Contractor shall notify Dig- Safe (1-800-322-4844) to have all existing public and private utility lines and underground structures marked out.

1.12 OPERATION OF EXISTING WATER INFRASTRUCTURE

The Contractor shall not operate any hydrants, valves, curb stops or corporations, nor shall they draw any water from the system without specific approval of the City of Waltham Public Works Department. Only City personnel will operate valves, hydrants corporations and curb stops unless otherwise directed by the City. Should operation of such items be necessary, the Contractor shall contact the City a minimum of 48 hours in advance of such facility to coordinate this work.

1.13 HANDLING OF ASBESTOS PRODUCTS

If the Contractor should encounter asbestos products during construction, the Contractor shall conform with all applicable provisions of OSHA, Federal, State and Local Regulations regarding the handling and/or disposing of asbestos products.

1.14 SOILS MANAGEMENT PLAN

A. The Contractor shall prepare and submit prior to the start of work, a SOILS MANAGEMENT PLAN detailing the contractors procedures for handling suitable and unsuitable materials transported to and from the work area(s).
   1. At a minimum, the plan is to include:
      a. Sampling requirements
      c. Requirements for handling soil with no analyte concentrations detected
      d. Analyte concentrations detected between laboratory detection limits and reportable limits
      e. Concentrations above reportable limits.
   2. Soil Management plan shall be signed by a Massachusetts Licensed Site Professional.

B. All surplus unsuitable material removed from the excavations shall remain at the property of the Contractor and shall be properly disposed by the Contractor with

approval by the ENGINEER. The Contractor is responsible for the disposal fees for the deposition of all waste, unsuitable and hazardous materials from the work performed.

C. All surplus suitable material removed from the excavations may be incorporated into the project upon approval. Surplus suitable material not used in the work, is the responsibility of the Contractor including disposal fees.

1.15 REMOVALS, RELOCATIONS AND REARRANGEMENTS

Examine the existing site for the work of all trades which will influence the cost of the work under the general bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the finished project. The Contractor is responsible for all coordination in this regard.

A. Include all removals, relocations, rearrangements and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.

1.16 RESTORATION OF DISTURBED AREAS

The Contractor is responsible for the restoration of all areas disturbed by the work to an equal or better condition than that encountered prior to construction. This requirement is especially important to the City and will be enforced.

1.17 EXISTING UTILITIES, MAINTAINING SERVICE AND ACCESS

A. The Contractor is advised that protection of the existing utilities in the vicinity of the project, and the assurance of uninterrupted service during the contract period is of the essence. Existing utilities must remain in service throughout the entire project, except in the case of tying in services and/or making connections to existing equipment. This is particularly critical in the case of cutting over existing utilities.

B. Interruptions in service will be allowed only during scheduled shutdowns approved in advance.

C. The location and size of some existing underground facilities such as sewers, drains, culverts, water mains, gas mains, cables, service pipes, etc., are shown on the plans, based on results of surveys and existing records, and are shown as approximate only. The plans do not show the exact location and depth of all utilities, nor do they show all utilities that may be encountered.

D. The Contractor shall assume that there are existing underground utility connections to each and every building or structure along the line of work, whether they appear on the drawings or not. The Contractor shall notify the proper utility companies and obtain and preserve the locations as marked for all existing gas, electric and other utilities that may be encountered along the line of work, until such time as such markings are no longer required.

E. Experimental trench excavations are to be made prior to commencing pipe laying operations. The experimental trench locations shall be where requested by the Contractor and/or as directed by the Engineer, and shall be paid for under the applicable bid item.

F. The Contractor shall dig by hand in advance of the trenching machinery to determine the

exact location and depth of each utility to be encountered. Excavating machinery shall be stopped at least two feet away from each side of the utility to be crossed and the Contractor shall tunnel by hand under these utilities after he has ascertained their exact location and depth.

G. The use of steel plates will be permitted by the City. Should the Contractor choose to use steel plates to cover trenches during the daytime or at night, the plates must be keyed into the surrounding pavement and the edges secured with spikes.

1.18 BLASTING

In the event that blasting or other operations undertaken by the Contractor under this contract result in damages to, all necessary repairs to water piping, valves, hydrants, fittings, cables, etc., shall be done by the Contractor. The Contractor shall provide, at no extra cost to the Owner, all necessary materials, equipment and labor necessary to satisfactorily excavate backfill, repair, etc., in conjunction with such repair work.

1.19 TRASH REMOVAL

The Contractor shall arrange to dispose of all liquid and solid refuse in a lawful, safe and efficient and anti-pollutant manner subject to the prior approval of the City.

A. The Contractor shall remove daily from the Location(s) of Work by means provided by the Contractor, all garbage, debris, and other waste materials (whether solid or liquid) arising out of or in connection with its operations hereunder, and any such garbage, debris and other waste materials not immediately removed shall be temporarily stored in a clean and sanitary condition, approved by the City, in suitable garbage and waste receptacles, also approved by the City and shall be kept covered except when filling and emptying them.

B. The Contractor shall exercise care in removing such garbage, debris and other waste materials from the Location(s) of Work. The manner of such storage and removal shall always be subject in all respects to the continual approval of the City. No equipment or facilities of the City shall be used in such removal unless prior written consent is given by the City. No such garbage, debris, or other waste materials shall be or be permitted to be thrown, discharged or disposed into or upon waters or bounding the Location(s) of Work.

1.20 CHANGES IN AMOUNT OF WORK

The Owner reserves the right to increase or decrease the amount of any item of the work listed as may be found desirable or necessary during the carrying out of this contract and the unit prices quoted in the Proposal shall apply without change to such variation in the quantity of each of the Items.

1.21 SEQUENCE OF CONSTRUCTION

A. For the protection of life and property all backfill operations shall follow closely behind pipe laying. The Contractor shall insure that no excavation be left open, unguarded, or water filled during any period of time when work is not actually in progress. It is the purpose and intent that all excavations and backfill, including consolidation operations, the installation of service connections and temporary surfacing and pavements within an area be accomplished expeditiously before proceeding to other work areas. Construction scheduling and methods will be

discussed at the pre-construction conference.

B. The Owner reserves the right to schedule the Contractor to construct at any locations within the project area. At the same time the Owner may order the suspension of construction at any location. Construction in seasonally heavily traveled roads shall be avoided during the peak traffic periods.

C. Staging of Construction material outside of the trench prior to installation may be required while working within heavily traveled intersections in order to minimize traffic disruptions and maintain emergency vehicle access, particularly at the intersections of Hazel St. & Dale St.

1.22 PROGRESS OF WORK

The Contractor shall promptly start pipe installation and continue actual construction work under this contract with the necessary crews and equipment to properly execute and complete this contract in the specified time. No cessation of Contractor's operations will be allowed without the approval of the Owner. The rate of progress shall be satisfactory to the Owner.

1.23 TECHNICAL SPECIFICATIONS

All technical specifications such as ASTM, AWWA, AASHTO, etc, referred to in these specifications refer to the latest revision of such technical specifications.

1.24 STATE AND LOCAL HIGHWAY BOUNDS AND PROPERTY MARKERS

When encountered, the Contractor shall engage a Professional Land Surveyor to provide permanent reference points for all bounds and private property markers along the line of the work, which in the opinion of the Engineer, may be disturbed during construction. The Contractor shall submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the site. Any bounds or markers disturbed by the Contractor shall be replaced utilizing the services of a Professional Land Surveyor. The cost of replacing markers negligently disturbed shall be at the Contractor's expense.

1.25 TWENTY-FOUR (24) HOUR EMERGENCY SERVICE

A. The Contractor shall maintain a 24-hour, 7-day a week telephone service and a local facility to handle emergency requirements such as settled trenches, clogged drains, rain damage, etc. The Contractor's emergency personnel shall be able to respond to emergency calls within thirty minutes. A list of the personnel and their telephone numbers shall be submitted to the Engineer and Owner. This requirement shall apply during the entire length of the project.

B. This list shall be submitted on the Contractor's letterhead and shall state that should an emergency arise during the implementation of this project, these people are to be contacted. The Contractor shall submit this letter at the Pre-Construction Conference.

1.26 CONTRACTORS LAYDOWN/STORAGE

The Contractor is responsible for securing property for his operations including storage of materials and equipment. Storage of equipment and materials shall not be permitted within the right-of-way.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Utility location and coordination shall be the responsibility of the Contractor. Dig Safe shall be contacted prior to the layout or excavation of any work.

B. The Contractor shall coordinate his schedule such that construction does not affect local school bus schedules. If it is expected that a construction event may impact the ability of the school bus to maintain their schedule, the Contractor shall notify the School Department 48 hours prior to the event.

C. The Contractor shall contact the responsible heads of the Fire, Police, and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, and other requirements. Wherever detours are permitted, traffic plans, procedures and signage shall conform with local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to the primary route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.

3.2 WORK CONDITIONS

Contractor shall utilize extreme care to prevent any contamination when working in proximity to natural water bodies. No oil, fuel, solvents, chemicals, or other type of potential liquid contaminants shall be stored on site. All equipment shall be checked daily for any type of fluid leak. Contractor shall immediately notify Owner and Engineer of any type of leak or spill. Contractor shall take all necessary measures to contain and clean up any type of leak or spill.

3.3 MAINTAIN EXISTING WORKS

A. Maintain Flows:

1. The responsibility of the Contractor shall be to provide, maintain and operate all temporary facilities required to maintain sewerage flows and drainage collection and flow such as pumping equipment, piping, and all other labor and equipment necessary to maintain flows.

B. Minimize Interference

1. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Owner, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations there-from are expressly permitted.
2. Work of connecting with, cutting into and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. Before starting work, which will interfere with the operation of existing facilities, the Contractor shall do all

possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

END OF SECTION 01010

SECTION 01024

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.

B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.

1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the work day.
3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.

B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work and until its final acceptance by the Engineer, and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence

of the suspension of the Work as herein authorized.

C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

A. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

1.6 PAYMENT FOR MATERIAL DELIVERED

A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.

B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

A. The Engineer will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:

1. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications, and other submittals required by the Contract Documents.
2. Permits not otherwise paid for or provided by the Owner.
3. Clearing, grubbing, and stripping.
4. Visits to the Project site or elsewhere by personnel or agents of the Contractor,

including manufacturer's representatives, as may be required.

5. Preconstruction Photos and Videos.
6. Coordination with the Owner, Utilities and others, including related inspection cost (refer to Section 01050)
7. Earthwork (except ledge)
8. Dust control. Contractor shall have watering equipment on site for the duration of the construction. Watering shall take a place a minimum of two times per day or at the direction of the Engineer.
9. Dewatering and disposal
10. Temporary utilities for construction and to maintain existing service during construction, payment is otherwise made.
11. Temporary construction and other facilities not to be permanently incorporated into the Work necessary for construction sequencing and maintenance of operations.
12. Steel and/or wood sheeting as required, including that left in place
13. Materials testing
14. Quality assurance testing
15. Utility crossings and relocations, unless payment is otherwise made
16. Traffic Regulation except uniformed police detail and Certified Flaggers.
17. On-site and other facilities acceptable to Engineer for the storage of materials, supplies and equipment to be incorporated into the Work
18. Pipe Markings
19. Utility crossings and relocations, unless payment is otherwise made.
20. Engineer's Temporary Field Office.
21. Weather protection, winter construction equipment and fuel.
22. Restoration of property, and replacement of fences, curbs, structures and other minor items disturbed by the construction activities.
23. Repair and replacement of utilities damaged by construction activities and corresponding proper disposal of removed materials.
24. Clean-up.
25. Loam and seeding.
26. Potable water for cleaning, disinfection and testing.
27. Facilities start-up services required by the Contract Documents.
28. Construction Administration and Insurance.
29. GPS location of all structures
30. Demobilization
31. Project record documents.
32. Rebuilding/reconstruction/modification of tables and inverts where new drain is constructed into an existing drain.

1.9 DESCRIPTION OF PAY ITEMS

A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.

B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

Item 1: Mobilization and Demobilization

1. For the Lump sum bid price for this Item, the Contractor shall mobilize and demobilize to and from the site all labor, materials, and equipment to complete all work associated with this contract. Demobilization from the site includes, but is not limited to: removal of all equipment and final cleanup to the satisfaction of the City.

2. Payment for the mobilization and demobilization shall be by lump sum. Fifty percent of the lump sum price shall be paid to the Contractor upon completing mobilization activities, and the remaining fifty percent shall be paid upon demobilization from the site.

3. Mobilization and Demobilization Costs cannot exceed 5 percent of the total Bid Price.

Item 2: Traffic Management

1. For the Lump sum bid price for this Item, the Contractor shall prepare a Traffic Management Plan in conformance with all current and applicable requirements and implement the plan throughout the execution of the project. This will include all the signs, electronic displays, safety devices, labor, materials, and equipment to complete all work associated with this contract.

2. Payment for the item shall be on a lump sum basis.

Item 3: Furnish and Install 15-inch RCP Storm Drain & Appurtenances

1. Storm drain pipe measured for payment under these items shall be the number of linear feet installed measured along the center line of the pipe as laid, regardless of materials of construction. Pipes shall be measured between centers of manholes or structures minus half the inside diameter of each structure. Pipe installed into the structure will not be measured for payment.
2. The contract unit price per linear foot for storm drain pipe installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Items 4 and 5: 4-foot and 5-foot Diameter Precast Concrete Manholes

1. The units for measurement for payment under these items shall be the number of precast concrete manholes installed at each location as called for on the drawings.
2. The contract unit price per each drain manhole installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to

existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Item 6: Precast Concrete Deep Sump Catch Basins with Double Frame and Grate and Hood

1. The units for measurement for payment under these items shall be the number of deep sump catch basins with frame and grate and hood installed at each location as called for on the drawings.
2. The contract unit price per each deep sump catch basins with double frame and grate and hood installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Item 7: Heavy Cleaning and CCTV Inspection – 12-inch Pipe

1. Removal of heavy sediment and debris and CCTV inspection of 12-inch storm drain measured for payment shall be the number of linear feet cleaned and inspected and measured along the center line of the pipe as indicated in the Contract Drawings and as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole.
2. The contract unit price per linear foot for heavy cleaning and CCTV inspection of storm drains shall be full compensation for all labor, materials, and equipment necessary to complete this work including cleaning drain prior to CCTV inspection; disposal of material removed from the drain; providing video DVDs, database, and written logs; site restoration; and all else incidental thereto for which payment is not provided under other items.

Item 8: Light Cleaning and CCTV Inspection – 15-inch Pipe

1. Removal of light sediment and debris and CCTV inspection of 15-inch storm drain measured for payment shall be the number of linear feet cleaned and inspected and measured along the center line of the pipe as indicated in the Contract Drawings and as directed by the Engineer. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole.
2. The contract unit price per linear foot for light cleaning and CCTV inspection of storm drains shall be full compensation for all labor, materials, and equipment necessary to complete this work including cleaning drain prior to CCTV inspection; disposal of material removed from the drain; providing video DVDs, database, and written logs; site restoration; and all else incidental thereto for which payment is not provided under other items.

Item 9: Catch Basin Sump and Lateral Pipe Connection Cleaning

1. Removal of sediment and debris from the catch basin sumps and lateral connection pipes measured for payment shall be the number of catch basins and lateral connection pipes cleaned as indicated in the Contract Documents or as directed by the Engineer.
2. The contract unit price per manhole cleaning shall be full compensation for all labor, materials, and equipment necessary to complete this work including cleaning catch basins and lateral pipe connections; proper disposal of material removed from the manhole; and all else incidental thereto for which payment is not provided under other items.

Items 10 and 11: Bituminous Concrete Binder Course and Wearing Course

1. Bituminous concrete pavement accepted for payment shall be the number of tons of pavement placed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
   A. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.
   B. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.
2. Pavement shall be paid for at the Contract unit price per ton stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the placement and removal of pavement, preparation of base material, application of tack coat, placement and grading of gravel shoulder material to back up overlay pavement, adjusting castings to final grade (includes private utilities) and installation of pavement markings. No additional payment will be made to the contractor for repair work done by him in maintaining bituminous concrete pavement.

Item 12: 4 Inch Reflectorized White Line Thermoplastic (MassDOT 866.040)

1. Under the unit bid price for this Item, the Contractor shall provide all necessary materials equipment and labor to execute the work as specified and as shown on the drawings.

2. Payment shall be per unit as listed on the Bid Form.

Item 13: 4 Inch Reflectorized Yellow Line Thermoplastic (MassDOT 867.040)

1. Under the unit bid price for this Item, the Contractor shall provide all necessary materials equipment and labor to execute the work as specified and as shown on the drawings.

2. Payment shall be per unit as listed on the Bid Form.

Item 14: Police Detail Allowance

1. Uniformed police details will be paid based on actual invoices submitted by the Contractor and will be paid from the Bid Item allocation.
2. Cash allowance as compensation for fees associated with providing uniformed police officer in accordance with the requirements of the City of Waltham Police Department. The cost associated, MUTCD signage, and other traffic control requirements shall be considered incidental to the work. Adjustment to the final cost for this item will be made as follows. Prior to final payment, Contractor shall present all receipts for this work (if not previously presented to the Engineer), and the amount due will be deducted from the allowance.
3. There will be no markup allowed on the police detail invoices.

Item 15: Miscellaneous Work and Cleanup

1. Under the lump sum price for this Item, the Contractor shall provide all general construction services, labor, materials, supplies, consumables, and equipment necessary to complete all work required to construct the work identified on the Drawings and in the Specifications, which is not included in all other Bid Items. This shall include, but is not limited to, the following:

    a. Attending the pre-construction conference and monthly job progress meetings, a minimum of 1 community meeting prior to the start of construction, and coordination of all construction activities with the appropriate local authorities and utilities.
    b. Submission of all schedules, lists, laboratory test results, materials and sources, and shop drawings, photographs before and after construction, as required, in a timely manner to the Engineer for review and approval.
    c. Maintenance and repair of all work for one (1) year period.
    d. 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 and 29 CFR 1926.
    e. Implementation of the Health and Safety Plan.
    f. Construction, maintenance, and removal of equipment from any staging or wash down areas.
    g. Erosion Control measures to prevent exposed fill, excavated material, or other materials from washing away or otherwise eroding from slopes or into wetlands.
    h. Coordination of all construction activities with the City of Waltham.
    i. Preparation of As-Built Record Drawings
    j. All other project related direct and indirect costs not described above.

2. Payment for this lump sum item will be based on a percentage of the work completed, as determined by the Engineer.

Item 16: Erosion and Sedimentation Control

1. Under the lump sum price for this Item, the Contractor shall provide all necessary materials equipment and labor to execute the work as directed by and to the satisfaction of the Engineer.

2. Payment for this lump sum Item shall be made based on the percentage of work completed, as determined by the Engineer.

3. Catch basin inserts to capture sediment during construction will be required and maintained at a minimum of four (8) existing catch basins as directed by the Engineer.

4. The Contractor shall provide all environmental protection measures such as straw bales, silt fences, fabric wraps under existing catch basin grates, and all other protective measures necessary during construction.

5. Controls shall be removed upon completion of the work.

END OF SECTION 01024

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1-GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section specifies administrative and procedural requirements for cutting, coring, rough and finish, and patching.

B. Refer to other sections for specific requirements and limitations applicable to cutting, and patching individual parts of the Work.

1. Requirements of this section do not apply to mechanical and electrical installations. Refer to Division 15 and 16 Specification Sections for requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

A. For informational purposes only, submit proposed cutting and patching well in advance of the time cutting and patching will be performed. Include the following information, as applicable:

2. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.

3. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

4. List products to be used and firms or entities that will perform Work.

5. Indicate dates when cutting and patching is to be performed.

6. List utilities that we be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

7. Where cutting and patching involves addition of reinforcement to structural elements, submit details to show how reinforcement is integrated with the original structure.

8. Review by the Engineer prior to proceeding with cutting and patching does not waive the Engineer's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

8. Refer to Paragraph 1.4 - Quality Assurance and submit the information specified.

1.4 QUALITY ASSURANCE

A. No structural members shall be cut without the approval of the Engineer. No holes shall be drilled in beams or other structural members without the approval of the Engineer.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

C. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Unit masonry.
b. Stucco and plaster.
c. Aggregate wall coating.
d. HVAC enclosures, cabinets or covers.

PART 2-GENERAL

2.1 MATERIALS

A. Provide materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. Plaster Soffits: Comply with ASTM C 842.

1. Base Coat: Ready-mixed, sand aggregate gypsum plaster base.

2. Finish Coat Ready-mixed gypsum finish plaster.

C. Concrete and grout for rough patching shall be as specified in Divisions 3 and 4.

PART 3 -EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support and Bracing: Provide temporary support and bracing of area to be cut, prior to start of cutting.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions to avoid cutting existing conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have made to bypass them.

E. Check area during sawing operations for partial cracking and provide additional

support and bracing to prevent a partial release of cut area during sawing operations.

F Provide equipment of adequate size to remove cut panels.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

2. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

3. Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.

4. By pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

6. Provide full control of slurry generated by sawing operations on both

sides of wall

7. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

C. Coring

1. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved.

2. If holes are cored through floor slabs they shall be drilled from below.

2. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

4. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeve, equipment or mechanical seals to be installed.

5. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

6. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

7. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

D. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction a n1anner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

4. Where patching occurs in a painted surface, extend final paint coat over entire unbroken area or surface containing the patch, after the patched area has received primer and second coat.

5. Finish patching shall be the responsibility of the Contractor and shall be performed by the trade associated with the application of the particular finish.

E. Plaster Installation: Comply with manufacturer's instructions and install thickness and coats as indicated.

1. Unless otherwise indicated provide 3-coat Work.

2. Finish gypsum plaster with smooth-troweled finish. Sand lightly to remove trowel marks and arises.

3. Cut, patch, point-up and repair plaster to accommodate other construction and to restore cracks, dents and imperfections.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01046

CONTROL OF WORK

PART I-GENERAL

1.1 EQUIPMENT

A. Furnish equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such equipment appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he/she may order the Contractor to increase the efficiency, change the character or increase the plant equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his/her obligations to secure the quality of the work and rate of progress required.

1.2 PRIVATELAND

A. The Contractor shall not enter or occupy private land outside of easements, except by permission of the land owner.

1.3 HAULING, HANDLING, AND STORAGE OF MATERIALS

A. The Contractor shall, at his own expense, handle and haul all materials furnished by him and shall remove any and all of his surplus materials at the completion of the work. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him that are liable to injury, and shall be responsible for any loss or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance, even though partial payments have been made under the Contract.

1.4 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, fences, guardrails, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. The Contractor is required to comply with all provisions of General Laws Chapter 353 entitled "Excavations-Public Ways-Notice Requirements", otherwise known as DigSafe. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

B. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including, but not limited to existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures, as described in this Section, shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit prices established in the Contract.

D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City is required, which is not shown on the Plans or the Specifications, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Articles of the General Conditions. If relocation of a privately- owned utility is required, the Town will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the City and utility, and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies, in writing, at least 72 hours (excluding Saturdays, Sundays, and legal holidays) before excavating in any public way.

1.5 PIPE LOCATIONS

A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him/her from laying and jointing different or additional items where required.

1.6 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his/her own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated n1aterial in the street requiring that the trench shall not remain open oven1ight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

I.7 TEST PITS

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled and compacted immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

1.8 MAINTENANCE OF TRAFFIC

A. Unless permission to close a street is received in writing from the proper authority, all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.

B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner.

C. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

D. When, in the opinion of the Police Department, public safety requires the services of police, the Safety Officer may direct the Contractor to provide manpower to direct traffic within the location of work under this Contract.

E. Under normal circumstances the City of Waltham shall coordinate the scheduling of all police activities, however, when so directed, the Contractor shall make all arrangements in obtaining the manpower and all invoices for policing.

F. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open trenches.

G. Nothing contained herein shall be construed as relieving the Contractor of any of his/her responsibilities for protection of persons and property under the terms of the Contract.

H. All payments shall be made to police for work under this Contract as described in Section 01024, MEASUREMENT AND PAYMENT, and shall be supported by the proper documentation.

I. Contractor shall furnish and maintain traffic control signage throughout the project and at all construction areas. Signs shall be standard signs in compliance with Massachusetts

Highway standards. In general the following signs and devices shall be placed and maintained at each side of all work areas:

1. Construction Ahead - 1000 feet
2. Construction Ahead - 500 feet
3. Keep Left/Keep Right
4. End Construction
5. Left/Right Lane Closed Ahead
6. Safety Barrels with flashers
7. Detour Ahead
8. Detour (as required)

J. It is the intent of this contract that traffic be maintained at all times in the areas of construction. The contractor may be required to halt operations and/or transport material to areas beyond immediate work locations in order to allow minimum traffic disruptions. Access to the site by emergency vehicles, school buses and residents shall be maintained at all times.

K. The contractor shall be responsible for providing property owners with written notification of proposed construction which may require detours or road closures.

1.9 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly-constructed work shall be carefully protected from injury in any way. No placing of heavy loads on it shall be allowed, and all portions injured shall be reconstructed by the Contractor at its own expense.

B. All structures shall be protected in a manner approved by the Engineer. All such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense, and to the satisfaction of the Engineer.

C. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship, without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction, and other work undertaken herein, for at least the guarantee period described in the Contract Documents.

D. The Contractor shall take all necessary precautions to prevent damage to any work during and after construction, and until such work is accepted and taken over by the Owner.

1.10 CARE AND PROTECTION OF PROPERTY AND SURVEY MONUMENTS

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property, by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a

condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.

B. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated on the Drawings as soon as conditions permit. All grass areas beyond the limits of construction, which have been damaged by the Contractor, shall be graded and seeded.

C. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any trees be cut or removed without prior notification of the Town or other person in charge. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods using only approved tools and materials.

D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the Bid Proposal. The Contractor is responsible for protecting and, if required, re-setting survey monuments (bounds). If a bound is in the way of required excavation, the Contractor will notify the Engineer/Inspector and/or the City Engineering Division with as much notice as possible prior to performing excavation near the bound.

1.11 REJECTED MATERIALS AND DEFECTIVE WORK

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the Specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work. Any errors, defects, or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor, and in a manner satisfactory to the Engineer. The Contractor shall reimburse the Owner for any expenses, losses, or damages incurred in consequence of any defect, error, omission, or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

1.12 COORDINATION WITH LOCAL AGENCIES

A. The Contractor shall attend a Pre-Construction Meeting to be held at the Engineering Department approximately two weeks prior to start of work. City departments who will also be invited to this meeting include Police, Fire and Conservation. Electric, gas and phone utility companies will also be invited. The contractor will provide the proposed schedule at that time (see Submittals, Section 01300). Any proposed detours will be reviewed with all parties at the Pre-Construction Meeting. If any additional detours are considered after the Pre-Construction Meeting, the Contractor must first get approval from the Engineer.

B. The Contractor will immediately notify the utility owner of any utility main breaks.

C. The Contractor will be required to reimburse the Owner for the actual cost of the services of the Department of Public Works Personnel required during other than regular working hours. This includes the cost of the Engineer/ Site Inspectors when inspection is required outside the normal business hours. This cost shall be at the rate of time and one-half of the Inspector's pay rate, to be paid to the City by the Contractor.

D. The Contractor shall notify the City at least 72 hours prior to the construction of any public improvement so that the City can have an inspector present if work requires inspection. In general, inspection will be required:

1. For Road Construction:
   a. When the subgrade is established,
   b. while placing gravel,
   c. when final grade of base course is established, and
   d. during paving operations.

2. For Drainage, Water and Sewer Construction:
   a. While laying pipe, but before backfilling, and
   b. during backfilling operations. (In the case of water main installations, final pressure test will be monitored by the Engineer after disinfection tests have been successfully completed.)
   c. during paving operations.

E. The Engineer will have the authority to reject any work or materials that do not constitute approval by the City and shall not relieve the Contractor of his obligations to perform the work in accordance with the Plans and Specifications.

F. The Contractor shall maintain pavement as specified in Section 02576 and shall provide the Engineering Department and Department of Public Works with contact information at which he/she can be contacted when he/she is not at the site. Upon notification by the Owner or the Engineer the Contractor shall promptly make repairs to the construction site as may be necessary.

G. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, curbing, electric and telephone cables, whether or not they are shown on the drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. .Any damage resulting from the Contractor’s operations shall be repaired by him/her at his/her expense.

H. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

I. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a pat1 of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.

J. The Contractor shall coordinate the removal and replacement of traffic loops and signals, if required for the performance of the work, at no additional cost to the Owner.

K. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City of Waltham is required, he/she may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Article II of the Supplementary Conditions. If relocation of a privately owned utility is required, the Department of Public Works will notify the Utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Waltham Engineering Department and the Utility and shall have no claim for delay due to such relocation. The Contractor shall notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays and Legal holidays) before excavating in any public way. Contractor shall also notify Massachusetts Dig Safe, telephone 1-800-322-4844 at least 72 hours prior to start of work. .

The following is a partial list of Owners of Utilities: Water, Storm Drain and Sewer:

Waltham Engineering Department
119 School Street
Waltham, MA 02451
Telephone: (781) 314-3844

Electric:
NStar Electric
Telephone: (800)592-2000

Gas:
National Grid
Telephone: (800) 233-5325

DIGSAFE: (800) 344-7233

1.13 WATER FOR CONSTRUCTION PURPOSES

A. In locations where water is in sufficient supply, the Contractor may be allowed to use water without charge for jetting backfill and other construction purposes. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

B. The Contractor shall furnish all water required for and in connection with work to be done under this Contract including but not limited to: water for cleaning and testing all pipelines, manholes and structures: temporary potable water: sanitation and toilet facilities: disinfection: and including water curing, heating, chemical mixing and testing for permanent pipeline liner rehabilitation system.

C. No separate measurement and payment shall be made for temporary water and all costs Shall be incidental to and included with each applicable item..

1.14 MAINTENANCE OF FLOW

A. The Contractor shall maintain the flow in all watercourses, whether open channels or in pipes, in all sewers and other pipes interfered with in the line of work and convey the flow to a suitable point of discharge so as not to flow upon the work or create a nuisance. In the discharge of water removed from the excavations by pumping or by gravity similar precautions shall be observed.

1.15 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his/her Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.16 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, the Contractor shall keep the site of his/her operations in as clean and neat a condition as is possible. He/She shall dispose of all residue resulting from the construction work and at the conclusion of the, he/she shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his/her subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.

D. Outdoor burning of rubbish and waste material on the site will not be permitted.

E. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

F. 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. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

1.17 INTERRUPTION OF WATER SERVICE

A. The Contractor shall plan his work and shall follow a procedure so as not to inconvenience the general public.

B. All affected customers shall be notified with a minimum of 24 hours notice prior to interruption of water service. Residential notification cards shall be obtained from the Waltham Public Works Department. It shall be the Contractor's responsibility to request and obtain the Residential notification cards from the Waltham Public Works Department

C. A list of all recipients of notices will be provided to the Waltham Public Works Department immediately.

D. Failure to comply with notification requirements may result in temporary tem1ination of work until such time that notification is issued. Such termination of work will not be reason for extending contract time limits (see Articles 3 & 7 of the Agreement).

E. The 24 hour notice requirement is for planned interruptions. Unplanned interruptions require immediate notification of the Waltham Public Works Department (781) 314-3844. Unplanned interruptions are those that could not possibly have been foreseen. Interruptions such as failure of an isolation valve to provide a tight seal when there are personnel such as the Engineer or other City staff who could provide information as to the reliability of a valve are considered interruptions that should be planned.

END OF SECTION 01046

SECTION 01050

COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.

B. The Contractor shall coordinate construction under this Contract with homeowners, utilities and roadway owners.

C. Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

D. All work shall be in accordance with the Standards of the City of Waltham, Massachusetts and shall meet all state and local standards.

E. A minimum of 48 hours advanced notice is required for all coordination.

1.2 COORDINATION WITH OTHERS

A. City of Waltham:

1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Waltham Police Department. The Contractor shall notify Waltham Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours.
2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
3. The Contractor shall not operate any hydrants, valves, curb stops and corporations without specific approval of the City of Waltham Engineering Department.

B. Waltham Consolidated Public Works (CPW)

1. Contractor shall be responsible for coordinating all work related to the roadway, sidewalks and curbing with the Waltham Consolidated Public Works. Contractor shall bear all costs for the CPW’s inspection requirements, temporary facilities, any adjustments and other requirements.

C. NStar Electric:

1. The Contractor shall be responsible for coordinating and providing power to all construction sites both temporary and permanent services. The Contractor shall be responsible for coordinating all work in and around NStar facilities with NStar and bear all costs for NStar inspection, temporary facilities relocation and all other requirements.

D. National Grid Gas:

1. The Contractor shall be responsible for coordinating all work around gas mains and gas services with National Grid Gas. The Contractor shall bear all costs for National Grid inspection, temporary facilities relocation and all other requirements.

E. Other Public Services:
   1. The Contractor shall be responsible for coordinating and maintaining public services to all properties.

END OF SECTION 01050

SECTION 01080

ABBREVIATIONS AND DEFINITIONS

PART I-GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 ABBREVIATIONS:

A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D. C.
125-lb. ANSI or 250 lb. ANSI	American National Standard Institute for Cast-iron 250-lb. ANS Pipe Flanges and Flanged Fittings, Designation B16.1, for the Appropriate class
AWG	American or Brown and Sharpe Wire Gage
NPT	National Pipe Thread
OSHA	Occupational Safety and Health Act.
OS&Y	Outside screw and yoke
Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or

	Roebling Gage
USS Gage	United States Standard Gage
UL	Underwriters' Laboratories

1.3 DEFINITIONS:

A. Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

B. General: Basic Contract definitions are included in the Conditions of the Contract

C. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

D. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Engineer, requested by the Engineer, and similar phrases.

E. Approve: The term approved, when used in conjunction, with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

F. Regulation: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

G. Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

H. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

I. Provide: The term provide means to furnish and install, complete and ready for the intended use.

1. The term experienced, when used with the term Installer means having a minimum of five previous projects similar in size and scope to this project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Using terms such as carpentry is not intended to imply that certain

construction activities must be performed by accredited or unionized individuals of a corresponding generic nan1e, such as carpenter. It also does not imply that

requirements specified apply exclusively to tradespersons of the corresponding generic name.

J. Project Site is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Elevation: The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

M. Rock: The word "rock,11 wherever used as the name of an excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

N. Earth: The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

PART 2 -PRODUCTS (NOT USED)

PART 3 -EXECUTION (NOT USED)

END SECTION 01080

SECTION 01105

RODENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies rodent control and general pest control requirements within project areas, and bordering areas as designated by the Owner and Engineer. This work is to be performed prior to demolition, excavation, and site preparation and throughout the Contract, so that rodents and other pests do not disperse from or infest the project area.

B. The Contractor shall develop and implement an Integrated Pest Management (IPM) approach. As part of that approach, the Contractor shall maintain a cooperative dialogue with appropriate agencies and management/representatives of neighboring properties.

C. The Contractor shall perform the rodent control tasks described in this Scope of Work and also respond to other pest control needs when directed by the Owner.

1.2 SUBMITTALS

A. Submit to the Engineer copies of pesticide applicator certifications and licenses within ten (10) days of the start of Rodent Control activities and ten (10) days prior to their issuance or renewal for the duration of this Contract.

B. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

C. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

1. Weekly - Submit data sheets with locations of sites treated, amounts and types of pesticide used, number and types of traps set, survey and inspection results, sanitation conditions, complaint calls investigated, and any problem that occurred.
2. Monthly - Submit a written summary that includes determinable results of the IPM program and recommendations.
3. Quarterly - Submit a map that shows bait stations, manholes, and catch basins where rodent baits are being maintained.

1.3 QUALIFICATIONS

A. The Contractor shall perform this work at all times in accordance with the following minimum standards and as acceptable to the Owner and Engineer.

1. The Contractor and key personnel shall have experience with commercial and residential accounts and construction projects; have experience and technical training in vertebrate pest management and integrated pest management; have experience with various rodent control techniques, equipment, and strategies; have training and experience with insect control; and have knowledge of and experience with techniques to reduce non-target hazards.

2. The supervisor shall be licensed and certified by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41) and Vertebrate Pest Control (category 44). The supervisor shall have specific training and experience in vertebrate pest management, commercial rodent control, general pest control, and integrated pest management.
3. Applicators shall be licensed by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41). Applicators shall have specific training and experience in commercial rodent control and integrated pest management.

1.4 COORDINATION

A. Perform this Work in cooperation with the other Work performed under the Contract.
B. Initiate the work on or before field mobilization begins for the Contract and with adequate timing to achieve control before environmental disruptions. Provide a maintenance program until Contract is completed and all equipment and materials are removed.
C. Perform the Work according to the preliminary schedule described in this section and as accepted or revised by the Owner and Engineer. Estimated durations and start dates may be changed by the Owner or Engineer to suit changes in construction schedules and field conditions. The Work could potentially require performance any day of the week and any hour of the day or night, regardless of weather.
D. Perform this work in such a manner that toxicant or other control tools do not pose a hazard to persons, domestic animals, or non-target wildlife.

1.5 PERMITS

A. Obtain and maintain in coordination with the Contractor appropriate permit(s) from city or state agencies for pest control activities associated with this Work.
B. Obtain and maintain in coordination with the Contractor all right of entry permits required for the performance of this Work. This includes all utilities and private properties to which entrance is required.

PART 2 - PRODUCTS

A. Furnish and use only pesticide formulations registered by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Food and Agriculture, where appropriate according to label directions and as acceptable to the Engineer.
B. Furnish and use devices and supplies (e.g., traps and bait stations) to facilitate the management and effectiveness of the pest control program, where appropriate and as acceptable to the Engineer.

PART 3 - EXECUTION

3.1 MEETINGS

A. Before proceeding with the Work, all pest control personnel shall attend a Work Shop held by the Contractor and Engineer to discuss planned pest control methods and coordination.
B. The supervisor shall meet with the Contractor and Engineer weekly to discuss pest control activities.

3.2 SURVEY

A. Prior to baiting, survey the proposed construction area and accessible or observable bordering areas and record signs of rodent activity and sanitation conditions. Closely inspect all embankments, edge areas, and properties within and abutting the construction area. Maintain survey records in the manner described in Paragraph 3.7 below.

B. Thoroughly inspect construction area and accessible or observable bordering areas and any nearby areas designated by the Owner or Engineer, for rodent activity and sanitation deficiencies weekly throughout the duration of this Contract and in accordance with the work schedule. Maintain inspection records in the manner described in Paragraph 3.7 below.

C. Plan the control program and allocate resources based on survey and inspection data and as acceptable to the Owner.

3.3 APPLICATION FOR RODENT CONTROL

A. Apply rodenticide in strict accordance with EPA-approved label directions and the Rules and Regulations of the Massachusetts Department of Food and Agriculture. Maintain records of all bait placements in the manner described in Paragraph 3.7below.

B. Where appropriate, especially for surface placements of rodent baits, use properly secured and tamper-resistant bait stations consistent with EPA regulation. Individually number and properly identify all bait stations.

C. Surface Applications

1. Initial Surface Baiting. Rid the construction area of all detectable rodents before construction begins, or as acceptable to the Owner. Bait all observable rodent burrows. Install and secure bait stations at regular and appropriate intervals and locations, and document rodent activity (burrows, droppings, bait consumed, and dead rodents). Replenish bait and shift bait stations as necessary to ensure complete control of rodent populations. Bait edge and accessible bordering areas as necessary to ensure that rodents will not be dispersed by construction activities and that rodents will not infest work areas.

2. Maintenance Surface Baiting. Establish a maintenance baiting program prior to mobilization by the Contractor, including construction areas and accessible bordering areas, as acceptable to the Owner. Check bait placements weekly. Use survey and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute bait and bait stations as appropriate to ensure continued control.

D. Subsurface Applications

1. General. For situations involving underground construction/demolition, utility relocation, or utility construction, and for other situations when determined necessary by the Owner or Engineer, initiate subsurface baiting and rid underground environments of all detectable rodents before construction begins. Assign an identifying number to each manhole and catch basin where bait is placed so that locations of bait placements can be identified and rodent activity (droppings, bait consumed, dead rats) can be documented. Conduct bait applications during off- peak traffic hours unless otherwise directed by the Engineer. Access manholes according to the requirements of appropriate agencies and utility companies. Coordinate the Work with appropriate municipal agencies and utility companies.

2. Initial Subsurface Baiting. Apply appropriate baits to control rodent populations in manholes and catch basins. This will involve suspending and securing bait using

noncorrosive wire (e.g., 24-gauge plastic coated). Place bait in all accessible manholes and catch basins within the construction work area. In addition, bait an appropriate set of manholes and catch basins in the blocks bordering the work area and as acceptable to the Owner. Identify all baited manholes and catch basins with a standardized paint mark on the street and a numbered tag to be attached to the suspending wire. Approximately seven days after completion of the first baiting, check all manhole and catch basin baits and record estimates on the amount of bait consumed. Replenish or increase the amount of bait applied according to the amount consumed or as acceptable to the Owner and Engineer. Repeat this process again approximately fourteen days later and until there is little or no bait consumed. Check manholes and catch basins weekly when they repeatedly have 100 percent of the bait consumed.

3. Maintenance Subsurface Baiting. Prior to mobilization by the Contractor, establish a maintenance baiting program appropriate for the rodent infestation patterns identified during initial subsurface baiting. This program shall ensure continued control and shall be performed in a manner acceptable to the Owner and Engineer. Maintain bait in manholes and catch basins that have rodent activity and those that had activity during initial baitings. Check each bait according to rodent activity levels. This could range from weekly to approximately every three months, depending upon the recent history of bait consumption. Use utility maps and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute baiting locations as necessary to ensure adequate interception points for controlling immigrating rodents.

E. Cleanup

1. Remove visible rodent carcasses and dispose of them daily consistent with the pesticide label directions and applicable codes, laws, and regulations.
2. Upon completion of any pest control operations at the site, remove remaining bait and dispose of it according to the pesticide label and applicable codes, laws, and regulations. Also remove all wires used for subsurface baiting and any bait stations or traps.

3.4 SANITATION

A. Prior to construction and throughout the duration of this Contract, identify and document harborage and food sources available to rodents on the construction site and in observable bordering areas. This includes any littering or improper or insufficient use of trash receptacles in construction areas. It also includes any bordering areas with sanitation conditions or structural deficiencies that violate City or State sanitation codes.

B. Maintain records of sanitation conditions in the manner described in Paragraph 3.7 below.

3.5 COMPLAINT CALLS

A. During construction, respond to pest-related complaints from the "adjacent" neighborhood (i.e. within 200 feet of the project limits) within 12 hours when directed by the Owner or Engineer. Inspect the particular premises and adjacent areas for sanitation and structural deficiencies and also signs of historic and recent pest activity. Provide sanitation and structural maintenance information to the property owner or manager. Use pesticides or traps as necessary and appropriate to resolve the complaint when there is a relationship between the pest infestation and construction activities, or when directed by the Owner or Engineer.

B. Maintain records of all complaints investigated, including location, contact person, inspection results, and actions taken. Document the relatedness of the pest infestation to construction activities.

3.6 GENERAL PEST CONTROL

A. When directed by the Owner or Engineer, the Contractor shall determine appropriate methods for any pest control task not specifically identified above and shall submit them in writing to the Owner and Engineer for approval in advance. Such pest control tasks would relate to unanticipated pest control needs within construction areas or adjacent areas. This could include control of insects or vertebrates other than rats and mice.

B. Maintain records of general pest control activities and results in the manner described in Paragraph 3.7 below.

3.7 RECORD KEEPING

A. Use standardized data sheets acceptable to the Owner and Engineer to maintain accurate records of date, placement, type, and amount of pesticides or other control tools (e.g., traps) applied. Similarly, maintain records of surveys, inspections, changes in pest activity, sanitation conditions, and complaint calls. Submit data in a format acceptable to the Owner and Engineer and as required under Paragraph 1.3 (C) above.

END OF SECTION

SECTION 01170

SPECIAL PROVISIONS

PART 1-GENERAL

1.1 GENERAL OBLIGATIONS OF THE CONTRACTOR

A. General obligations of the Contractor shall be as set forth in the Contract Documents. Unless special payment is specifically provided in the payment paragraphs of the specifications, all incidental work and expense in connection with the completion of work under the Contract will be considered a subsidiary obligation of the Contractor and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

1.2 SITE INVESTIGATION

A. The Contractor shall satisfy himself/herself as to the conditions existing within the project area, the type of equipment required to perform the work, the character, quality and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Drawings and Specifications. Any failure of the Contractor to acquaint himself/herself with the available information will not relieve him/her from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.3 CONTRACTOR'S EMERGENCY CONTACT AND RESPONSE REQUIREMENT

A. The Contractor will be required to designate a contact person as well as an emergency response crew who can be notified by the City of Waltham and the Engineer during Contract related emergencies, 7 days a week, 24 hours a day throughout the length of this Contract.

B. The name of the designated person, a daytime contact telephone number, an evening contact telephone number, and a portable cellular telephone number must be furnished to the City of Waltham at the pre-construction meeting. In addition, the contact person will be required to carry a City of Waltham approved paging device (beeper) at all times during the Contract. The beeper number shall also be supplied at the pre construction meeting. The Contractor must also provide a mobile cellular telephone that will remain at the construction site during the hours of construction. The phone will be in a location that will allow the Contractor to respond to calls as well as the Owner or Engineer.

C. The contact person shall be required to respond to any City of Waltham notification in this regard within one hour of such notice by calling (781) 314-3844 Upon being

advised by the City of Waltham of the location and nature of the emergency, the Contractor will be required to provide an emergency coordinator or contact at the site within one hour of the initial notification and to mobilize the necessary response crew(s) and have them at the site of the emergency within two hours of the initial notification.

D. The Contractor's failure to comply with the above notification and response requirements shall result in a five-hundred dollar ($500.00) fine for each failure to respond as indicted in 1.3.C. In addition the Contractor shall be liable for any and all damages, liabilities and costs which result from his/her failure to respond to any emergency within the designated time periods. The City of Waltham assumes no responsibility or costs for the Contractor's negligence in complying with these requirements. If the subject fine or other liabilities are not paid by the Contractor upon request, it shall be deducted from any payment(s) which may be due the Contractor by the City of Waltham, solely at the discretion of the City of Waltham.

E. The Contractor shall not use any City of Waltham personnel to fulfill these requirements.

F. This requirement shall be considered an incidental part of the Contract, no matter how many times the Contractor is alerted during this Contract, and no payment will be made for any costs incurred or associated with the emergency contact and response requirements.

1.4 PUBLIC UTILITIES

A. The Contractor shall comply with the requirements of the Commonwealth of Massachusetts Statute - Chapter 82, Section 40, for excavations in public and private property. Compliance shall include the following:

1. The Contractor shall notify public utility companies in writing at least 72 hours (excluding Saturdays, Sundays and legal holidays) but not more than 30 days before excavating in areas where underground utility plant (pipes, cables, manholes, etc) exist.

2. The Contractor shall be responsible for providing the Utility Companies with a schedule of his/her activities in areas where the utilities exist.

3. The Contractor shall immediately notify utility companies of any damage to their utilities resulting from construction operations.

4. The express approval of the Owner shall be obtained before public water is used. Hydrants shall only be operated under the supervision of the Owner's personnel. The water is to be metered. A meter must be attained by the Water Division. The Contractor will be responsible for all associated fees and charges for water use.

B. The Contractor shall notify DIGSAFE at 1-800-322-4844 at least 72 hours before digging, trenching, blasting, demolishing, boring, backfilling, grading, landscaping or other earth moving operations in any public ways, rights of way and easements.

1.5 PERMITS

A. The Contractor shall be required to obtain all necessary permits for proper execution of certain phases of the project. The Contractor shall fill out all forms and furnish all drawings required to obtain the permits. A copy of the approved permit shall be submitted to the Engineer. All fees associated with these permits shall be paid by the Contractor as part of the project. Work shall not commence on any phase of the work requiring a permit until the permit is obtained.

B. The Contractor shall obtain the required street opening permit from the Department of Public Works for excavations within the street or sidewalk area.

1.6 TRAFFIC AT STREET INTERSECTIONS

A. The Contractor shall minimize interferences with the normal flow of traffic. The Contractor shall take all actions ordered by the Engineer to minimize the disruption of normal traffic flow.

1.7 FIVE FOOT DIAMETER CONCRETE MANHOLE STRUCTURE

A. The Contractor is made aware that a new five-foot diameter concrete manhole is required to be installed at the intersection of Lowell and Ash Streets to replace the existing one.

B. A total of 6 pipe connections connect to this manhole. The Contractor must submit his proposed precast concrete manhole design identifying the proposed invert connections and piping orientations to the Engineer for review.

C. The live traffic design load for the manhole is HS-20.

1.8 WORK IN CLOSE PROXIMITY TO RESIDENCES

A. The proposed storm drain replacement and drain cleaning project will require work to be performed in close proximity to existing residences.

B. The coordination and scheduling with the residents, means and method to provide and maintain access, complete site restoration of any/all disturbed areas on private properties will be considered incidental to the installation of the drain pipe and no separate payment will be made.

1.9 RAIN AND WEATHER FORECAST

A. The Contractor is made aware that the existing storm drain to be replaced in Lowell Street is prone to flow surcharge during rain events.

B. The Contractor must track weather forecast to track any anticipated rainfall at least 48-hours in advance and notify the Engineer.

C. The Contractor must make an end connection of the new pipe to the existing storm drain pipe or manhole to the satisfaction of the Engineer 24-hours prior to the anticipated rainfall or as directed by the Engineer. No work will be allowed prior to, during and immediately following any rainfall and as directed by the Engineer. All work related to this will be considered incidental to installation of the new storm drain and no separate payment will be made.

PART 2 -PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01170

SECTION 01200

PROJECT MEETINGS

PART 1-GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE CITY

A. As part of this Contract, the Contractor shall coordinate his activities with the City. In addition, the Contractor will give the City significant notice on any work that may be required to meet the contract schedule.

1.3 PRECONSTRUCTION CONFERENCE

A. A pre-construction conference will be held between the Contractor, the Engineer, the Owner, and applicable agency representatives to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. Contractor will be notified of the time, date and place where the pre-construction conference will be held.

1.4 PROGRESS MEETINGS WITH ENGINEER

A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings twice each month with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable) consultants, separate contractors (if any), principal subcontractors, suppliers/ manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited, and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

B. Within seven days after each progress meeting date, the Engineer will forward copies of the minutes-of-the-meeting, to the Contractor.

C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1- GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Construction Photographs, and Construction Schedules. Additional general submission requirements are contained in Paragraphs 6.24 and 6.25 of the General Conditions. Detailed submittal requirements will be specified in the technical specifications sections.

B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.2 SHOP DRAWINGS PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special. wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.

2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

5. Submittals for equipment specified under Division 2 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance's and applicability, roughing in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and

include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

C. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.

D. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on- site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

E. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.4 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer.

C. Number of submittals required:

1. Shop Drawings as defined in Paragraph 1.2 A: Six copies.

2. Product Data as defined in Paragraph 1.2 B: Three copies.

3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in x 3-in blank space for Contractor and Engineer stamps.

1.5 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 - "NO EXCEPTION TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "SUBMIT SPECIFIED ITEM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within I 0 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within I 0 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his/her option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.6 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed 6.

1.7 CONSTRUCTION PHOTOGRAPHS

A. Where directed by the Engineer, the Contractor shall have an average of 20 color photographs per month made of the work during its progress and 20 color photographs of the completed facilities. The photographs shall be of such views and taken at such times as the Engineer directs. Photographs shall be taken at each property.

B. All photographic work shall be done by a qualified, established commercial photographer acceptable to the Engineer. Three prints of each photograph shall be furnished promptly to the Engineer, and each print shall have a glossy finish and be mounted in plastic sleeving on a substantial backing. The overall dimensions of each mounted print shall be 8 x 10-in with 1-1/4-in flexible binding margin on the long top side to permit storage in standard 3-ring binders.

C. The film negatives shall be retained in the files of the photographer until the completion of the project and shall then be turned over to the Owner.

D. Each photograph shall have attached to the backing a paper label, approximately 2-114-in wide by 1-3/4-in high containing thereon in neat lettering;

1. Contractor's name

2. Short Description of View

3. Photo No. and

4. Photographer's Firm Name

1.8 SCHEDULES

A. Provide all schedules required by Articles 2.6, 2.9, 14.1, and elsewhere in the General Conditions.

B. The Contractor shall submit a progress schedule before starting any work, in accordance with Article 2.6 of the General Conditions. The Contractor shall review the progress schedule with the Engineer periodically. Such review shall be made on a monthly basis or more frequently as required by the Engineer. The progress schedule shall be updated as required by the Engineer.

1.9 "OR EQUAL"

A. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and baring an authorized signature.

B. Manufacturers' standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.

C. The Contractor shall be responsible for all additional costs including license fees, foundation, piping and electrical work necessary to accommodate the proposed "or equal" equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified.

1.10 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other Sections of these Specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.11 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01300

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.

B. Form of Schedules:
   1. Narrative: Completely describe the construction methods to be employed.
   2. Network Analysis System (Gantt Chart):
      a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
      b. Present in chronological order the beginning of each trade or operation showing duration and float time.
      c. Scale: Identify key dates and allow space for updating and revision.
   3. Mathematical Analysis:
      a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
      b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.
   4. The schedule shall be developed using Microsoft Project or other scheduling software approved by the ENGINEER and OWNER.

C. Content of Schedules:
   1. Provide complete sequence of construction by activity:
      a. Shop Drawings, Project Data and Samples:
         1) Submittal dates.
         2) Dates reviewed copies will be required.
      b. Decision dates for:
         1) Products specified by allowances.
         2) Selection of finishes.
      c. Estimated product procurement and delivery dates.
      d. Dates for beginning and completion of each element of construction.
   2. Identify work of separate phases and logically grouped activities.
   3. Show the projected percentage of completion for each item of work as of the first day of each month.
   4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.

D. Updating:
   1. Show all changes occurring since previous submission.
   2. Indicate progress of each activity, show completion dates.
   3. Include:
      a. Major changes in scope.
      b. Activities modified since previous updating.
      c. Revised projections due to changes.
      d. Other identifiable changes.
   4. Provide narrative report, including:

a. Discussion of problem areas, including current and anticipated delay factors.
b. Corrective action taken, or proposed.
c. Description of revisions that may affect schedules.

1.2 SUBMITTALS

A. Submit schedules in electronic format and hard copy as follows:
   1. Prior to start of work
   2. Bi-weekly
   3. When there are changes in the schedule
   4. With each progress payment request

B. Submit 4 copies of initial and updated schedules to the Engineer.

END OF SECTION 01310

SECTION 01320

SAFETY AND HEALTH PLAN

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within (10) days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
   a. Provide documentation that Contractor's hazardous communication program is up to date.
   b. Provide documentation that Contractor's safety training is up to date.
   c. Prepare a project specific Safety and Health Plan addressing construction safety issues, including but not limited to excavations, fall protection and egress, excavation adjacent to existing utilities, traffic and pedestrian safety, materials handling, and other potential safety issues.
2. Safety provisions for confined space entry shall follow General Industry Standard CFR Title 29 Part 1910.146 and will be incorporated into the Safety and Health Plan.
   a. The Contractor shall be responsible for all aspects of construction site safety including development of appropriate confined space entry procedures. The plan shall include, but not necessarily be limited to, the following:
      - Definitions
      - Confined Space Evaluations
      - Equipment Selection
      - Confined Space Entry Training Documentation
      - Permit Required Confined Space Entry Requirements

- Testing (Monitoring) and Ventilation
- Confined Space Entry Permit Form
- Rescue and Emergency Procedures
- Emergency Contact Information

b. The Contractor shall inform the Owner and Engineer's representative whenever work will be performed in a confined space and the permit space program that the Contractor will follow.

c. The Contractor shall inform the Owner and Engineer's representative of any hazards confronted or created during entry operations, either through a briefing or during the entry operation.

d. The Contractor will coordinate entry operations with the Owner when both Owner personnel and Contractor personnel will be working in or near permit spaces.

e. The Owner, Engineer, their representatives, independent testing laboratories and government agencies, when inspecting the site, shall be supplied by the Contractor proper safety equipment when entry into a confined space is required.

C. Updating:

1. Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

1.2 SUBMITTALS

A. **Contractor shall be responsible for all aspects of construction site safety.** Provide 3 copies of the Contractor's site specific Safety and Health Plan to the Engineer. The Safety and Health Plan is provided for information only to inform the Owner, Engineer (and Resident Project Representative) of the project specific safety program requirements. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) at the beginning of the project, and subsequently when the safety plan is updated.

B. Provide updated Safety and Health Plans as necessary during the course of the project.

C. Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

1.3 ON-SITE COORDINATION MEETINGS

A. Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.

B. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.

END OF SECTION 01320

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Extent of Work:
   1. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

B. Related Work Specified Elsewhere:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections of these Specifications.
   2. Schedule of values is required under the General Conditions.
   3. Schedule of values is required to be compatible with applications for progress payment.

1.2 QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer substantiating the sums described.

1.3 SUBMITTALS

A. Prior to first application for payment, submit a proposed schedule of values to the Engineer.
   1. Secure the Engineer's approval of the schedule of values prior to submitting first application for payment.

END OF SECTION 01370

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Pre-Construction Record: Contractor shall utilize digital photographs and video to obtain a visual record of the project area; copies of same shall be given to the Engineer and Owner.
2. Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at his option, observe.

1.2 QUALITY

A. Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, etc. can be readily determined.

1.3 SUBMITTAL OF PRINTS

A. Pre-Construction Record: Submit hard copy prints and electronic files on CD ROM, and video electronic files on DVD to the Engineer and Owner prior to any construction work.

B. The quality of the photos and video are subject to approval by the Engineer prior to the start of construction work in the areas shown by the photos.

END OF SECTION 01380

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section covers Quality Assurance and Control requirements for this contract.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, (filed sub-bidders) and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

C. Refer to the Article 6 - Contractor's Responsibilities, paragraphs 6.01 6.02, 6.03, of the GENERAL CONDITIONS.

1.3 TESTING LABORATORY SERVICES

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents, shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory must be certified by the Commonwealth of Massachusetts for the parameters tested and required under the project. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, asphalt mixtures, moisture density (Proctor) gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and

testing as necessary to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.

E. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.

F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Refer to Article 3 .. Contract Documents, Intent, Amending, Reuse, paragraph 3.3 of the General Conditions.

Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards needed by the Contractor for Superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.

B. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

C. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.5 OFFSITE INSPECTION

A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.

B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

1.6 MATERIALS AND EQUIPMENT

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.7 SHOP AND FIELD TESTING

A. The Contractor is also responsible for providing the shop and field testing specified in the technical specifications sections.

B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty one days notice to the Engineer so that the Engineer may witness Contractor and for Subcontractors off site and on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.8 MANUFACTURER’S FIELD SERVICES

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturers of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

1.9 CERTIFICATION FORMS AND CERTIFICATES

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 -PRODUCTS (NOT USED)

PART 3- EXECUTION

3.1 QUALITY CONTROL

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel) procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards, fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.
2. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of temporary wiring of a special nature for light and power required, other than that above mentioned.
3. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and

requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.

B. Heating:
   1. The General Contractor shall furnish, install, and maintain a complete temporary heating system, including fuel therefore, which will provide heat and ventilation as required by the trades and for the protection of stored and installed materials from injury as can be caused by dampness and cold. The General Contractor shall employ, within the terms of the General Contract, a competent watchman who will maintain and operate the systems, as required. The General Contractor shall bear all costs incurred from the temporary heating and ventilation from the time the systems are first required until the date of Substantial Completion of the General Contract, as defined in the General Conditions and Supplementary Conditions.

C. Water and Sanitary:
   1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at his own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
   2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
   3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for his employees.
   4. See Site Plan for nearest water hook-up.
   5. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.
   6. Relocate temporary toilet facilities as required to facilitate the construction.
   7. Remove all temporary facilities at completion of work when directed by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Electrical:
   1. Provide electrical energy to:
      a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
      b. Construction site offices.
      c. Lighting as required for safe working conditions at any location on the construction site.
      d. Night security light.
      e. When applicable, Owner's present facilities during the changeover of electrical equipment.

2. Capacity:

   Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.

3. Installation:
   a. Install all work with a neat and orderly appearance.
   b. Have all installations performed by a qualified electrician.
   c. Modify service as job progress requires.
   d. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.

B. Heating:
   1. Maintain a heated environment for the work at the temperature and for the length of time specified or as directed by the Engineer.
   2. Precaution:
      a. Operate temporary heating apparatus in such a manner that finished work will not be damaged.
      b. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer.

C. Water:
   1. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.

D. Sanitary Accommodations:
   1. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.
   2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION 01500

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.1 DESCRIPTIONS

A. Work Included:

1. Contractor to have watering equipment on site throughout construction duration.
2. Furnish and apply water on the road surfaces within the construction site, at a minimum of two times per day, to control dust and when directed by the Engineer.
3. When dust control is not included as a separate item in the Contract, the work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Water for Sprinkling:

B. Clean, free of salt, oil, and other injurious matter.

PART 3 - EXECUTION

3.1 APPLICATION

A. Water:

1. Apply water by methods approved by the Engineer.
2. Use approved equipment including a tank with gauge equipped pump and spray bar.

END OF SECTION 01562

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
   2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
   3. Do not close roads or streets to passage of the public without the permission of the proper authorities.
   4. Refer to Section 01010 Summary of Work for additional requirements.

B. The local police department will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage.

C. Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.

1.2 SCHEDULING WORK

A. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.

B. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour. All detours shall be approved by the local police department.

C. Do not start work in any new location without the permission of the Engineer.

D. Notify all police and fire departments of all scheduled detours and when streets are reopened.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

A. Provide adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.

B. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.

C. Provide barricades of substantial construction and painted with a finish that increases visibility at night.

D. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.

E. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.

F. Traffic control signs for construction work shall be located and of the size and type as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways as published by U. S. Department of Transportation.

2.2 UNIFORMED POLICE OFFICER

A. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.
B. Arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

2.3 FLAG PERSON

A. A flag person is a trained and certified individual assigned specifically to the task of directing traffic and is outfitted in the necessary high visibility vest and apparel needed for traffic control.
B. Flag persons shall be provided by the Contractor.

PART 3 - EXECUTION

3.1 DETOURS

A. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.
B. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

A. Whenever a traveled way is closed, perform the Work in such a manner that local travel and residents in the vicinity of the Work will be inconvenienced as little as possible.
B. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

3.3 TRAFFIC CONTROL OFFICERS

A. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.
B. Where the local, county or state police departments do not wish to or are unable to furnish traffic control officers and/or when specified, the traffic control officers shall be flag person.

END OF SECTION 01570

SECTION 01576

POLICING

PART 1- GENERAL

1.1 SUMMARY

A. When, in the opinion of the Owner, public safety or convenience requires the services of police, the Owner may direct the Contractor to provide manpower to direct traffic within the location of work under this Contract.

B. When so directed, the Contractor shall make all arrangements in obtaining the manpower and all invoices for policing will be made to the Owner, the Owner shall approve the Daily Police Billing Verification Form, and the Owner shall pay all expenses incurred, including the salaries of the assigned personnel. Forms are available from Owner.

C. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open tranches.

D. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.

E. All payments to police for work under this Contract shall be in accordance with Section 34B of Chapter 149 of the General Laws of the Commonwealth of Massachusetts which states that reserve police officers shall receive the same prevailing wage rates as paid to the regular police officers.

F. The Policing shall be paid for on a weekly basis in accordance with an invoice from the Police Department, with payment sent directly to the Police Department.

END OF SECTION 01576

SECTION 01601

CONTROL OF MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the following other Division 1 Specification Sections:

Section 01024 Measurement and Payment
Section 01046 Control of Work
Section 01300 Submittals
Section 01400 Quality Assurance

1.2 SUMMMARY

A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.3 APPROVAL OF MATERIALS

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. Any delay of approval resulting from the Contractor’s failure to submit samples or data promptly shall not be used at basis of a claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.4 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide equipment and personnel to unload all items delivered to the site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.5 HANDLING, STORAGE, AND PROTECTION OF MATERIALS

A. All materials and equipment to be incorporated in the work shall be handled and stored by the manufacturer, fabricator, supplier and Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting and any injury, theft or damage of any kind whatsoever to the material or equipment.

B. All pipe and other materials delivered to the job shall be unloaded and placed in a manner which will not hamper the no1mal operation of existing facilities or interfere with the flow of necessary traffic.

C. Only the materials and equipment required for the days operations will be allowed to stand within the limits of the rights-of-ways. All else shall be removed and stored by

the Contractor at a private off-site location to be acquired by the Contractor) or an agreed upon staging area arranged and approved by the Owner.

D. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

E. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter. Provide environmental protection measures as specified in Section 01110.

F. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

G. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

H. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.

I. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

J. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at time of acceptance.

K. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the .

equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

L. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work and the Contractor shall receive no compensation for the damaged material or its removal

PART 2- PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01601

SECTION 01700

WORK ON PRIVATE PROPERTY AND SITE ACCESS

PART 1-GENERAL

1.1 SUMMARY

A. The Contractor shall perform all required construction work on private property. The Contractor shall take special care to preserve and restore private property to its original condition or better after work is completed.

B. The Contractor shall coordinate site access to private property with the City of Waltham Engineering Department.

1.2 EXTERIOR WORK ON PRIVATE PROPERTY

A. The Contractor shall take all precautions necessary to minimize disturbance to retaining walls (stone, concrete block or other), shrubs, trees, mailboxes, lamp posts, etc. and all other features of the property. No cutting of trees or removal of shrubs will be allowed on private property unless directed otherwise by the Owner. The Contractor will be responsible for restoration of the property to a condition at least equal to that existing prior to construction.

B. The Contractor shall minimize damage to existing landscape and yard features by properly handling and removing these items. Existing landscaping and other yard features shall be reinstalled whenever possible. Any damaged items or items deteriorated or for other reasons are unable to be reinstalled shall be replaced with items equal to or better than existing. All items to be replaced and/or reinstalled shall be approved by the Owner.

C. If trees or shrubs which are not to be removed are damaged during construction to such degree as to affect their growth of diminish their beauty or usefulness, they shall be replaced at the Contractor's expense by items of kind and quality at least equal to that existing at the start of the work.

D. Fences, walks, stone walls and other private property which might be damaged by the Contractor's operations shall be removed, and replaced at the Contractor's expense to a condition at least equal to that existing at the start of the work.

E. Grass areas damaged by the Contractor's operations shall be loamed and hydroseeded as specified under applicable provisions of Section 02930 and shall be restored to a condition at least equal to or better than that existing prior to construction.

F. All paved areas shall be repaired as specified in Section 02576 and all concrete sidewalk, walkway, driveway apron and driveway areas shall be repaired as specified in section 02515.

1.3 INTERIOR WORK ON PRIVATE PROPERTY

A. The Contractor shall take all precautions to minimize disturbance to walls, floors, piping, hangers, columns, girders, personal belongings, etc. and other features existing inside existing basements and structures where the work will be performed. No private property shall be demolished or destroyed. The Contractor shall be responsible for restoration of property to a condition at least equal to that existing prior to construction.

B. The Contractor shall minimize damage to existing basement features during execution of the work. Personal belongings in the way of the area of work shall be carefully moved aside to complete the work. If the Contractor is not comfortable moving personal belongings in the way of the Work, he shall coordinate with the Waltham Engineering Department to have the items moved by the property owner. Any damaged items shall be replaced with an item equal to or better than existing. All items replaced shall meet the approval of the Owner.

C. Any walls damaged (scuffed, chipped, etc.) as a result of the Contractor's operations shall be repaired prior to completion of work.

D. The Contractor shall protect existing private property and belongings along all paths of entrance and egress during the progress of work. Work areas and walkways used to enter and exit the building shall be cleaned and returned to the condition existing prior to construction.

1.4 SITE ACCESS

A. Access to the site shall be coordinated by the Waltham Engineering Department (WED). The WED will obtain permission to access property through a separate agreement between the WED and the property owner. The WED will schedule an appointment with the property owner to execute the work. The Contractor shall not access private property until authorized by the WED.

B. Upon completion of the construction, all traces of access shall be removed and all yard features and landscaping which existed prior to the start of the work shall be replaced or restored to their original condition.

1.5 RESTORING PRIVATE PROPERTY AND RIGHTS-OF-WAY

A. The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury, all walls, fences, cultivated shrubbery and vegetables, fruit trees, pavement, underground facilities, such as water pipe, or other utilities which may be encountered along the pipe route. If removal and replacement are required, it shall be done in a workmanlike manner so that replacement is equivalent to that which existed prior to construction.

B. Existing trees, shrubs, plants and bushes shall be fully protected as specified. The work shall also include removing and replacing trees, shrubs and bushes as required.

It shall include the careful excavation of the root ball which shall be wrapped with burlap while out of the ground. The Contractor shall replant them after backfilling the trench, stake them in an upright position, and shall periodically water replanted trees, bushes and

shrubs. The Contractor shall be fully responsible for ensuring that any and all trees, bushes and shrubs removed and replanted "take" and return to a viable state. Any replanted item that fails to "take" or that is so damaged as to be unsuitable for replanting shall be replaced by the Contractor, at no additional cost to the Owner, with a tree, bush, or shrub equal to the one removed. New or replacement trees, bushes or shrubs shall be installed in accordance with Section 02950.

C. The Owner will inspect all work for provisional acceptance upon written request of the Contractor as specified in Section 02950.

D. All plants shall be guaranteed by the Contractor as specified in Section 02950.

E. The Contractor shall be responsible for all damage to private property and belongings inside existing basements and structures. The Contractor shall repair or replace damaged items to pre-construction conditions. The Contractor shall clean all areas where work took place or used to conduct work and leave areas in the condition existing prior to construction.

END OF SECTION 01700

SECTION 01710

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for contract closeout, including, but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Division 2.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before the Contractor requests inspection for Certification of Substantial Completion of the project, the Contractor shall complete the following items. Exceptions to the listed items will be noted in the request.

B. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete. Include supporting documents for completion, as indicated in these Contract Documents, and a statement showing an accounting of changes to the Contract Sum.

1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.

2. Advise the Engineer and Owner of pending insurance change over requirements if applicable.

3. Submit specific Warranties, Workmanship Bonds, Maintenance Agreements, Final Certifications, As-Built Plans, and similar documents.

C. Complete final cleanup requirements.

D. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or

advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assure that the work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for Certification of Final Acceptance and Final Payment, complete the following. List exceptions in the request.

1. Submit the Final Payment Request with releases and supporting documentation not previously submitted and accepted.

2. Include Certificates of Insurance for Products and Completed Operations, where required.

3. Submit an updated final statement, accounting for final additional changes to the contract sum, if any.

4. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer. This will include acceptance by the Engineer of any seeded areas.

B. Submit Consent of Surety to Final Payment.

1. Submit a final liquidated damages settlement statement, if applicable.

2. Submit evidence of final, continuing insurance for one year’s coverage complying with insurance requirements.

C. Re-inspection Procedure: The Engineer will re-inspect the work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has delayed because of circumstances acceptable to the Engineer.

1. Upon completion of re-inspection, the Engineer will prepare a Certificate of Final Acceptance, or advise the Contractor of work that is incomplete, or of obligations that have not been fulfilled, but are required for Final Acceptance.

2. If necessary, re-inspection will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

A. Record Drawings: Submit As-Built Drawings of the piping, storm drainage structures and all appurtenances. Drawings will be submitted to the Engineer at the completion of the

job as specified in Section 01300. Drawings shall be neat, accurate and thorough and submitted in hard copy format (8 1/2 x 11 sheets) and electronically as AutoCAD files.

PART 2- PRODUCTS (NOT USED)

PART 3 -EXECUTION

3.1 FINALCLEANING

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

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat 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. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Town's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

F. 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. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

END OF SECTION 01710

SECTION 01710

PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Maintain premises, private, and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
   2. At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
B. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.
C. Mechanical sweeper – the sites shall be swept on a daily basis at the conclusion of each work day. Sweeping shall be performed by a mechanical power sweeper.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Cleaning During Construction:
   1. Execute cleaning operations to ensure that buildings, grounds, private, and public properties are maintained free from accumulations of waste materials and rubbish.
   2. Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, lawns, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
   3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
   4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
   5. When applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.
B. Control of Hazards:
   1. Store volatile wastes in covered metal containers, and remove from premises daily.
   2. Prevent accumulation of wastes which may create hazardous conditions.

3. Provide adequate ventilation during use of volatile or noxious substances.

C. Disposal:
   1. Do not burn or bury rubbish and waste materials on project site.
   2. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.

D. Final Cleaning:
   1. Employ experienced workmen, or professional cleaners, for final cleaning.
   2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
   3. Repair, patch and touch up marred surfaces to specified finishes.
   4. Rake clean non-paved surfaces of the project site.
   5. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION 01710

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Keep accurate record documents for all additions, substitutions of material, variations in work, and any other additions or revisions to the Contract.

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain at job site, one copy of:
   1. Contract Drawings
   1. Specifications
   2. Addenda
   3. Reviewed Shop Drawings
   4. Change Orders
   5. Any other modifications to the Contract
   6. Field Test Reports
B. Store documents in files and racks specifically identified for this use that are apart from documents used for construction.
C. File documents in a logical manner indexed for easy reference.
D. Maintain documents in clean, dry, legible condition.
E. Do not use record documents for construction purposes.
F. Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.

1.3 RECORDING

A. Label each document "PROJECT RECORD" in large high printed letters.
B. Keep record documents current and do not permanently conceal any work until required information has been recorded.
C. General Field Recording Issues:
   1. All ties should be taken from existing, permanent features such as utility poles, corners of houses and hydrants. Porches, sheds or other house additions should be avoided for they could be torn down. A minimum of two ties should be taken.
   2. Stations should be recorded to the nearest foot.
   3. Inverts should be recorded to the nearest hundredth of a foot.
   4. Elevations should be recorded to the nearest hundredth of a foot.
   5. Building dimensions should be recorded to the nearest 1/4".
D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):
   1. Existing Utilities

      Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be

required.

a. Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties should be shown on plan. Utility should be drawn to scale in section (horizontally and vertically) and an elevation should be called out to the nearest hundredth of a foot.
b. When existing utility lines are broken and repaired, ties should be taken to these locations.
c. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.

2. Manholes, Catch Basins, Valve Pits and other structures.
   a. Renumber structure stationing to reflect changes.
   b. Show ties to center of structure covers or hatches.
   c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
   d. Show inverts for other structures at the face of the structure.
   e. Draw any new structures that are added on plan and profile.
   f. Show any field or office redesigns.
   g. Redraw plan if the structure's location is moved more than 5 feet in any direction. [Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.]
   h. Redraw profile if inverts changed by more than 6 inches.
3. Gravity Sewer Line
   a. Change sewer line slopes indicated on Drawings if inverts are changed.
   b. Draw any new gravity lines that are added on plan and profile.
   c. Show any field or office redesigns.
   d. Redraw the sewer line profile if manhole inverts are redrawn.
   e. Redraw the sewer line on plan corresponding to relocated manholes.
4. Water Mains and Force Mains
   a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks should be recorded.
   b. Revise elevations indicated on the Drawings to reflect actual construction.
5. House Services
   a. Draw all house services (even to empty lots) on plan, and show ties.
   b. Show ties or distances to wyes from manhole.
   c. Show chimneys heights in the profile.
   d. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record sewer service information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.
6. Septic Tanks
   a. Show ties to center of tank covers.
   b. Label size of septic tanks that are other than standard 1000 gallon capacity.
   c. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record septic tank information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.
7. Ledge
   a. Ledge profiles should be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.

8. Yard Piping and Buried Electrical Conduit
    a. Site piping should be drawn to reflect the installed locations, with ties and elevation of all bends (horizontal and vertical).
    b. Show routing for electrical conduits and pull boxes, especially in close proximity to buildings and when the conduits change direction or cross process piping.
9. Roads
    a. Show centerline road profile and level spot elevations.
    b. Show pavement widths.
    c. On road cross sections, show the pavement cross slope.
    d. Show any deviations from the design plans.
10. Buildings
    a. In general, small changes to structures should not be redrawn. If any dimensional changes were made in the field, the numerical change should be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings.
    b. Show finished concrete elevations (top of slab, top of wall, top of footing, etc.). Redraw any foundation, frost wall, etc. that was modified, deepened, or altered during construction.
    c. Adjust finished concrete horizontal dimensions that are shown on the Drawings.
    d. Adjust structural steel elevations and horizontal dimensions that are shown on the Drawings.
    e. Show location of anchors, construction and control joints, and waterstops, when they are different from those shown on Drawings.
    f. Any additions or major changes should be shown in both plan and elevation (i.e. relocated doors, opposite door swings, change in wall location, relocation of floor drains).
    g. Show approximate location and routing of electrical conduits in walls, slabs and ceilings. Most conduits are run in groups, therefore, use range of measurements to define location for entire section of conduits.
    h. Special circuits for computers, alarms and instrumentation should be shown.
    i. Show any changes in location and elevation of ductwork and devices, fuel piping and equipment, and heat piping and equipment.
    j. Location of gravity sewer system below slabs in buildings should be shown, if changes are made in the configuration.
    k. If wall mounted electrical switches, control boxes, thermostats, etc. have been relocated significantly, (other side of door, or to a wall other than indicated diagrammatically on electrical plans) make the revision accordingly.

E. Specifications and Addenda - Legibly mark up each section to record:
    1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

    2. Changes made by Change Order, Field Order, or other method.

1.4 SUBMITTALS

A. At the completion of the project, deliver record documents to the Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date, project title and number.
2. Contractor's name and address.
3. Title and number of each record document with certification that each document is completed and accurate.
4. Signature of Contractor, or his authorized representative.

C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in additional retainage from monthly partial payment requests, and in non- approval of final payments of the Contract and/or if contract time (as specified in accordance with the Standard General Conditions of the Construction Contract) has elapsed, this shall be grounds for the enactment of the liquidated damages as specified.

END OF SECTION 01720

SECTION 02020

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies equipment and materials for an erosion and sediment control program installation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for an erosion control program. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

A. Examine Contract Documents and Drawing Details for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01110 Environmental Protection Procedures

1.3 SUBMITTALS

A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:

1. List of proposed materials including manufacturer's product data.

2. Erosion Controls shall be installed prior to construction. Schedule of erosion control program indicating specific dates from implementing programs in each major area of work, including Erosion Control installation and truck wheel wash station installation.

B. Samples

The following samples shall be submitted:

Sample	Size
Filter Fabric (Woven and Non-Woven)	12 X 12 in.

1 .4 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. Massachusetts Department of Public Works, and The Commonwealth of Massachusetts Department of Public Works; Construction Standards.

2. Massachusetts Department of Environmental Protection.

1.5 EROSION CONTROL PRINCIPLES

A. Erosion Control Principles

The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.

2. Whenever feasible, natural vegetation shall be retained and protected.

3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.

4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.

5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.

6. Sediment shall be retained on-site.

7. Erosion control devices and truck wheel wash station shall be installed prior to start of clearing and grubbing operations and excavation work.

B. Erosion Protection

Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure is expected to be less than two months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

2. Temporary erosion protection shall be accomplished by covering with an erosion protection n1aterials, as appropriate for prevailing conditions.

3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 4:1 (horizontal: vertical) cut slopes shall be limited to a grade of 4:1.

PART 2 -PRODUCTS

2.1 HAY BALES

A. Hay bales for construction of erosion control devices shall be new, firm, bound salt marsh hay bound with biodegradable twine.

2.2 TEMPORARY SEED COVER

A. If required, seed mixture for temporary cover by hydroseeding application shall conform to the following:

Quantity per 1000 sq. ft. Coverage	Material
27-1/2 lb.	Wood Fiber Mulch
4lb.	Seed
½ lb.	Annual Ryegrass
22lb.	10-6-4 Fertilizer
69 gal	Water

B. Hydroseeding Equipment

Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 ft.

1. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.

2. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 ft.

2.3 FILTER BASKETS

A. Filter baskets shall be Metal-Era Inlet Baskets, manufactured by Metal-Era Inc., Wukesha, WI 53186, approved equal. Baskets shall be installed at all newly installed and existing catch basins and remain in place until vegetation on the site is stabilized. Filter basket shall include a nonwoven geotextile filter fabric material with a minimum Grab strength of 45 lb., Mullen Burst Strength of 60 psi minimum, a minimum permeability of 120 gpm/sq. ft., and an opening no greater than No. 20 U.S. Standard Sieve.

PART 3 EXECUTION

3.1 HYDROSEEDING

A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.

B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.

C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 FILTER BASKETS

A. Filter baskets shall be installed at all newly installed and existing catch basins. Filter baskets shall be installed in accordance with manufacturer's recommendations. Maintain filter baskets as required and as follows. Baskets shall be inspected within 24 hours after each rainfall or daily during extended periods of precipitation. Repairs shall be made immediately, as necessary, to prevent particles from reaching the drainage system. Sediment deposits shall be removed after each storm event, or more often if the fabric becomes clogged. Clean clogged fabric and repair or replace damaged filter fabric as necessary.

3.3 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.

B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.

C. Erosion Control Devices

1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be re1noved if greater than 6 in. deep.

2. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

3. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.

4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.

D. Removal of Erosion Control Devices

1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded.

2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project.

END OF SECTION 02020

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall furnish all labor, materials, tools, equipment and apparatus necessary and shall do all work required to complete the demolition, removal, and alterations of existing facilities as indicated on the Drawings, as herein specified, and/or as directed by the Engineer.
2. Demolition and alteration work within occupied areas shall be accomplished with minimum interference to the occupants and to the plant which shall be in continuous operation during construction.
3. All equipment, piping, and other materials that are not to be relocated or to be returned to the Owner shall become the property of the Contractor and shall be disposed of by him, away from the site of the work and at his own expense.
4. All demolition or removal of existing structures, utilities, equipment, and appurtenances shall be accomplished without damaging the integrity of existing structures, equipment, and appurtenances to remain, to be salvaged for relocation or stored for future use.
5. Such items that are damaged shall be either repaired or replaced at the Contractor's expense to a condition at least equal to that which existed prior to the start of his work.
6. Unless otherwise indicated, all items labeled to be "removed", "demolished" or "remove/demolish" shall be removed and disposed of off site in accordance with all Local, State and Federal Regulations.

1.2 JOB CONDITIONS

A. Condition of Structures:

1. The Owner assumes no responsibility for the actual condition of structures to be demolished.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as practicable. However, variations within the structures may occur due to Owner's removal and salvage operations prior to the start of demolition work (where applicable).

1.3 UTILITIES

A. Utility Locations:

1. Utility locations shown on the plans are approximate only.
2. The Contractor shall make all necessary arrangements and perform any necessary work to the satisfaction of affected utility companies and governmental divisions involved with the discontinuance or interruption of affected public utilities and services.

1.4 SUBMITTALS

A. Schedule - Demolition:

1. Submit two (2) copies of proposed methods and operations of demolition to the Engineer for review prior to the start of work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required.
2. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations.
3. Provide detailed work plan including location of material disposal.

1.5 PROTECTIONS

A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons. Erect temporary, covered passageways as required by authorities having jurisdiction.

B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.6 DAMAGES

A. The Contractor shall promptly repair damages caused by demolition operations to adjacent facilities at no cost to the Owner.

PART 2 - PRODUCTS

Not
Applicable.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Remove and dispose of non-salvageable material in accordance with all applicable local and state laws, ordinances and code requirements.

B. Dispose of material daily as it accumulates.

C. Carefully remove, store and protect from damage all materials to be salvaged.

D. Buildings and Adjacent Property:

1. Protect all buildings and property adjacent to equipment to be removed from damage by erecting suitable barriers or by other suitable means.
2. Leave such buildings in a permanently safe and satisfactory condition.

F. Mechanical/Process Demolition:

1. Mechanical/Process demolition in general shall consist of the dismantling and removal of existing piping, tanks, pumps, motors, equipment and other appurtenances as specified, and indicated on the Drawings.
2. It shall also include, where necessary, the cutting of existing piping for the purpose of making connections thereto.
3. Piping not indicated to be removed but which may interfere with construction shall be removed to the nearest solid support, capped and left in place. Where piping that is to be removed passes through the wall of existing structures, it

shall be cut off and properly capped on each side of the wall.

4. When piping is to be altered or removed underground, the remaining piping shall be properly capped or plugged.
5. Abandoned underground piping shall be left in place unless it interferes with new structures or unless otherwise noted on the Drawings.

H. Salvage:

1. Salvaged items shall be stored on site for the Owner in an acceptable location and manner.

I. Demolition Sequence:

1. The demolition sequence is to conform the reviewed and approved project schedule, and restrictions outlined in Section 01310, Construction Schedules.

END OF SECTION 02050

SECTION 02100

SITE PREPARATION

PART I- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Provide labor, material, tools and equipment to prepare site as indicated and specified.

B. Related sections include the following:

1. Section 02200: Earthwork

PART 2- PRODUCTS

2.1 WOOD CHIPS

A. Chip from cleared wood.

B. Provide additional wood chips as directed by Engineer.

C. Do not permit use of elm wood and elm bark as wood chips.

PART 3- EXECUTION

3.1 EXISTING TREES AND VEGETATION

A. Avoid cutting or injuring trees and vegetation outside easement line and Outside areas to be cleared as indicated, without Engineer’s permission Protect existing trees from damage.

B. Accept responsibility for damages outside these lines.

C. Remove trees within permanent and temporary easement as designated by Engineer.

3.2 EXISTING STRUCTURES AND PROPERTY

A. Remove existing signs, posts, catchbasin frames and grates, manhole frames and covers, and granite curbing within construction path unless directed otherwise.

B. Store at a site designated by Owner, items in reusable condition as determined by Engineer.

C. For work in loamed areas, strip loam to one side to avoid mixing with excavation materials. Do not take loam from site.

3.3 CLEARING

A. Cut or remove trees, brush, and other vegetable matter such as snags, bark and refuse, from areas to be cleared. Clear ground to width of permanent easement unless otherwise directed.

B. Cut trees, stumps, and stubs to be cleared, except where clearing done by machinery, as close to ground surface as practicable, but no more than 6 in. above ground surface for small trees and 12 in. for larger trees.

C. Bury elm bark, at least 1 ft. deep, or burn in incinerators off site with anti- pollution controls and fire prevention controls, to prevent spread of Dutch Elm disease as required by applicable laws.

3.4 CLEARING IN WOODED AREAS

A. Chip and stockpile wood cleared at location directed by Owner. Do NOT PERMIT use of elm wood and elm bark as wood chips.

B. Chip and spread wood cleared at locations and cover as indicated. Do NOT PERMIT use of elm wood and elm bark as wood chips.

C. Supply and spread wood chips.

3.5 GRUBBING, STRJPPING, DISPOSAL

A. Remove stumps and roots larger than 3 in. in diameter to a depth of 12 in., and roots larger than 1/2 in. in diameter to a depth of 6 in. Measure depths to cut from existing ground surface or proposed finished grade, whichever is lower.

B. Strip stumps, roots, foreign matter, topsoil, loam and unsuitable earth from ground surface. Utilize topsoil and loam insofar as possible for finished surfacing. Do not take loam from site.

C. Promptly dispose off site material from clearing and grubbing not reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules and regulations. Do not consider work completed until final cleaning, unless otherwise directed.

3.6 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01710.

END OF SECTION 02100

SECTION 02101

SITE INVESTIGATION

PART 1 GENERAL

1.1 SITE CONDITIONS

A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table or similar physical conditions at the site, the conformation of subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work.

1.2 SUBSURFACE DATA

A. The Contractor acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions, to be actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the Contractor performing more or less work than he originally anticipated.

PART 2 PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 02101

SECTION 02112

REMOVAL OF UNDERGROUND NONFRIABLE ASBESTOS CEMENT

PIPE PART 1 - GENERAL

1.1 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 nonfriable (pipe that has been below the groundwater level or is in otherwise saturated soils will generally be nonfriable 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 which is removed during construction is the responsibility of the Contractor, for removal, transportation and proper disposal.

1.2 RELATED WORK:

A. Section 01601 CONTROL OF MATERIALS

B. Section 02200, EARTHWORK

1.3 SUBMITTALS:

A. 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.

1.4 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.

PART 2 - PRODUCTS

2.1 MATERIALS, TOOLS, AND EQUIPMENT:

A. Wetting Materials: For wetting before disturbance of asbestos-containing materials use either amended water or a removal encapsulant. The material must be odorless, non- flammable, 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.

C. 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.

D. 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.

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

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

G. 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.

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

I. 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

3.1 GENERAL

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.

3.1 AC PIPE REMOVAL DURING EXCAVATION:

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

B. Removal Of Non-Friable Asbestos Materials:

1. Carefully excavate, by hand, a sufficient area around the pipe to perform the work. 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.

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

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

4. Remove AC pipe as follows:

Cut sections of pipe will be removed from the trench and immediately wrapped and sealed in two layers of 6-mil asbestos waste bags. Packaged waste will then be placed into acceptable waste transportation vehicle.

Whenever possible, the Contractor will limit cutting of asbestos cement materials and dismantle materials in intact sections. Removal should be up to Contractor's means and methods in accordance with applicable laws and regulations.

3.2 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.

3.3 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.

END OF SECTION

SECTION 02140

DEWATERING AND DRAINAGE

PART I-GENERAL

1.1 SCOPE OF WORK

A. Furnish, install, operate, monitor, maintain, and remove temporary dewatering and drainage systems as necessary to lower and maintain groundwater levels below subgrades of excavations and prevent surface water runoff from entering or accumulating in excavations, to permit construction in the dry.

B. Collect and properly dispose of all discharge water from dewatering and drainage systems in accordance with local requirements and permits.

C. Repair any damage caused by dewatering and drainage system operations.

D. Remove temporary dewatering and drainage systems when no longer needed, and restore all disturbed areas.

1.2 RELATEDWORK

A. Trenching, backfilling, and compacting included in Section 02221.

1.3 SUBMITTALS

A. Submit the proposed temporary dewatering and drainage system designs. Contractor shall remain responsible for adequacy and safety of construction means, methods, and techniques.

1.4 DEFINITIONS

A. Where the phrase "in-the-dry" is used in these specifications, it shall be defined as soil conditions that are no more than two percentage points above the optimum moisture content for that soil.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Employ the services of a dewatering specialist or firm having the following qualifications:

1. Have completed at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years.

2. Retain the services of a Registered Professional Engineer (in the state where the project is located) having a minimum of five (5) years experience in the design of well points, deep wells, recharge systems, or equal systems.

3. Retain the services of a field representative having a minimum of 5 years experience in installation of well points, deep wells, recharge systems, or equal systems.

B. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.

C. Notify the Engineer immediately if any settlement or movement is detected on structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.

D. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.

PART 2- PRODUCTS

2.1 MATERIALS

A. Piping, pumping equipment and all other materials required to dewater excavations shall be suitable for the intended purpose. Standby pumping units shall be maintained at the site to be used in case of failure of the normal pumping units. Do not excavate until the dewatering system is operational

B. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, a minimum of one (1) working auxiliary pump is required, and an additional one (1) pump for every five (5) used.

C. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.

D. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.

E. Provide cement grout having a water cement ratio of 1 to 1 by volume.

PART 3- EXECUTION

3.1 GENERAL

A. Surface water and groundwater shall be controlled such that excavation to final grade is made in-the-dry, the bearing soils are maintained undisturbed, and softening or instability of, or disturbance to, the subgrade due to the presence or seepage of water does not occur.

B. All work shall be protected from flotation.

C. The impact of anticipated subsurface soil/water conditions shall be factored into the selection of methods of excavation and proposed dewatering and drainage systems. Where groundwater levels are above the proposed bottoms of excavations, it is expected that some type of pumped dewatering system will be required for predrainage of the soils prior to excavation to final grade and for maintaining the lowered groundwater level until construction has been completed to such an extent that the foundation, structure, pipe, conduit, or fill will not be floated or otherwise damaged. It is further expected that the type of system, spacing of dewatering units, and other details of the work will vary depending on soil/water conditions at a particular location.

3.2 SURFACE WATER CONTROL

A. Surface water control measures shall be constructed to prevent flow of surface waters into excavations. Such measures may include dikes, ditches, and sumps.

3.3 EXCAVATION DEWATERING

A. Provide and maintain adequate equipment and facilities to remove promptly and dispose of properly all water entering excavations. Excavations shall be kept in-the- dry, so as to maintain an undisturbed subgrade condition throughout construction below grade, including backfill and fill placement.

B. Water entering excavations from precipitation or surface runoff shall be collected in shallow ditches around the perimeter of the excavation; drained to sump, and pumped from the excavation to maintain in-the-dry conditions.

C. Pipe and conduit shall not be laid in water or allowed to be submerged prior to backfilling. Pipe and conduit which becomes submerged shall be removed and excavation dewatered and restored to proper conditions prior to reinstalling the pipe and conduit.

D. Excavations for foundations and structures shall be maintained in-the-dry for a minimum of four days after concrete placement. In no event shall water be allowed to enter an excavation and rise to cause unbalanced pressure on foundations structures until the concrete or mortar has set at least 24 hours.

E. Dewatering and drainage operations shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade at the bottom of the excavation. If the subgrade becomes disturbed for any reason, the unsuitable subgrade material shall be removed and replaced with concrete, compacted granular fill, or other

approved material to restore the bearing capacity of the subgrade to its natural undisturbed condition.

F. Dewatering and drainage operations shall be conducted in a manner which does not cause loss of ground or disturbance to the pipe bedding or soil which supports overlying or adjacent structures.

3.4 DISPOSAL OF DRAINAGE

A. All water discharged from temporary dewatering and drainage systems shall be disposed of in accordance with approved sedimentation and control plans and methods. Existing or new sanitary sewer systems or private on-site septic systems shall not be used to dispose of drainage.

END OF SECTION 02140

SECTION 02200

EARTHWORK

PART 1- GENERAL

1.1 SUMMARY

A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading;; constructing embankments; miscellaneous earth excavation; the removal, hauling and stockpiling of suitable excavated material for subsequent re-use in the work; all rehandling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations; the removal and satisfactory disposal off site of unsuitable material; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

RELATED SECTIONS

A. Drawings and general provisions of the Contract including General and Supplemental Conditions and Division 1 Specification Sections, apply to this section.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Backfill Materials Source Verification: Submit 50 pound sample for each proposed source of backfill materials. Submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the specified gradation requirements. Material obtained from the cuts on the site can be used for backfill provided that it meets the spec for Common Fill or Gravel Borrow contained herein.

C. Submit a moisture-density curve indicating the maximum dry density and optimum moisture content as determined by ASTM D1557 for each proposed source of compacted backfill for review of the Engineer.

A. Filter fabric: Submit the manufacturer's information and a one square foot representative sample of the filter fabric (Section 02273) to the Engineer for review.

E. Within one week of a field change, resubmit revised working drawings as necessary to reflect changes required by field conditions.

F. Submit reports from the geotechnical testing laboratory documenting all earthwork activity and field testing. The field reports shall include as a minimum the following:

1. A description of the day's activities.

2. The results of in-place density testing including in-place dry density, moisture content, percent compaction, elevation of test and a description of the soil.

3. A sketch indicating the extent of each day's work and the location of testing.

G. Submit the qualifications of the certified independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory must demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer.

1.4 EXCAVATION CLASSIFICATIONS

A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.

B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

1. Under footings, foundations bases, concrete slabs, retaining walls or other structures, fill unauthorized excavations to the proper elevations with lean concrete. Elsewhere, backfill and compact unauthorized excavations as specified for excavations of the same class, otherwise directed by the Engineer.

C. Additional Excavation.

1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions..

2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.

1.5 ROCKEXCAVATION

A. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90 HP flywheel power and 30,000 lb. drawbar pull Trenches in excess of 10 foot 0-inches in width and pits in excess of 30 feet 0-inches in either length or width are classified as open excavation.

B. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modem track-mounted heavy-duty excavation equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).

C. Determination of rock excavation classification will be made by the Engineer. Typical of materials classified of rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. If the area to be excavated is pre-blasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the pre-blast drilling by the Engineer in order to classify the excavation. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing. Such excavation will be paid on the basis of contract unit rates for this classification. If site rock or trench rock is encountered, the contractor must submit a plan for its removal to the Engineer for approval. Excess boulder and rocks must be removed from the site.

D. Rock payment lines are limited to the following:

1. Two feet outside of concrete work for which forms are required, except footings.

2. One foot outside the perimeter of footings.

3. Rock in pipe trenches shall be measured from its surface to 6-inches below the outside of the pipe and with a width of two (2) feet greater than the inside diameter of the pipe but not less than 3 feet minimum trench width. Any rock excavated to a depth or width greater than the above shall be removed and backfilled with ordinary borrow at the Contractor's expense.

1.6 EXCAVATION

A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe and other work, and to permit access to the Engineer for the purpose of observing the work Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.

B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.

1.7 GROUNDWATERCONTROL

A. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to maintain the excavated area(s) sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. The drainage of all water resulting from pumping shall be managed so as not to cause damage to adjacent down-gradient property or resource areas.

B. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Engineer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Engineer to protect the work and/or to maintain satisfactory progress.

C. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations and drainage operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or resource areas, or damage to the work completed or in progress.

D. The Contractor shall control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided for drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

PART 2- PRODUCTS

2.1 BACKFILL MATERIALS

A. Ordinary Borrow: Ordinary Borrow (MHD M1.01.0) shall be soil containing no stone greater than 2/3 loose lift thickness. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. Ordinary Borrow shall not contain more than 30 percent by weight of soil material passing the number 200 sieve. It shall be of such a nature and character that it can be compacted to the specified densities in a reasonable length of time. Topsoil and subsoil shall not be considered Ordinary Borrow. Ordinary Borrow shall be used for general subgrade fill areas.

B. Structural Fill: Structural Fill shall be used beneath foundations and slabs and as backfill of foundations and other load bearing structures. Structural Fill shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The gradation shall meet the following requirements:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
6 inch	100
3 inch	70-100
¾ inch	40-95
No. 4	30-90
No. 10	25-80
No. 40	10-50
No. 200	0-12

C. Processed Gravel for Subbase: Processed gravel for subbase shall be used where specified as sidewalk and pavement subbase material and shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Gradation requirements for Processed gravel for subbase shall be as designated by MHD M1.03.1 and shall conform to the following:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
3 inch	100
1 ½"	70-100
1/4"	50-85
No. 4	30-60
No. 200	0-10

D. ¾" Crushed Stone: ¾" Crushed stone should be used where specified as bedding under pipes and structures, as a working mat, as a filter around perforated drain pipe or as backfill behind retaining walls. Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone gradation requirement shall be as designated by MHD M2.01.4 and shall be uniformly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
1 inch	100
¾-inch	70-100
1/2-inch	10-50
3/8-inch	0-20
No. 4	0-5

E. 1 1/2" Crushed Stone: 1 1/2" Crushed stone should be used where specified as bedding under pipes and structures, as a working mat, as a filter around perforated drain pipe or as backfill behind retaining walls. Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone gradation requirement shall be as designated by MHD M2.01.1 and shall be unifom1ly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
2 inch	100
1 ½ inch	95-100
1 inch	35-70
3/4-inch	0-25

F. Dense Graded Crushed Stone for Subbase: Dense graded crushed stone for subbase should be used where specified as pavement and sidewalk sub-base material, only if a deficit of reclaimed material occurs. Dense graded crushed stone shall consist of durable crushed rock or durable crushed gravel stone combined with fine aggregates of natural sand or stone screenings uniformly premixed with a predetermined quantity of water. The composite material shall be free from ice and snow, clay, loam, or other deleterious or organic material. The dense graded crushed stone for subbase gradation requirement shall be as designated by MHD M2.0 I.7 and shall be uniformly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
2 inch	100
1 ½ inch	70-00
3/4-inch	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-10

G. Gravel borrow: Gravel borrow shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Graduation requirements for gravel shall be determined by AASHTO-T11 and T27 and shall conform to the following:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
1/2 inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be as follows:

6 inches largest dimension Type a

3 inches largest dimension Type b

2 inches largest dimension Type c

H. Bank-run gravel: Bank run gravel shall be obtained from approved natural deposits and unprocessed except for the removal of deleterious materials and stones larger than the maximum size permitted.

Bank-run gravel shall be unfrozen and substantially free from vegetation, roots, loan1 and other organic 1natter, clay, snow, frozen particles and other fine or harmful substances.

Bank-run gravel: Inorganic granular material meeting the following gradation:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY_WEIGHT
6 inch	100
2 inch	80-100
No. 4	20-65
No. 200	00-12

PART 3 EXECUTION

3.1 FILLING AND BACKFILLING

A. Verify locations and elevations of existing utilities. Maintain and protect utilities which are to remain.

B. Verify that survey bench marks, horizontal control points, and intended elevations for the work are as shown on the Drawings. Protect survey control points and existing structures.

C. Sequence the work such that work associated with lower elevations and utilities are completed before placing higher elevations and utilities.

D. Stockpiles shall be neatly trimmed and graded to provide drainage from surfaces and to prevent depressions where water may become impounded. Stockpiles shall be protected and shall not be disturbed. Unsuitable soils shall be segregated and legally disposed by the contractor at no additional cost to the Owner.

E. Subgrade Preparation: After the subgrade has been shaped to line, grade, and cross-section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

F. Backfill Material Selection: Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under Backfill Materials (Part 2). In general, the material used for backfilling utility trench excavations shall be material removed from the excavations provided that the reuse of these materials result in the required trench con1paction and meets the requirements specified for common fill. All backfill placed beneath concrete slabs shall be structural fill unless otherwise specified. In areas where the bottom of the excavation is in fine sand and silt, and is below the groundwater table, the first lift of backfill shall be 12-inches of compacted sand and gravel (Gravel Borrow) to provide a working mat and drainage layer.

Place backfill to a maximum loose lift thickness of 12 inches. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as unifom1 as possible in lift thickness, moisture content, and effort required to compact soil mass.

G. Trench Backfill:

1. The trenches shall be backfilled as soon as practicable with suitable material. All trench backfilling shall be done with special care, in the following manner and as directed by the Engineer.

2. Backfill material for pipe bedding shall be deposited in the trench, uniformly on both sides of the pipe, for the entire width of the trench to the springline of the pipe. The selected backfill material shall be placed by hand shovels, in layers not more than 12-inches thick in loose depth, and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe, free from voids.

3. The balance of backfill shall be spread in layers not exceeding 12-inches in loose depth. Each layer shall be thoroughly compacted by mechanical methods and shall contain no rock, stones or boulders larger than 4-inches in their greatest dimension.

4. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time; if necessary, a timber grillage or other suitable method shall be used to break the fall of material. The moisture content of the backfill material• shall be such that proper compaction will be obtained. Puddling of backfill with water will not be permitted. Backfill within

areas to receive topsoil or pavement construction shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.

5. In backfilling trenches, each layer of backfill material shall be n1oistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving or foundation construction of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

6. Any trenches or excavations improperly backfilled or where settlement occurs shall be reopened, to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.

7. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied in a manner satisfactory to the Engineer at no additional cost to the Owner.

H. Backfilling Against Structures:

1. Backfilling against masonry or concrete shall not be done until permitted by the Engineer. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, special leakage tests of the structures shall be made by the Contractor, as required by the Engineer. After the satisfactory completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using suitable and approved excavation material. The best of the backfill material shall be used for backfilling within 2 feet of the structure. Just prior to placing backfill, the areas shall be cleaned of all excess construction material and debris and the bottom of excavations shall be in a thoroughly compacted condition.

2. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures. During backfilling operations, care shall be exercised that the equipment used will not overload the structures in passing over and compacting these fills. Except as otherwise specified or directed, backfill shall be placed in layers not more than 12-inches in loose depth and each layer of backfill shall be compacted thoroughly and evenly using approved types of mechanical equipment. Each pass of the equipment shall cover the entire area of each layer of backfill.

3. In compacting and other operations, the Contractor shall conduct his operations in a manner to prevent damage to structures due to passage of heavy equipment over, or adjacent to, structures, and any damage thereto shall be made good by the Contractor at no additional expense to the Owner.

I. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a sn1ooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.

J. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed, or pavements are to be constructed, or footings or slabs are to be constructed shall not be disturbed by traffic of other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of n1aterials on finished subgrade will not be permitted.

K. Uniformly smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations, shall be accomplished. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.

3.2 COMPACTION

A. Compaction Requirements: The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

AREA	ASTM DENSITY DEGREE OF COMPACTION
Below Footings & Slabs	95%
Pavement sub-base and access roads	95%
Root zone areas	85%-88%
Trench Backfill -below pavements -below general landscaped Areas -below structures and walls	 95% 92% 95%
Other Areas	92%

B. Moisture Control:

1. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

C. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

2. In freezing weather, a layer of fill shal1 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 with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

D. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922 or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. Testing shall be made at the Contractor's expense by the geotechnical testing laboratory.

2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.

3. In-place density tests shall be performed as a minimum according to the following frequency:

   a. One test per lift under spread footings, or slabs.
   b. One test per lift for every 100' length of strip footings or wall foundations.
   c. A minimum of every 50 cubic yards of backfill in trenches or around structures, or beneath pavement
   d. One test every 500 cubic yards of material placed for general fill areas

4. Minimum laboratory testing requirements for granular fill and backfill materials are as follows:

Type of Test	Frequency	Testing Method
Grain Size Analysis (to the No. 200 Sieve)	1 test/1500 cy	ASTM D-422
Proctor Compaction Test	One test/source	ASTM D-1557

a. The results of the initial tests shall be submitted to the Engineer for review at least 15 days prior to beginning of construction. The testing results shall indicate that the material meets the specified requirements.

b. All other tests shall be performed during construction at the specified intervals or in the opinion of the Engineer, if the gradation of the materials changes. The samples obtained for testing shall be the newly placed backfill soils. The results shall be submitted to the Engineer for review prior to placement of overlay backfill material The testing results shall indicate that the material meets the specific requirements.

c. The rerun of the initial tests due to change of gradation of the backfill soils shall be performed by the Contractor at no additional expense to the Owner.

E. Placement:

1. Where the subgrade surface has an inclination of less than 4:1 (H:V), fill shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill should be benched into the existing slope in order to avoid the formation of a shear plane.

2. When placing materials on slopes, the material can be compacted following the natural contours provided the materials are compacted to the requirements given in Paragraph 3.03.A of these specifications. Care should be exercised to avoid the formation of a smooth surface between layers of compacted soil. This may require that the Contractor scarify the top 2 to 3 inches of previously compacted material to permit shear transfer with the subsequent layer.

3.2 FINAL QUALITY CONTROL REPORT

A. The Contractor shall submit a final quality control report presenting all of the results of the materials testing. The Contractor is responsible for compiling all of the quality control testing data into a formal report. The report shall be submitted within 15 days after the completion of all earthwork operations. The report shall include all test results including laboratory compaction, field density, grain size analysis, and plans showing field density testing locations. The report shall be prepared and sealed by a Professional Engineer registered in the Commonwealth of Massachusetts.

3.4 FINE GRADING

A. Before surface or subbase is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable n1aterial or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of ½ inch above or below the finished subgrade will be allowed provided that this ½ inch above or below grade is not maintained for a distance

longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.

END OF SECTION 02200

SECTION 02212

ROCK EXCAVATION

PART 1 -GENERAL

1.1 SUMMARY

A. Rock excavation may be required where boulders, monolithic concrete, reinforced concrete or stone structures measuring in excess of two cubic yards solid in volume or larger are encountered or solid ledge which, in the opinion of the Engineer, requires drilling and blasting, wedging, sledging, barring, or hydraulically fracturing for removal, is encountered.

B. The following do not constitute rock excavation: hardpan; soft or disintegrated rock; concrete which can be removed with a pick; previously blasted rock or broken stone less than the above mentioned two cubic yards; stone walls; rocks or sections of blasted ledge that may fall into or be jarred loose from the sides of the trench beyond the maximum limits of excavation approved by the Engineer.

C. The blasting shall be accomplished by an experienced technician and the Contractor or Sub-Contractor shall be conducted in accordance with 527 CMR 13.00. The Contractor will procure the proper blasting permit from the City of Waltham Fire Department and shall acknowledge all the contents and laws of the State Fire Marshall in handling, using, storing and transporting explosives and caps. Blasting shall be conducted with all possible care so as to avoid injury to persons and property. The rock shall be well covered with suitable mats or heavy logs chained together or other such effective appliances; Sufficient warning shall be given to all persons in the vicinity of the work before blasting. Extreme care shall be taken to avoid injury to water mains and services, gas pipes, sewers, drain ducts, cables and other structures.

D. In addition to adhering to all the laws and ordinances relating to the handling and storage of explosives, the Contractor shall also conform to any further regulations deems necessary by the Fire Department Chief and the Engineer and be aware of any inspection fees as required by the fire department.

1.2 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to excavate and dispose of rock boulders as shown on the Drawings and as specified herein.

B. Blasting permits are the responsibility of the Contractor. All applications and fees shall be provided by the Contractor. When permits have been obtained, blasting may be used to fracture rock and boulders for excavation. If blasting is performed, provide the services of a qualified blasting technician, licensed in Massachusetts.

C. All arrangements for inspections required by the Waltham Fire Department shall be made by the Contractor.

1.3 RELATED WORK

A. Earth excavation and backfilling are included in Section 02221.

B. Environmental Protection is included in Section 01110.

1.4 SUBMITIALS

A. Submit three copies of blasting permits required by local agencies and authorities. Original permits shall be prominently displayed on the Work site prior to initiating blasting operations. Submittals shall be for information only. Contractor shall remain responsible for means, methods, and techniques, as well as all safety considerations.

B. All blasting shall be in accordance with 527 CMR 13.00.

C. The cost for all photographs and/or pre-blast videotapes shall be included in the bid price.

D. The cost for inspection, shall be paid directly to the Waltham Fire Department. All fees for inspection shall be included in the blasting cost.

1.5 DELIVERY, STORAGE, AND HANDLING

A. The delivery, storage, and handling of explosives shall be performed only by qualified persons licensed in Massachusetts, and shall be in full conformance with all laws, regulations, ordinances, and practices. Extreme care shall be taken to avoid injury or damage to persons or property.

1.6 DEFINITIONS

A. Rock: Any large mass of stone, bedrock, or ledgerock.

B. Boulder: Rock fragments not exceeding two cubic yards in volume.

C. Rock Excavation: The removal of solid rock or rock fragments greater than two cubic yards in volume which cannot be removed by conventional mechanical excavation equipment or without continuous, systematic drilling blasting.

D. Boulder Excavation: The Removal of boulders not exceeding two cubic yards in volume which can be excavated without by conventional mechanical excavation equipment or without continuous, systematic drilling and blasting.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Gravel fill shall be as specified in Section 02230.

PART 3 -EXECUTION

3.1 PREPARATION FOR BLASTING

A. A pre-blast survey shall be conducted for all structures within the influence range of blasting operations, or within 250-ft of the blast area, whichever is greater. The pre- blast survey shall consist of a close visual inspection, fully supported by photographs or video recordings, performed by, or under the supervision of, a licensed professional engineer or geologist experienced in such surveys. The Contractor's insurance underwriter shall be present during such surveys.

B. Any damage noted after completion of blasting operations which cannot be determined from the pre-blast survey to be a pre-existing condition shall be presumed to have been caused by blasting operations. Such damage shall be repaired promptly and completely to the property owner's satisfaction to restore the condition of the property to that existing prior to blasting.

C. Pre-blast survey records shall be maintained for a period of not less than three years following final completion and acceptance of the Work.

3.2 BLASTING PLANS

A. Prior to initiating blasting operations, a blasting plan shall be prepared as required by the Waltham Fire Department. The plan may include sketches to show blast locations; proximity to, and methods for protection of, existing structures and utilities; drill hole patterns, amount of charges, firing sequence and times; calculations of ground velocities, energy ration, acceleration and displacement; and any other pertinent information required. Field monitoring methods and techniques shall also be addressed.

B. If required by local or state regulations, blasting plans shall be reviewed by the appropriate agency or authority and revised as required to n1eet with their approval.

3.3 BLASTING

A. Blasting operations shall be performed under the direct supervision of a qualified blasting technicians licensed in Massachusetts. Blasting operations shall be in full compliance with applicable state and local laws, regulations, ordinances and practices.

B. Blast locations shall be heavily matted to contain potential flying debris.

3.4 BOULDER EXCAVATION

A. Boulders and rock fragments up to two cubic yards in volume may be reduced in size by rock excavation methods to simplify its removal.

3.5 TRENCH PROCEDURE

A. Excavate rock in pipe trenches, before laying pipe, to no less than 6 in. from pipe. Backfill trench, before pipe is laid, to correct subgrade. Use thoroughly compacted, suitable material or, when so specified or indicated on drawings, same material as required for bedding pipe. Furnish and place at no additional compensation.

B. Fill excess excavation below elevation of the top of bedding, cradle, or envelope when in pipe trenches with material of same type and placed and compacted in same manner as specified for bedding, cradle, or envelope.

C. At option of Contractor, fill excess excavation in rock beneath foundations with Class A or Class B concrete.

D. Drill and blast a single line of holes in vertical face of rock at end of trench, when shattering rock at ends of pipe or elsewhere as indicated. Provide minimum depth drillholes of 4 ft. and maximum spacing of 18 in. centers. Use sufficient explosive to shatter rock for future excavation. Complete shattering before any pipe or fitting is placed within 50 ft. of rock to be shattered.

E. Remove shattered rock. If rock below normal depth is shattered due to drilling or blasting operations of Contractor and Engineer considers such shattered rock to be unfit for foundations, remove it and backfill excavation with concrete as required, except that in pipe trenches, use screened gravel for backfill. Do such removal and backfilling at no additional compensation.

F. Remove dirt and loose rock, as directed, from designated areas and clean surface of rock thoroughly, using steam to melt snow and ice, if necessary. Remove water in depressions, so that whole surface of designated area can be inspected to determine whether seams or other defects exist.

G. Rough surfaces of rock foundations sufficiently to bond well with masonry and embankments to be built thereon and, if required, cut to rough benches or steps.

H. Remove from the rock surface to remain all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Use picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means to accomplish this cleaning, and remove free water left on the surface or rock. Perform all of above before any masonry embankment is built on or against rock.

I. Remove piles of boulders or loose rock encountered within limits of earth embankments to a suitable place of disposal.

J. Use excavated rock in backfilling trenches subject to following limitations:

1. Do not use pieces of rock larger than permitted by Engineer.

2. Do not allow rock quantities used in backfill in any location to result in formation

of voids.

3. Do not place rock backfill within 16 in. of surface of finish grade.

K. Backfill with material obtained from outside sources at no additional compensation, when material suitable for backfilling is not available in sufficient quantity from other excavations.

3.6 DISPOSAL OF ROCK AND BOULDERS

A. Fragmented rock with dimensions not exceeding 6-in. in any direction may be mixed with common fill (providing compaction requirements will not be compromised) and used as common fill in accordance with Section 02221.

B. Fragmented rock up to 12-in in length in any direction may be used as riprap or slope stabilization, provided that such materials meet the requirements for riprap and slope stabilization specified in Section 02221.

C. Rock and boulders may be crushed and screened for reuse in the Work, provided that the resultant materials meet the requirements for gravel, crushed stone, or structural fill as specified in Section 02221.

D. Unused rock and boulders shall be removed and disposed of off-site.

END OF SECTION 02212

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and easements.

B. Excavation shall extend to the width and depth shown on the Drawings and or as specified and shall provide suitable room for installing pipe, structures and appurtenances.

C. The Contractor shall furnish and place all sheeting, bracing and supports and shall remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry and in all respects, acceptable to receive the work. Work shall not be placed on frozen ground nor shall work be placed on wet unstable ground. If conditions warrant, the Contractor may be ordered to deposit gravel for pipe bedding, or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of open trench shall be related closely to the rate of pipe laying. All excavation shall be made in open trenches.

D. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Wherever the requirement for 92 percent compaction is referred to herein it shall mean "at least 92 percent of maximum density as determined by ASTM D1557, Method C". Backfilling operations shall be such that material is compacted in 6 inch lifts, including the trench around the barrel of the pipe. Care shall be taken as to not place excessive pressure on the new pipe, such as using heavy rubber tire equipment as a compaction method directly over the new pipe.

F. Contractor will hand dig around existing utilities.

G. Excavation shall be protected each day by either backfilling or steel plates as required.

H. Abandoned pipes and structures are to be completely removed or sealed.

1.2 RELATED WORK

A. Granular fill materials is included in Section 02200.

C. Dewatering and Drainage is included in Section 02140.

D. Pavement repair and resurfacing is included in Section 02576.

1.3 DEFINITIONS

A. Percentage of compaction is defined as the ratio of the field dry density, as determined by ASTM Dl556 or ASTM D2922 to the maximum dry density determined by ASTM D1557 Method C, multiplied by 100.

B. Proof Roll: Compaction with a minimum of 4 passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller cannot be used.

C. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch [15 cm] in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.

D. Unacceptable Materials: Materials that do not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.5 I, two (2) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

2. Submit an excavation, backfilling, and filling plan at least one week prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:

a. Detailed sequence of work.

b. General description of construction methods.

c. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

d. Details of dust control measures.

e. Proposed locations of stockpiled excavation and/or backfill materials.

f. Proposed surplus excavated material off-site disposal areas and required permits.

g. Details of erosion and sedimentation control measures which will prevent erosion and sedimentation during the earth moving activities.

3. The following material submittals shall be submitted to the Engineer prior to backfilling and filling:

a. Gravel Borrow as specified in Section 02230.

b. Bank-run Gravel as specified in Section 02230.

c. Crushed Stone as specified in Section 02230.

d. Other Acceptable Materials: Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.

4. During Construction, submit written confirmation of fill lift thickness, in- place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

5. Controlled Density Fill Mix Design:

a. Prior to beginning the work the Contractor shall submit for review, flowable fill mix designs which shall show the proportions and gradations of all materials for each class and type of flowable fill specified

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Dewatering and Groundwater Control: Provide and maintain as specified in Section 02140.

C. Excavations shall be performed in the dry, and kept free from standing water, snow and ice during construction. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material

D. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall con1ply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Do not excavate, construct embankments, or fill until all the required submittals have been reviewed by the Engineer.

F. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

G. Employ an independent testing laboratory to perform particle size and gradation analyses in accordance with ASTM D422, and to determine compactibility in accordance with ASTM D1557 for all the proposed backfill and fill materials, and monitoring field compaction operations. The independent testing laboratory shall have the following qualifications:

1. Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Have three (3) years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations.

3. Able to provide three (3) references from previous work.

H. Field Testing and Inspections:

1. By (Owners testing laboratory or Contractor's independent testing laboratory, acceptable to the Engineer, at Contractor's expense) as specified.

2. Location of tests mutually acceptable to testing laboratory and the Engineer or as directed by the Engineer.

3. In the event compacted material does not meet specified in-place density, recompact material and retest this area until specified results are obtained at no additional cost to the Owner.

4. Testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.

I. Methods of Field Testing:

1. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922.

2. In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959.

J. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading and embankment

1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per lift:

   a. Trenches under structures foundation preparation or roadways subbase: Every 100 lin. ft. [30 m.] per lift.

   b. Trenches in areas without structures or roadways: Every 250 lin. ft. [60 m.] per alternate lift.

   c. Paved Roadways: Every 100 lin. ft. [30 m.] per lift.

   d. Paved Areas: 2,000 sq. ft. [185 sq. m.] per lift.

   e. Under Structure: 1,000 sq. ft. [100 sq. m.] per lift.

   f. Around Structures: 1,500 sq. ft. [150 sq. m.] per lift.

   g. Embankment Fills: 5,000 sq. ft. [465 sq. m.] per lift.

2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 1,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.

3. Gradation Analysis – A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.

4. Liquid Limit, Plastic Limit and Plasticity Index - Minimum of one test per 500 cubic yard [382cubic meter] of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

K. Construction Tolerances

1. Construct finished surfaces to plus or minus 1 inch [2.5 cm] of the elevations

2. Grade cut and fill areas to plus or minus 0.20 foot [6.0 cm] of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches [15 cm] of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

L. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.

M. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed.

N. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbings, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefor, to at least as good condition as that in which they were found immediately before the work was begun.

O. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.

P. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.

Q. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the 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.

R. Restore existing property or structures as promptly as practicable.

S. If material is unacceptable for foundation support (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in

accordance with the drawings and/or specifications, remove such material to the required width and depth as directed by the Engineer and replace it with gravel borrow, crushed stone, or concrete.

T. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

U. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

PART 2 PRODUCTS

2.1 GENERAL

A. Use only acceptable materials from excavations or borrows, as determined by the Engineer.

B. Provide 3,000 psi [20 MPa] concrete, bank-run gravel, gravel borrow, and crushed stone.

C. Provide Fine Aggregate conforming to ASTM C33.

D. Provide erosion/sedimentation control devices as indicated, including geotextile fabric in accordance with Section 01110.

E. Provide geotextile fabric and silt fence as indicated, .

F. Provide erosion/sedimentation control devices as indicated, including geotextile fabric in accordance with Section 01110.

PART3 EXECUTION

3.1 TRENCH EXCAVATION

A. Pavement shall be cut with a saw, or wheel along straight lines before excavating.

B. Trenches shall be excavated to sufficient depths and to sufficient widths for installing new pipe/components where required, placing and removing of decking, sheeting and bracing, and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width shall be a practical minimum, as needed for proper execution for the work.

C. Trench excavation shall include material of every description and of whatever substance encountered, except rock and boulders. Trench excavation shall also include removal of existing reinforced concrete subbase, if encountered.

D. The Contractor shall strip and stockpile excavated trench materials. Any bushes that are removed shall be protected and replanted in the same location. Removed curbing shall be stockpiled in a safe manner. Where grassed areas are disturbed by stockpiled materials, the Contractor shall rake out the area and loam and re-seed at his expense.

E. Stockpiling of materials shall be included in the pay items for excavating and no Allowances shall be made for any stripping and stockpiling requirements.

F. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.

G. Trenches shall be excavated to the depth indicated on the Drawings and in widths sufficient for laying the pipe, bracing and for pumping and drainage facilities. The

bottom of the excavations shall be firm and dry and in all respects acceptable to the• Engineer. Trench width shall be practical minimum.

H. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by gravel borrow as required by the Engineer at the Contractor's expense.

I. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last one foot of depth.

J. Where pipe is to be laid in crushed stone, the trench may be excavated by machinery to the normal depth of the pipe plus the depth of the stone, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

K. Where pipe is to be laid directly on the trench bottom. final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

L. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations. .

M. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

N. Excavate trenches with approximately vertical sides between springline of pipe and elevation 1 ft. [30 cm] above top of pipe.

3.2 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. It is expressly understood that no excavated material shall be removed from the site of the work or disposed of by the Contractor except as directed by the Engineer. When removal of surplus materials has been approved by the Engineer, the Contractor shall dispose of such surplus material in approved areas designated by the Contractor.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.

D. All cost of handling, storing and rehandling excavated materials shall be included in the respective unit bid in the Bid Form for the installation of new water main.

3.3 SHEETING AND BRACING

A. Furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. When moveable trench bracing such as trench boxes; manhole boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.

C. When installing pipe; trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recompacted to provide uniform side support for the pipe.

D. All excavations within the right-of-way of streets shall be sheeted and braced. Sheeting and bracing shall be adequate to support decking and to meet the requirements of applicable general laws and regulations.

E. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting will be included in the bid items for pipe and shall include full compensation for driving, bracing and later removal of sheeting.

F. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.

G. The Contractor shall receive no payment, for sheeting, bracing, etc., during the progress of the work. The Contractor shall receive no payment for sheeting which has actually been left in the trench for the convenience of the Contractor.

H. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1-ft above the top of the pipe.

3.4 TEST PITS

A. The Contractor may be required to excavate test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.

B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.5 EXCAVATION BELOW GRADE AND REFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

B. If the Contractor excavates below grade through error or for his/her own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he/she 1nay be directed by the Engineer to excavate below grade as set forth in the following paragraph, in case the work of excavating below grade and furnishing and placing the refill shall be performed at his/her own expense.

If the material at the level of trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel notwithstanding effective drainage, the subgrade material shall be removed to the extent directed and the excavation refilled with a 6-in layer of crushed stone as approved by the Engineer, to form a filter layer preserving the voids in the gravel bed of the pipe. The composition and gradation of gravel shall be approved by the Engineer prior to placement. Screened gravel shall then be placed in 6-in. layers thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, bank-run gravel shall be used for refill of excavation below grade.

D. Geotextile filter fabric may be substituted for filter layer if approved by the Engineer. Filter fabric shall be Mirafi 140N, Supac equivalent, or equal.

3.6 BACKFILLING

A. As soon as practicable after the pipe has been laid and jointed and inspected by the Engineer, backfilling shall begin and thereafter be prosecuted expeditiously. Bedding gravel, as specified for the type of pipe installed, shall be placed up to 1-ft over the pipe.

B. An impervious dam or bulkhead cutoff of clay or other impervious material shall be constructed in the trench as directed, to interrupt the unnatural flow of groundwater after construction is completed. The dam shall be effectively keyed into the trench bottom and sidewalls. Provide at least one clay or other impervious material dam in the pipe bedding between each manhole where directed or every 300 feet, whichever is less.

C. Where the pipes are laid in streets, the remainder of the trench up to a depth of 1-ft below the bottom of the specified permanent paving shall be backfilled with common fill material in layers not to exceed 1-ft and thoroughly compacted. The subbase layer for paving shall be of bank-run gravel thoroughly compacted in 6-in layers.

D. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level 1-ft over the pipe.

E. Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tan1ping, or vibrating with 1nechanical compacting equipment or hand tamping, to 92 percent compaction. If rolling is employed, it shall be by use a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

E. Backfilling and filling operations shall be suspended in areas where test are being Made until tests are completed and the testing laboratory has advised the Engineer That adequate densities are obtained.

E. Water jetting or puddling may be used unless the refill contains too great a proportion of clay or loam to permit satisfactory drying. Water jetting shall consist of using a suitable length of pipe at least 1-1/4 in in diameter fitted with quick acting valve and sufficient hose to connect to hydrant or pump having adequate pressure and capacity. The full depth of backfill shall be thoroughly inundated by thrusting the pipe into the fill at frequent intervals with the valve open until all slun1ping ceases. Where backfill is compacted by puddling, it shall be done by depositing in water. Water for jetting or puddling may be obtained from Owner hydrants wherever possible. Water may be furnished by the Owner from these hydrants if reasonable care is exercised in its use and when approved by the Water Department.

G. If water restrictions are in force, the Contractor shall obtain his/her own water elsewhere, or compact the backfill by other approved methods at no additional cost to this Contract.

H. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The material being spread and compacted in layers not over 6-in thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

I. Backfill around structures shall be selected common fill material, may be compacted by puddling where approved by the Engineer. All backfill shall be compacted, especially under and over pipes connected to the structures.

J. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 6-in may be used in trench backfill providing that the quantity in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2-ft of earth cover. Small stones and rocks shall be placed in thin layers alternating with earth to insure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe.

K. Bituminous paving shall not be placed in backfilling unless specifically permitted, in which case it shall be broken up as directed. Frozen material shall not be used under any circumstances.

L. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

3.7 RESTORING TRENCH SURFACE

A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he/she shall immediately deposit additional fill to restore the level of the ground.

B. In and adjacent to streets, the top 12-in layer of trench backfill shall consist of compacted bank-run gravel. Should the Contractor wish to use material excavated from the trench as gravel subbase for pavement replacement, the Contractor shall at his/her own expense have samples of the material tested by an independent testing laboratory at intervals not to exceed 500 feet, in order to establish its compliance with the specifications. Only material which has been tested by the Contractor and approved by the Engineer shall be allowed to be incorporated into the work.

C. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored by the Contractor to a condition at least equal to that existing before work began.

3.8 PROTECTION

A. Curbing, fencing, sign posts, utility poles, mailboxes, etc. in the vicinity of the Contractor's operations shall be adequately protected, and if necessary removed and restored after backfilling. All items which are damaged during construction shall be replaced with material fully equal to that existing prior to construction. Where curbing or throatstones are to be removed and not replaced, the curb pieces shall be brought to the Waltham Department of Public Works yard and deposited near the curbing laydown area.

B. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

C. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.

D. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are

injured to such a degree as to affect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

E. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels which are so shaped as to cut or otherwise damage such surfaces.

F. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable Materials and methods for such restoration.

3.9 DUST CONTROL

A. Calcium Chloride shall be uniformly applied by hand methods or by approved spreading devices as directed by the Engineer. The Contractor shall have a nominal supply of Calcium Chloride on hand at all times.

END OF SECTION 02221

SECTION 02222

CLEARING AND GRUBBING

PART 1-GENERAL

1.1 SCOPE OF WORK

A. This work shall consist of clearing, grubbing, cutting, removal and disposal of all vegetation and debris from areas either within or outside of the right-of-way as shown on the drawings or as designated by the Engineer. The work shall also include the preservation from injury or defacement of all vegetation and objects designated by the Engineer to remain.

PART 2-PRODUCTS (NOT USED)

PART 3-EXECUTION

3.1 GENERAL

A. The burning of trees, brush, stumps, etc., will not be permitted. The Contractor shall provide other satisfactory methods of disposal without additional compensation.

B. The Contractor shall obtain written permission of the Engineer for use of storage areas within the right-of-way requiring clearing and grubbing or selective clearing and thinning. Any clearing for the Contractor's convenience shall be done at his own expense. All such areas shall be restored to a condition acceptable to the Engineer including necessary mulching, seeding, and planting without additional compensation.

C. The Engineer shall be provided with notarized copies of agreements between the Contractor and owners used as disposal or storage areas.

D. When fencing is installed outside normal clearing areas, every reasonable effort shall be made to preserve trees or shrubs whose removal is not essential to the installation of the fencing.

E. Acceptable material obtained on the project may be used to produce wood chip mulch. Material obtained from Elm trees shall not be accepted for use.

F. Wood chips produced from clearing and grubbing shall be stockpiled within the location and used where and as directed.

G. Except for materials used for making wood chip mulch, the Contractor shall make all arrangements and negotiations necessary for the satisfactory disposal of trees, shrubs, stumps, roots, dead wood and other litter, in areas outside the Right of Way

and in such manner that no condition or accumulation of material shall be permitted to disfigure or mar the finished landscape.

3.2 CLEARING AND GRUBBING

A. The stumps of all trees, brush and major roots shall be grubbed and removed in all excavation areas and under all embankments where the original ground level is within 3-1/2 feet of the subgrade or slope of embankments.

B. All trees, stumps, and brush shall be cut off within 6 inches of the ground in embankment areas where the original ground level is more than 3-1/2 feet below the subgrade or slope of embankments.

C. Trees and shrubs that are specifically designated by the Engineer not to be cut, removed, destroyed or trimmed shall be saved from harm and injury.

D. All damage done to trees by the Contractor's operation and all branches of trees extending within the roadway shall be trimmed and painted where cut as directed to provide a 20-foot minimum vertical clearance including selective trimming of such trees as directed.

3.3 SELECTIVE CLEARING AND THINNING

A. The work under this item shall consist of the removal of hazardous growth and dead, dying or diseased plant material; the removal of groups and individual plants which interfere with the growth of more desirable types of trees and the clearing away of lesser growth that may obscure outstanding trees, tree groups, or scenic views. Any part of tree trunks or base of plant material located on the Location Lines shall be considered within the limit of work.

B. Densely wooded areas shall be trimmed to provide space for healthy growth by eliminating thinner, weaker trees and the reduction of number of varieties.

C. The Contractor's attention is called to the requirements for work under this item. The desired appearance to be attained in certain areas of heavy growth may require three or more operations. First, the obvious dead, dying and diseased trees and undergrowth shall be cut and cleared out of the area. This work includes the removal of any previously fallen trees, branches, uprooted stumps and other debris as directed. Next, the area is to be thinned out, as directed, by removing the less desirable trees and brush which interfere with the growth of better plant material Finally, clear out lesser growth which may obscure outstanding trees, tree groups or scenic views.

D. Tree up-branching and shaping under this item will be restricted to trees which have limbs and branches restricting sight distance, extending over roadways, shoulders, turn outs, etc. Up-branching or trimming will be required to produce an 20-foot minimum vertical clearance over locations described hereinbefore, and the removal. of limbs and branches involved in this operation shall be accomplished as outlined

hereafter.

E. Quality of work must confom1 with accepted tree trimming practices.

F. All trimming and pruning shall conform to recognized tree surge1y practices, and particular note should be made that painting with an approved tree dressing or paint will be required on all cuts 2-inchcs or over in diameter.

G. The dressing or paint shall be applied no later than two days after the cuts are made.

H.. Recognized tree surgery practices include among many others, the fact that all limbs find branches which require removal and all shrubs regardless of age must be cut flush either to a union with the next larger sound limb or branch or flush to the trunk of the tree.

I. The cutting shall be performed by experienced woodsmen. Trained tree climbers are required for pruning of tall growth. Care shall be exercised by the Contractor to prevent injury to trees and shrubs designed to be preserved. Any injury to limbs, bark or roots of such plants shall be repaired by the Contractor, as directed, or the plants replaced without additional compensation for such repair or replacement.

J. Standing trees, undesirable brush and existing stumps to be removed shall be cut flush with the ground and a 2 inch tolerance permitted and the resulting stumps or stubble then brushed or sprayed with a chemical spray material.

K. Applications shall be by brush or spray so as to give complete coverage and wetting to the point of runoff.

L. This application shall be completed within two days after the cutting.

M. As the specified chemical herbicide is harmful to desirable roadside growth, the Contractor shall apply the chemical in such a manner that damage will not occur either from direct spray or from drift of the chemical on any desirable growth.

N. The Contractor shall use all necessary precautions to prevent injury to crops or damage to other desirable growth on private abutting property, as well as those within the Right-of-Way, and shall assume full responsibility of damage.

O. The Contractor may dispose of cut material by processing into a wood chip mulch and spreading uniformly throughout the cleared and thinned areas as directed by the Engineer.

3.4 DISPOSAL OF TREES

A. All trees to be cleared shall become the property of the Contractor, and the satisfactory disposal of the wood in such trees outside the right-of-way shall become his/her responsibility.

B. The trees, including cuttings and slash, shall be disposed of after cutting as soon a practicable and in a manner as not to detract from the appearance of the roadside.

C. If the existing ground in the area is disturbed by any of the work or equipment, the Contractor shall rough-grade and loam and seed if necessary the disturbed areas, if so directed, without additional compensation.

3.5 DISPOSAL OF STUMPS AND BRUSH

A. After removal, all stumps including the major root system shall be disposed by the Contractor at his/her own responsibility outside the layout where the material will not cause obstruction to streams and will not detract from the appearance of the roadside.

3.6 DISPOSAL OF DUTCH ELM DISEASED WOOD

A. Dutch Elm diseased wood shall be disposed of in accordance with the provisions of General Law, Chapter 87, Section 5 and Chapter 132, Sections 8 and 11, as amended; and in accordance with any additional local regulations.

B. Where the work includes the removal of elm trees or the limbs of elm trees, such trees or limbs thereof shall be disposed of immediately after cutting or removal and such a manner as to prevent the spread of Dutch Elm Disease. This shall be accomplished by covering them with earth to a depth of at least 6 inches in areas outside the right-of-way location where the Contractor has arranged for disposal.

C. Where the work includes the removal and disposal of stumps of elm trees, such stumps shall be completely disposed of immediately after cutting in the manner specified above.

END OF SECTION 02222

SECTION 02273

GEOTEXTILE FABRIC

PART 1 -GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Providing geotextile fabric in foundation preparation for separation of existing soil from screened gravel or crushed stone beneath structures.

2. Placing the geotextile fabric beneath the crushed stone or rip rap at tank overflow or storm drain outlets.

3. Providing geotextile fabric for silt fence as indicated or specified.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section, and.

1. Section 02200 - Earthwork

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300-SUBMITTALS:

1. At least two weeks prior to shipment, submit manufacturer's certificate of compliance and physical property data sheet indicating that requirements for materials and manufacture are in conformance as specified.

2. For informational purposes only, submit manufacturer's printed installation instructions.

1.4 QUALITY ASSURANCE

A. GENERAL

1. Producer of geotextile fabric to maintain competent laboratory at point manufacture to insure control in accordance with ASTM testing procedures. Laboratory to maintain records of quality control results.

2. Do not expose geotextile fabric, except the geotextile fabric for silt fence, to ultraviolet radiation (sunlight) for more than 14 days total in period of time following manufacture until geotextile fabric is installed and covered with fill or backfill material.

3. Take all precautions to protect geotextile fabric from damage resulting from any cause. Either repair or replace geotextile fabric to Engineer's satisfaction at no additional cost to the Owner.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with manufacturer's recommendations.

B. Provide geotextile fabric in rolls wrapped with protective covering to protect geotextile fabric from mud, dirt, dust, and debris. Label each roll of geotextile fabric with number or symbol to identify production run.

C. Protect geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than two weeks during installation operations.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

A. Provide the following nonwoven (4.5 ounce per square yard) geotextile fabric, Model# US 120NW as manufactured by US Fabrics or approved equal.

B. Provide the following woven geotextile fabric for silt fence:

1. Amoco 2122 as manufactured by Arnoco Fabrics and Fibers Co., Atlanta, GA.

2. Mirafi 1OOX as manufactured by Mirafi, Pendergrass, GA.

3. Geotex 91OSC as manufactured by Synthetic Industry, Chattanooga, TN.

4. Or acceptable equivalent product.

2.2 MATERIAL

A. Geotextile fabric shall conform to test requirements for minimum average roll value (weakest principle direction) for strength properties of any individual roll tested from manufacturing lot or lots of particular shipment in excess of minimum average value (weakest principle direction) as specified hereafter:

B. Physical Properties of Minimum Average Roll of the 4.5-ounce per square yard Nonwoven geotextile fabric shall be.

	Property	ASTM Test Method	Units	Value
1.	Tensile Strength	D4632	lbs.	120
2.	Elongation at Break	D4632	%	50
3.	Trapezoidal Tear Strength	D4533	lbs.	50
4.	Puncture Strength	D4833	lbs.	70
5.	Permittivity	D4491	Sec-1	1.5
6.	Apparent Opening Size	D4751	Sieve#	70
7.	Mullen Burst Strength	D3786	Psi	230
8.	UV Resistance %Retained	D4355	%	70
9.	Flow Rate	D4491	Gal/min/sf	120

C. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be:

	Property	ASTM Test Method	Units	Value
1.	Grab Strength	D4632	lbs.	100
2.	Permittivity	D4491	sec- 1	0.10
3.	Apparent Opening Size	D4751	Sieve#	20-30
4.	Ultraviolet Stability	D4355	%	70

PART 3- EXECUTION

3.1 INSTALLATION

A. Install geotextile fabric in accordance with manufacturer's printed instructions.

B. Place geotextile fabric on the foundation subgrade prior to placing the screened gravel or crushed stone. Use low ground pressure equipment to spread soil over the filter fabric to protect against tearing.

C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint.

D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.

E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.

F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.

G. Extend the geotextile fabric and wrap around the screened gravel or crushed stone along the perimeter of foundations and slabs.

3.2 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 02273

SECTION 02510

HOT MIX ASPHALT PAVEMENT

PART 1 GENERAL

1.01 DESCRIPTION:

A. Furnish all labor, materials, equipment and incidentals required to install permanent hot mix asphalt pavement for roadways.

1.02 RELATED SECTIONS

A. Section 02200 – Earthwork

B. Section 02221 - Trenching, Backfilling, and Compaction

1.03 REFERENCES

A. Reference is made herein to the Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, 1988, (MHD Standard Specifications) and latest Supplemental Specifications and Standard Special Provisions.

1. All references to method of measurement, basis of payment, and payment items in the MHD Standard Specifications are hereby deleted.

2. References made to particular sections or paragraphs in the MHD

1.04 SUBMITTALS:

A. Job mix formula, including complete data on all materials, source, location, percentages, temperatures and all other pertinent data.

PART 2 PRODUCTS

2.01 MATERIALS TO BE FURNISHED BY CONTRACTOR

A. Hot mix asphalt paving material in accordance with MHD Standard M3.11.00 for Class I binder and top courses.

B. Tack coat shall consist of either emulsified asphalt, Grade MS-1 conforming to section M3.03.0, or cutback asphalt, Grade MC-70 or MC-250 conforming to Section M3.02.0 of the above referenced specifications.

C. Hot poured rubberized asphalt sealer shall conform to MassDOT Section M3.05.0

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install hot mix asphalt pavement in accordance with MHD, Section 460.

B. Hot mix asphalt paving at railroad track crossings shall be placed in accordance with the rubber rail seal manufacturer's instructions.

C. Place binder course as soon as possible after the subgrade and track have been prepared.

D. Place and compact binder and top courses by steel-wheeled rollers of sufficient weight to thoroughly compact the hot mix asphalt.

E. All pavement thickness referred to herein is compacted thickness. Place sufficient mix to ensure that the specified thickness of pavement occurs as indicated on the Contract Drawings.

F. The contact surfaces of existing pavement, castings, and other structures shall be painted with a tack coat prior to placement of paving.

G. All hot mix asphalt pavement shall be placed to the grades and in accordance with the cross sections and details shown on the Contract Drawings.

H. Existing drainage patterns shall not be altered by the new pavement construction unless otherwise indicated on the Contract Drawings.

I. After binder course has been installed, place and compact top course.

J. At both ends of railroad crossings, taper pavement down to top of ties at a slope not to exceed 2 horizontally to 1 vertically.

K. Apply tack coat at a rate of 0.05 to 0.10 gallons per square yard over the bottom course.

L. Top joint between existing sawcut pavement and new pavement shall be sealed using hot poured rubberized asphalt sealer.

END OF SECTION

SECTION 02515

CONCRETE SIDEWALKS, WALKWAYS AND DRIVEWAY APRONS

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and install concrete sidewalks, walkways and sidewalk aprons as specified herein.

B. Damaged concrete sidewalks, walkways and driveway aprons as a result of construction shall be replaced to the nearest existing undisturbed concrete panel on all sides of construction disturbance.

1.2 RELATEDWORK

A. Earthwork is included in Section 02200.

B. Cast-in-Place Concrete is included in Section 03300.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, MassHighway (SSHB) shall apply to materials and workmanship required for the work of this Section.

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 -PRODUCTS

2.1 MATERIALS

A. Concrete shall be as specified in Section 03300, but in no case less than 3,500 psi at 28 days.

B. Expansion joint shall be bituminous type, ½-in thick meeting AASHTO Spec. M-213-65.

.

C. Materials for gravel base course shall be as specified in Section 02200.

PART 3-EXECUTION

3.1 SIDEWALK, WALKWAY AND DRIVEWAY APRON INSTALLATION

A. The full sidewalk, walkway or driveway apron panel(s) disturbed during construction shall be replaced. The Contractor shall saw cut the edges of the existing concrete at the edge of the existing undisturbed panels. The existing panels shall be saw cut at an existing tooled joint or removed to an existing expansion joint.

B. The subgrade for sidewalks, driveways and driveway aprons shall be shaped parallel to the proposed surface of the sidewalks, walkways and driveway aprons and thoroughly compacted. All depressions occurring shall be filled and again compacted until the surface is smooth and hard.

C. After the subgrade has been prepared, a gravel base course shall be placed. After being thoroughly compacted, the base course shall be at least 4-in in thickness and parallel to the proposed surface of the sidewalk, walkway or driveway apron. Reuse existing gravel base in areas not disturbed for trenching and provide new gravel base in areas disturbed for trenching.

D. Forms:

1. Side and transverse forms shall be smooth, free from wrap, of sufficient strength to resist springing out of shape, of a depth to conform to the thickness of the sidewalk, walkway or driveway apron.

2. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished sidewalk, walkway or driveway apron. Walkways shall have sufficient pitch to provide for surface drainage, but not to exceed ¼-in per foot. Driveway aprons shall have sufficient pitch to provide for surface drainage and shall be finished to meet existing grades of the driveway and street.

E. Placing and Finishing Concrete:

1. Concrete sidewalks, walkways and driveway aprons shall be placed in slabs to dimensions to meet existing walkways and driveway aprons, except as otherwise ordered. The joints between new and existing concrete shall be separated by transverse, preformed expansion joint filler.

2. Preformed expansion joint filler shall be placed adjacent to structures.

3. Concrete shall be placed in such quantity that,. after being thoroughly consolidated in place, it shall be 4-in in depth for sidewalks and walkways and 6-in in depth for driveway aprons. Finishing operations shall be delayed until all bled water and water sheen has left the surface and concrete has started to stiffen. After water sheen has disappeared, edging operations shall be completed. After edging and jointing operations, the surface shall be

floated with an aluminum or magnesium float. Immediately following floating, the surface shall be steel troweled. If necessary, tooled joints and edges shall be rerun before and after troweling to maintain uniformity. Finish with broom at right angles to alignment of walk, then round all edges with ¼-in radius after brooming.

4. When completed, the sidewalks, walkways and driveway aprons shall be kept moist and protected from traffic and weather for at least 3 days.

END OF SECTION 02515

SECTION 02576

PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals removed or disturbed by the Contractor's operations and as specified and required for this project.

B. New pavement shall consist of initial temporary layer required to remain for a specified settlement time followed by the installation of final pavement layer.

C. Streets, driveways, parking areas or sidewalk pavements damaged or disturbed by the Contractor's operations shall be repaired, replaced or restored in accordance with the requirements specified herein and as directed for the respective type of pavement replacement and in a manner satisfactory to the Owner.

1.2 RELATED WORK

A. Trimming edges of existing pavement for the purpose of excavating trenches shall be by either saw or wheel cutters.

B. Roadway line painting shall be restored to n1atch the conditions prior to construction.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein; the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, Department of Public Works, shall apply to 1naterials and workmanship required for the work of this Section.

B. American Association of State Highways and Transportation Officials (AASHTO) AASHTO M144 - Standard Specification for Calcium Chloride.

C. Where reference is made to one of the above standards, the revision in effect at the tune of bid opening shall apply.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES.

1. Product Data: Submit complete data on materials to be used in construction, Including gradation tests for granular base.

2. Design Data: Submit design mix for bituminous base, binder and top course.

3. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Laboratory Testing Required:

l. The bituminous mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project. The density of the Bituminous Concrete Pavement will be determined by using either the following tests; Nuclear Density Gauge Method ASTM D2950 or the Bulk Specific Gravity Method AASHTO-T166.

C. Thickness: Test in-place asphalt concrete courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving as directed by Engineer. In-place compacted thickness will not be accepted if exceeding the following allowable variation from required thickness:

1. Binder Course 1-inch, plus no minus

2. Top (Wearing) Course: 1/2-inch, plus no minus

1.6 PROJECT SITE CONDITIONS

A. Environmental Requirements:

1. Do not place materials when underlying surface is muddy, frozen, or has frost, snow, or water thereon.

2. Do not place concrete when air temperature at time of placement, or anticipated temperature for following 24 hours, is lower than 40°F or higher than 90°F.

3. Apply prime and tack coats when ambient temperature is above 50°F and when temperature has not been below for 12 hours immediately prior to application.

4. Binder Course may be placed when air temperature is above 30°F and rising.

5. Grade Control: Establish and maintain required lines and elevations.

B. Existing Conditions:

1. Drawings show approximate locations of paving areas.

2. Drawings show approximate location of existing structures along pipeline route.

3. Location of subsurface borings and the logs are indicated on drawings.

1.7 GUARANTEE

A. All final pavement placed in City streets shall be warranted by the Contractor for a period of one year. During this period all areas which have settled or are unsatisfactory for traffic shall be removed and replaced at no cost to the City, including the cost of Traffic Police.

PART 2 PRODUCTS

2.1 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Initial pavement (temporary paving) shall be Binder Course, conforming to the referenced specification, Section M3.11, Class I, Type I-1 bituminous concrete.

C. For locations not receiving a full width overlay, final trench pavement shall consist of Binder Course and Top Course, conforming to the referenced specification, Section M3.11, Class I, bituminous concrete.

PART 3 -EXECUTION

3.1 GENERAL

A. Paving shall consist of an initial layer of temporary paving followed by a second layer of permanent paving.

B. Within 4 days of backfilling in areas to be paved, the Contractor shall commence temporary paving, unless directed otherwise in writing by the Engineer. The Contractor shall not leave excavated areas over weekends unless through written approval of the Engineer.

After completion of the backfilling, final pavement shall not be placed over trenches until the temporary paving has been in place for at least 90 days, or a winter settlement period, unless otherwise directed in writing by the Engineer. Where it is used as backfill, final pavement may be installed once the CDF has cured.

D. Materials for pavement shall be mixed, delivered, placed and compacted in accordance with the referenced specification, Sections M3.11 and 460 and as specified herein.

E. Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

F. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

G. Pavement Construction Period. No pavement shall be constructed during the period from December 20 to March 15, without approval in writing from the engineer.

3.2 PREPARATION

A. Protection of existing Roadways:

1. Saw cut existing pavement to required width and depth to avoid damage to adjacent pavement, curbs, gutters, or other structures and as indicated on the drawings.

B. Sub-Surface Preparation:

1. Pavement Subbase:

a. The subbase to be placed under pavement shall be a minimum of 12-inches thick after compaction. Subbase shall be evenly spread and thoroughly compacted in accordance with the Contract Documents.

b. The subbase shall be spread in layers not more than 8 - inches thick except the last layer of gravel shall be 4-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

c. Complete subbase preparation, including dynamic compaction, for full width before placing surfacing materials.

2. Subgrade:

a. Prepare subgrade in accordance with Section 0221.

b. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials. .

c. Stabilize subgrades in accordance with Section 02221 so that loaded construction vehicles do not cause rutting or displacement when depositing materials.

3.3 DESCRIPTION

A. In general, the following pavement repairs shall be made:

1. Wherever existing paved areas are disturbed a 2-inch temporary pavement layer is to be placed. When, and if, this material is disturbed during additional excavation work required for utility installation it shall be replaced. After a 90-day minimum period, or a winter settlement period, a permanent pavement wearing course shall be installed.

2. In roads and streets that are not scheduled to have full width overlay placed, following a 90-day minimum period, or a winter settlement period, the temporary

layer shall be removed, the pavement edges cutback 12-inches from existing, and a permanent pavement wearing course installed.

3. In roads and streets that are to receive a full width overlay, following a 90-day minimum period, or a winter settlement period, the full width 1-1/2 inch overlay of permanent pavement wearing course shall be placed over the existing pavement and the 2-inch temporary pavement layer.

4. Driveways shall be paved as described in 3.3A2, above.

5. Driveway aprons and waterways shall be paved as part of the work

6. Asphalt berms shall be replaced as part of the work.

7. The paving thicknesses specified above may be increased based on permit or field requirements. Payment for additional thickness shall be made at the unit price bid in the proposal

3.4 INSTALLATION

A. Initial pavement:

1. An initial layer of temporary pavement shall be placed wherever existing pavement has been removed or disturbed as soon as practical after backfilling is completed.

2. The pavement subbase shall be excavated, graded, and compacted to a depth of 2-inches below the existing pavement.

3. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until subsurface is dry.

4. The initial pavement layer shall be a hot mixed binder course placed and compacted to a thickness of 2-inches by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The new pavement shall be rolled smooth and even with the existing pavement.

5. Initial pavement shall be maintained in a condition suitable for traffic until replaced or overlaid by final pavement. Defects shall be repaired within 24 hours of notification of such defects.

B. Final pavement: areas not receiving full width overlay

1. Remove initial pavement and subbase to 3-1/2-in. below existing pavement. Saw cut all edges back 12-inches from edge of original trench, keeping the final pavement edge neat and straight. Shape and compact subbase to 95 percent of maximum dry density as determined by ASTM 01557, Method C.

2. Trim loose edges of existing pavement. Broom and tack coat all edges with emulsified or cutback asphalt.

3. Place Binder Course and compact to 2-in. thickness by steel-wheeled roller.

4. Place Top Course and compact to 1-1/2-in. thickness, finish smooth, dense and flush with surface of existing pavement.

5. Match roadway edges to and existing driveways or berms as required.

C. Final pavement: areas receiving full width overlay

1. The permanent pavement wearing course shall be a hot mixed top course and placed to a compacted thickness of 1-1/4 inches: Leveling course material shall be placed in vertical depression in the existing pavement which are greater than 0.5 inches from the surrounding existing pavement level.

2. Prior to the application of the overlay course, the entire surface shall be cleared of dirt and debris using power sweepers, and then tack coated with cut-back asphalt emulsion.

3. All thicknesses are measured after rolling. The permanent surface course shall be evenly spread and rolled with a power roller having a minimum weight of 5-tons.

4. The overlay course shall be keyed to the existing pavement at ends of pavement repair sections, including driveways. Keys shall be cut to full pavement depth and be at minimum width of 8-inches.

D. Pavement Markings:

1. The Contractor shall replace all reflectorized pavement markings removed or covered-over in carrying out the work, and as directed by the Engineer, no sooner than 48 hours after completion of overlay pavement. Markings shall conform to the latest standards of the municipality or agency having jurisdiction over the roadway. The markings shall be thermoplastic markings, 4-inches wide, white or yellow, single or double lines as required for road markings, and 12-inches wide, white for crosswalk markings.

2. Markings shall conform to MHD: M7.01.03 - White Thermoplastic Reflectorized Pavement Markings and M7.01.04 - Yellow Thermoplastic Reflectorized Pavement Markings.

3. The Contractor shall provide temporary markings on the temporary pavements where existing markings are removed at no additional cost to the Owner.

E. Curb and Gutter Replacement:

1. Replace curb and gutter with same material to pre-construction lines and curb sections. Reset granite curb to pre-construction line and grade.

2. Removal and replacement of curbing shall be done in accordance with Sections 501 and 580, as applicable of the MHD Specifications for Highways and Bridges.

3. Provide expansion joints at each intersection with existing curb sections.

4. Use expansion joints one inch wide. Fill with expansion joint material and cut to shape of curb section.

F. Sidewalk, Driveway, and Parking Area Replacement:

1. Gravel sidewalks:

a. Gravel sidewalks shall be restored to a condition at least equal to that existing immediately before the work was started.

2. Bituminous concrete sidewalks, driveways, and parking areas:

a. Construct in accordance with MHD Section 701, sidewalks, Wheelchair Ramps and Driveways.

b. The subgrade shall be shaped parallel to the proposed surface of the sidewalk or driveway and shall be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard in order for a gravel foundation to be placed upon it.

c. The sidewalk, driveway, or parking area shall be a minimum of 2-1/2 compacted inches thick, laid in two equal courses.

d. Sidewalk cross slopes cannot exceed 2 percent as required by the Americans with Disabilities Act (ADA). The Contractor shall merge new sidewalk slopes into existing sidewalk slopes as required by ADA.

3. Cement concrete sidewalks, and driveways

a. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

b. Use 6x6, W10xW10 welded wire reinforcement.

c. Concrete sidewalks shall be 4-inches thick and concrete driveways shall be 6-inches thick.

d. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content, and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

e. After the subgrade has been prepared, a subbase of gravel at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel shall be a minimum of 8 inches in thickness.

f. The forms shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk or driveway. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk or driveway.

g. The finished surface shall have sufficient pitch from the outside edge to provide for surface drainage. This pitch shall be ¼ of an inch per foot unless otherwise directed by the Engineer. Before the concrete is placed, he subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

4. Handicap ramps:

a. Handicap ramps will be installed where indicated on the drawings, in accordance with these contract documents.

b. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

c. The Contractor shall install curb cuts and accessible walkways in accordance with the requirements of the Americans with Disabilities Act and as required in 521 CMR (2/23/96 edition) Sections 21 and 22.

d. Handicap ramps are to be constructed of cen1ent concrete unless otherwise approved by the Engineer.

e. Existing granite curbing shall be removed, cut if required and reset to allow for the ramp construction. New curbing shall be installed to replace granite curbing damaged by the Contractor.

5. General:

a. Valve boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grades.

G. Berms and Waterways

1. Bituminous curbing shall be replaced as required. Curbing shall be machine laid and conform to grade of roadway and adjacent curb areas.

2. Bituminous berms shall be replaced as required. Berms shall be machine laid and conform to the grade of the roadways. Berms shall be placed in accordance with MHD Specification 470.20.

3. Bituminous waterways which have been disturbed by construction operations shall be repaired or replaced. The waterways shall be repaired and constructed in accordance with the applicable requirements of Section 280 of the MHD Specifications. Waterways shall be placed in two 1-1/2-inch thick courses on a prepared gravel base. Material shall be compacted by tamping or rolling.

3.5 RAISING BOXES AND CASTINGS

A. Prior to placing permanent pavement, the Contractor shall raise all boxes, utility castings, as required, to proper grade.

B. Contractor shall coordinate with all utility companies to obtain their requirements on Castings.

C. Castings which need to be raised or adjusted to complete final top course full-width paving shall be done immediately prior to paving.

END OF SECTION 02576

SECTION 02577

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. This work shall consist of providing final reflective pavement lines and markings during paving operations to match existing conditions and/or as shown on the plans. It shall also consist of providing temporary pavement markings during construction.

1.2 SUBMITTALS

A. Submit shop drawings in accordance with general conditions of the construction contract.

PART 2 - PRODUCTS

2.1 MATERIALS -PAINT

A. Paint shall conform to Massachusetts Highway Department (MHD) specifications for Fast Drying White Water-borne Traffic Paint M7.01.23 and Fast Drying Yellow Water-borne Traffic Paint M7.01.24.

B. Glass spheres (beads) used to reflectorize paint shall conform to Massachusetts Highway Department (MHD) specifications Glass Beads M7.01.07.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor is to replace all pavement markings disturbed by the construction.

B. Markings shall be applied only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free from sand, grease, oil or other foreign substances prior to application. Paint and pavement marking material shall be heated to the Manufacturer's recommended temperature. Ambient air temperature shall be a minimum of 45^{o}F and rising.

C. The paint shall be applied at the rate of between 300 and 350 linear feet per gallon for four (4) inch wide stripes and the glass spheres (beads) shall be applied by the drop-on method at the rate of six (6) pounds to each gallon of paint. Beads applied to reflectorized paint pavement arrows may require an increased application rate. The beads shall be distributed in even application over the entire paint surface.

D. The paint shall be done in a workmanlike manner, with lines well defined and without deviations. When repainting existing lines, the new line shall follow the exact pattern of the old lines and when new measurements are necessary, they shall be exact.

E. The Contractor shall provide all materials, equipment, labor, protective devices,

and warning signs necessary to the safe and efficient performance of the work and the safety of the traveling public.

F. Contractor is to protect pavement markings from traffic until markings are sufficiently dry.

END OF SECTION 02577

SECTION 02609

REINFORCED CONCRETE DRAIN PIPE

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Providing and testing reinforced concrete pipe as indicated and specified.

B. Related sections include the following:

1. Section 02221 - Trenching, Backfilling and Compaction

2. Section 02430- Manholes

3. Section 02431 - Catchbasins

4. Section 03300- Cast-in-Place Concrete

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Shop drawings showing pipe dimensions, reinforcement, joint and other details for each type and class pipe.

2. If less than 100 units of given size and class, submit three certified copies of pipe tests on identical pipe units made by the same manufacturer within past year.

3. If more than 100 units of given size and class, submit:

a. Reinforcing steel mill or sample test reports for each shipment of steel.

b. Cement mill test reports for each shipment of cement.

c. Aggregate test reports before manufacturer of pipe and monthly thereafter during production.

d. Records of average daily temperature and nun1ber of days pipe units cured, when average daily temperature below 60 deg.F.

e. Concrete cylinder compression test results within three days after test.

f. Absorption test results.

g. Pipe load-bearing test results.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B Provide pipe made by manufacturer of established good reputation in the industry and manufactured in a plant adapted to meet the design requirements of the pipe.

C. Accept on basis of tests of materials, absorption tests, plant load-bearing tests, pressure tests, and inspection of completed product.

D. Testing Agencies:

1. Engage an acceptable independent testing laboratory to perform or witness tests, other than mill tests on reinforcing steel and cement, and certify the results.

E. Allow Owner to engage independent testing laboratory at Owner's expense to perform additional inspection or tests of any or all pipe units at manufacturer's plant or elsewhere. Accept such additional inspections or tests as test results of record.

F. Conduct all tests in accordance with applicable ASTM Specifications.

1. Materials

a. Reinforcing Steel: Mill test reports or reports on samples taken from each shipment to pipe manufacturer.

b. Cement: Mill test reports for each shipment to pipe manufacturer. Cement for this project kept segregated from other cement.

c. Aggregates: Tests to demonstrate compliance with specified requirements. Initial tests prior to commencement of pipe manufacturer and additional tests at least monthly during production of pipe.

2. Concrete: Compression tests on standard cylinders for first pipe unit, then for every 100 cu. yd. of concrete used in pipe fabrication, or for each additional 200 units of pipe, whichever is lesser amount of concrete. Make 4 cylinders for each test and break them at 7, 14 and 28 days. Set aside one cylinder in case of unsatisfactory break.

3. Conduct pipe tests on units selected at random by Engineer.

a. Absorption: Before load test, take 3 cores from each unit.

Test by boiling. Average absorption: Maximum 8 percent of dry weight, no single test more than 9 percent.

b. Load-Bearing: Before delivery, conduct one test or one pipe unit of each size and class, and one additional test for each 200 units of each size and class, after taking cores for absorption test. Carry test to specified load to produce 0.01- in. crack; if no crack produced, pipe may be used. Plug cored holes with mortar as specified for repairs.

c. Pressure: Before delivery, test six units of each size and class. Join units in normal manner using joint to be furnished and bulkhead end units independently. Average internal hydrostatic pressure of 10 psi for 10 minutes minimum without visible leakage from joints or barrels. Perform test in presence of Engineer.

G. Inspection by Engineer:

1. At place of manufacture.

2. At site of work after delivery.

3. Reject pipe at any time if it fails to meet specified requirements, even If sample pipe accepted at plant.

4. Immediately remove rejected pipe from site.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610.

PART 2- PRODUCTS

2.1 PIPE FABRICATION

A. Interior: Smooth; no projections, indentations, offsets or irregularities.

B. Classes: As indicated.

C. Conform to ASTM C76, modified as follows:

1. Provide with proper concrete ends true to size; form on machined rings to ensure accurate joint.

2. Use Type II cement, no admixtures unless permitted by Engineer.

3. Cement content in concrete: At least 564 lbs. per cu. yd.

4. Aggregates: Fine and Coarse Aggregate per Sections 03300, 03346.

5. Reinforcement: Section 03200. Longitudinal reinforcement continuous. Minimum cover 3/4 in. allowed. Elliptical reinforcement not allowed.

6. Minimum laying length: 8-ft. except where otherwise indicated or permitted.

7. Curing: Saturated steam at temperature between 100 and 130 deg. F. for minimum 12 hours.

8. Shipping: Aged at least 450 day-degrees including steam curing period before shipping. Day-degrees defined as total nun1ber of days times the average daily air temperature at pipe surface. (Example: Five days at daily average temperature of 60 deg. F. equals 300 day- degrees.)

9. No lift holes.

10. Repairs

    a. Mortar: Minimum compressive strength 4,000 psi at 7 days, and 5,000 psi at 28 days, when tested in 3-in by 6-in. cylinders stored in standard manner.

    b. Only those allowed by ASTM C76.

11. Mark permanently on inside and outside of pipe:

    a. Date of manufacture

    b. Class

    c. Size

    d. Consecutive number

    e. Manufacturer's trade mark

2.2 FITTINGS AND SPECIALS

A. Reinforcement: As required for class of pipe to be used.

B. Details: As indicated and conforming to approved shop drawings.

C. Pipebells for chimneys or building connections:

l. Formed or built into pipe unit at plant.

2. Vitrified-clay bells with premolded gaskets: ASTM C700, extra strength, and ASTM C425.

2.3 JOINTS

A. Rubber Gasket Type: Gaskets in compression permitting longitudinal and angular movement.

B. Pipe 36 in. or less in diameter: 0-ring: ASTM C361 and as specified.

C. Pipe larger than 36 in. in diameter: 0-ring or ribbed-gasket: ASTM C443 and as specified.

D. Design:

1. No visible leakage, when tested average internal hydrostatic pressure of 10 psi.

2. Diameter of joint surfaces compressing the gasket: Not off more than 1/16 in. from true diameter, or as permitted by above ASTM Standard, whichever is less.

E. Composition and Texture of Gaskets:

1. Resistant to common ingredients of sewage, industrial wastes, and groundwater. Permanent under anticipated service conditions.

2. Fabricated by manufacturer regularly making rubber gaskets for pipe.

PART 3- EXECUTION

3.1 HANDLING

A. Handle into position in acceptable manner.

B. Furnish suitable devices for support when lifted.

3.2 INSTALLATION

A. Inspect before installation. Remove and replace defective units. Clear of debris and dirt.

B. Bedding:

1. Support on compacted screened gravel per Section 02223, or as indicated. Do not permanently support on saddles, blocking, or stones.

2. Provide bell holes for imparting bearing pressure to pipe barrel.

C. Alignment:

1. Install to line and grade indicated.

2. Maintain close joints with next adjoining unit. Match inverts. Do not drive down to grade by striking.

D. Jointing:

1. Clean and lubricate bell or groove before jointing per manufacturer's recommendation. Push into place. Force pipe units together by proper devices leaving minimum open recess inside and outside and achieving tightly sealed joints. Avoid force that could wedge apart or split bell or groove ends. Do not pull or cramp joints, except where permitted by Engineer.

2. Inspect proper position of joint gasket with feeler gage furnished by Contractor.

3. Remove and replace unfittable pipe units with suitable units and new gaskets.

4. Install gaskets and assemble joints in accordance with recommendations of manufacturers of joint material and pipe, subject to acceptance by Engineer. Provide watertight pipeline with flexible joints.

E. Backfill:

1. Compact gravel between pipe and sides of trenches to hold pipe in correct alignment Fill bell holes with screened gravel and compact as indicated.

2. Prevent floatation in trench.

F. Cleaning:

1. Use watertight plugs in open ends of pipe and branches when installation not in progress.

2. Do not use pipeline as conductor for trench drainage.

3. Prevent earth, water, and other material from entering pipeline.

4. Clean pipeline and manholes upon completion. Prevent soil, water, and debris from entering existing sewers.

3.3 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 02609

SECTION 02622

POLYVINYL CHLORIDE GRAVITY PIPE

PART 1 -GENERAL

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Providing and testing of pipe, pipe fittings and specials, jointing materials, and accessories, of various sizes, classes, joints and types, and appurtenant work, at the locations and to the lines and grades as indicated and/or as directed, complete in place, in accordance with the drawings and specifications.

2. The pipe specified under this section shall include all gravity flow sanitary sewers.

B. Related sections include the following:

1. Section 02210 - Earth Excavation, Backfill, Fill and Grading

2. Section 02601- Manholes

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300- SUBMITTAL PROCEDURES:

1. Submit shop drawings or descriptive literature, or both showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project. All pipe furnished shall be manufactured only in accordance with the specifications and the drawings.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610. PART 2 - PRODUCTS

2.1 PIPE FITTINGS AND SPECIALS

A. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM Standard Specifications for Type PSM PVC Sewer Pipe and Fittings, Designation ASTM D3034, latest revision, for sizes 4"-15" and ASTM F679, latest revision, for sizes 18"-27" The pipe shall have a maximum pipe diameter to wall thickness ratio (SDR) of 35. The pipe shall be tested by the flat plate deflection method at a minimum of 45 psi at 5 percent deflection in accordance with ASTM D 2412. Standard laying lengths shall be either 13 feet or 20 feet.

B. Specials, if required, shall conform to the Specifications for straight pipe insofar as applicable and to the details indicated on the Drawings or bound into the back of the Specifications.

C. Insulation shall be manufactured by Thermal Pipe Systems, Braintree, Massachusetts, Atlas Insulation, Ayer, Massachusetts or Insulated Piping Systems Inc., Canton, Massachusetts, or equal Insulation shall be factory formed-in-place polyurethane foam insulation having nominal thickness of 3", with an in-place density of 2.5 pcf, and a "K" factor of 0.14 BTU/in./hr/deg./F/sq.ft. Straight joints between insulated pipe lengths, and the end section of non-insulated pipe shall be 20-guage corrugated aluminum performed to be fastened with stainless steel screws and bands. Jackets shall have expansion joints at 25-foot intervals. Sections of jacket shall have 2-inch minimum at all seams.

2.2 JOINTS

A. Joints for the polyvinyl chloride pipe shall be push-on bell and spigot joints using elastomeric ring gaskets. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall be of a composition and texture which is resistant to con1mon ingredients of sewage and industrial wastes, as well as petroleum products (oil, gasoline, etc.) and groundwater, and which will endure permanently under the conditions of the proposed use. The joints shall conform to ASTM Standard Specifications for Joints for Drain and Sewer Plastic pipes using Flexible Elastomeric Seals, Designation D3212.

2.3 INSPECTION, TESTS AND ACCEPTANCE

A. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the above-mentioned ASTM Specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.

B. All tests shall be made in accordance with the methods prescribed by the above mentioned ASTM Specifications, and the acceptance or rejection shall be based on the test results.

C. The Contractor shall furnish all labor to assist the Engineer in inspecting the pipe. Pipe will be inspected upon delivery, and such as does not conform to the requirements of this contract shall be rejected and shall immediately be removed from the project site by the Contractor.

PART 3-EXECUTION

3.1 HANDLING PIPE

A. All pipe shall be stored at the site until installation in a manner which will keep the pipe at ambient outdoor temperatures. Temporary shading shall be provided as required to meet this requirement. Simply covering the pipe which allows temperature build-up when exposed to direct sunlight will not be permitted.

B. Care shall be taken to avoid damaging the pipe and fittings.

3.2 INSTALLATION

A; Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-inch per foot of length. If a piece of pipe fails to meet this requirement for straightness, it shall be rejected and removed from the site. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Crushed stone shall be as specified in Section 02435.

C. Suitable bell holes shall be provided, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material. Special care shall be taken to hold the trench width at the crown of the pipe to the maximum indicated on the Trench Detail included in the Details section of these specifications.

D. All pipe fittings shall be cleared of all debris, dirt, etc., before being Installed and shall be kept clean until accepted in the completed work.

E. Pipe and fittings shall be installed to the lines and grades indicated on the Drawings. Care shall be taken to ensure true alignments and gradients.

F. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.

G. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer 's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with minimum open recess inside and outside and have tightly sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.

H. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

I. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units and new gaskets.

J. Details of gasket installation and joint assembly shall follow the directions of the manufacturers of the joint materials and of the pipe, all subject to review by the Engineer. The resulting joints shall be watertight and flexible.

K. All premolded gasket joint polyvinyl chloride pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

L. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

M. After each pipe has been properly bedded, enough crushed stone shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes, provided for jointing, shall be filled with crushed stone and compacted, and then crushed stone shall be placed compacted to complete the pipe bedding.

N. The Contractor shall take all precautions to prevent flotation of the pipe in the trench.

O. At all times pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs, or by other acceptable means.

P. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.

Q. Pipelines shall not be used as conductors for trench drainage during construction.

3.3 ALLOWABLE PIPE DEFLECTION

A. Pipe provided under this Specification shall be so installed as to not exceed a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

B. Upon completion of a section of pipe, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer, and be reviewed by the Engineer. The section of pipe must be placed and backfilled for a minimum of 90 days before the deflection can be measured.

C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem without additional compensation.

3.4 CLEANING

A. Care shall be taken to prevent earth, water and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out the pipeline and manholes being careful to prevent soil, water and debris from entering any existing pipe.

3.5 TESTING OF PIPE

A. If the visual inspection of the completed pipe or any part thereof shows any pipe, manhole or joint which allows infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.

B. After completing installation and backfill of pipe, the Contractor shall, at his expense, conduct a line acceptance test using low pressure air.

C. Equipment used shall meet the following minimum requirements.

D. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

E. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

F. All air used shall pass through a single control panel.

G. Three individual hoses shall be used for the following connections.

1. From control panel to pneumatic plugs for inflation.

2. From control panel to sealed line for introducing the low pressure air.

3. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

H. All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

I. After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

J. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be te1med "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater that may be over the pipe) is not less than the time shown for the given diameter in the following table.

Pipe Diameter	Specification Time for Length Shown (min:sec)			
Inches	100ft.	200ft.	300ft.	400ft.
6	5:40	5:40	5:40	5:42
8	7:34	7:34	7:36	10:08
10	9:26	9:26	11:52	15:49
12	11:20	11:24	17:05	22:47
15	14:10	17:48	26:42	35:36
18	17:00	25:38	38:27	51:16
21	19:50	34:54	52:21	69:48
24	22:47	45:34	68:22	91:10

K. In areas where groundwater is known to exist, the Contractor shall install a 1/2-inch diameter capped pipe nipple, approximately 10-inches long, through the manhole wall adjacent to one of the sewer lines entering the manhole. This shall be done at the time the line is installed. immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is ll-112 feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same). In no case shall the starting pressure exceed 9.0 psig.

3.6 TEST FAILURE

A. If the section of pipe fails to pass the leakage and pressure test, or if there is any visible leakage, the Contractor shall locate, uncover and repair or replace the defective pipe fitting or joint and retest all at his own expense. Pipe will be considered passing only when the leakage does not exceed the above standard. Passing the test does not absolve the Contractor from his responsibility if leaks develop later within the period of warranty.

3.7 CONTRACT CLOSEOUT

Provide in accordance with Section 01700.

END OF SECTION 02622

SECTION 02650

BURIED UTILITY MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

B. This work shall consist of providing and installing utility line markings above all buried lines installed as part of this contract as indicated on the Drawings and replacing existing markings disturbed as part of this contract. Related Work Specified Elsewhere:

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.

B. Marking tape color shall be in accordance with latest American Public Works Association (APWA) Uniform Color Code and American National Standards Institute ANSI Standard Z535.1, Safety Color Code specifications for buried utility marking as noted in the Schedule below.

1. Schedule

Marker Color	**Buried Utility**
Blue	Potable Water &Associated lines
Green	Sanitary Sewers, Storm Drain and other Drain lines
Orange	Telecommunication, signal, alarm
Purple	Reclaimed, Recycled, Irrigation Water and Slurry Lines
Red	Electric Power lines cables conduits and lighting cables
Yellow	Gas, Oil, Steam, Petroleum or Gaseous Material Lines

2. Warning Information shall be in Black Letters with typical wording of:
   a. "CAUTION: BURIED (NAME OF UTILITY LINE) BELOW"

C. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility.

D. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.

E. Seton Identification Products, New Haven, CT, Utility Safeguard LLC or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Marking tape shall be installed over utility lines centerline and buried 24" below grade. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF SECTION 02650

SECTION 02721

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section or shown on the Contract Drawings, or both, but not limited to the following:

1. Storm drain piping, fittings, accessories and bedding.

2. Catch basins and catch basin frames and grates.

3. Drain manholes and drain manhole frames and covers.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, and:

1. Section 02200 Earthwork

2. Section 02140 Dewatering and Drainage

1.3 SUBMITTALS

A. Submit shop drawings and manufacturer's specifications and installation instructions for all pipe materials including flared end sections, precast concrete catch basins and drain manholes, manhole frames and covers and catch basin frames and grates. Include component construction, features, configuration, and dimensions.

B. Each shipment of pipe, catch basins and metal castings shall be accompanied with the manufacturers notarized certificate that the materials meet the specification requirements.

1.4 REFERENCES

1. ASTM C32-05 Sewer and Manhole Brick.

2. ASTM C62-08 Building Brick.

3. ASTM C76-08a Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

4. ASTM C139-05 Concrete Masonry units for Construction of Catch Basins and Manholes.

5. ASTM C270-08a Mortar for Unit Masonry.

6. ASTM C443-05a Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

7. ASTM C478-08 Precast Reinforced Concrete Manhole Sections.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Reinforce Concrete Pipe: ASTM C76, Class III (unless otherwise specified on the project drawings), modified bell and spigot compression gasket joints complying with ASTMC443.

B. General: Ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of same-type class of materials as piping unless otherwise indicated.

2.2 MANHOLES AND CATCH BASINS

A. The material to be used in the construction of storm drain manholes, catch basins, and drop inlets shall conform to MHD Standard Specifications, the Drawings, and these specifications. Design depths as indicated on the Contract Drawings.

B. Precast Concrete Manholes and Catch Basins: ASTM C478, eccentric cone, flat slab precast top; precast riser section and monolithic base section with integral floor.

C. Concrete Compressive Strength: 4000 psi minimum. Type II cement.

D. Reinforcing Steel: ASTM A185, 0.12 sq. in./linear ft. and 0.12 sq. in. (both ways) base bottom.

E. Joints sealed with rubber gaskets conforming to ASTM C443.

F. Steps: Forged 6061B, T6 aluminum or Copolymer Polypropylene Plastic with 1/2 inch Grade 50 steel reinforcement.

G. PVC Structures: ASTM DI784, ASTM D2122 and ASTM D2564.

H. Pipe Connectors: Provide a hydraulic cement, no shrink grout, which shall be made watertight with the RCP storm drainage pipe.

2.3 CAST IRON FRAME AND COVER

A. Frame and Cover: Cast iron construction, manufactured by LeBaron Foundry, Inc. (East Jordan Iron Works, Inc).

2.4 CAST IRON FRAME AND GRATE

A. Frame and Grate: Manufactured by E.L. LeBaron (East Jordan Iron Works, Inc.) model #LF-248-2 flange (single or double) or approved equal.

2.5 OIL AND FLOATING DEBRIS TRAP

A. Oil and Floating Debris Trap: Manufactured by Ground Water Rescue, Inc. model The Eliminator or approved equal.

2.6 MASONRY MATERIAL

A. Concrete Masonry Units: ASTM CI39.

B. Brick: ASTM C32Grade MS or ASTM C62) Grade SW.

C. Mortar: ASTM C270Type M.

2.7 PIPE BEDDING AND COVER MATERIALS

A. Bedding, Cover and Compaction Requirements: Fill Type as specified in Section 02200, and shown on the Details.

2.8 INFILTRATION BASIN

A. Infiltration basin shall be pre cast concrete type, a min of 6 feet in diameter and a min 6 ft. deep. Concrete strength shall be 4,000 psi @ 28 days. Cement shall be Portland Type II per ASTM Cl50-81. Steel reinforcement shall conform to ASTM A-615, Grade 60. Design loading per AASHO HS-10.

B. Infiltration basin shall comply with the standards of the City of Waltham.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Contract Drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with processed

B. Remove large stones or other hard matter, which could damage piping, structures, or Impede consistent backfilling or compaction

3.3 BEDDING

A. Excavate for pipe trench or structure in accordance with Section 02200. Hand trim excavation for accurate placement of pipe and structures to elevations indicated on the Drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 12 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION- PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight.

B. Place pipe on minimum 12 inch deep bed in accordance with Section 02200.

C. Lay pipe to slope gradients noted on drawings with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install processed gravel at sides to the midpoint of the pipe. Install Ordinary Borrow from the midpoint of the pipe to the elevations indicated on the Contract Drawings, compacted to 95 percent maximum density at optimum moisture content.

E. Refer to Section 02200 for trenching and backfilling requirements. Do not displace or damage pipe when compacting.

3.5 INSTALLATION- CATCH BASINS AND DRAIN MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Install and level precast concrete manhole base and sections per the Details of the Drawings including 12" depth of crushed stone with filter fabric.

C. Establish elevations and pipe inverts for inlets and outlets as indicated on the Drawings. D. Mount frame and cover or frame and grate level in grout, secured to top cone or flat top section to elevations indicated on the Drawings.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction will be performed in accordance with Section 02200.

3.7 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02721

SECTION 02901

MISCELLANEOUS WORK AND CLEANUP

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the 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 modem practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, the following:

1. Installing and maintaining construction warning signs.

2. Crossing and relocating existing utilities.

3. Restoring of driveways and sidewalks.

4. Cleaning up.

5. Incidental work.

6. Job photographs.

7. Protection and/or removal and reinstallation of existing signs, lampposts, fence posts, fencing and mailboxes.

8. Protection and bracing of utility poles.

9. Restoration and replacement of curbing.

10. Raking and re-seeding of grassed areas disturbed during construction and/or dewatering activities, including silt basin/dewatering activity areas.

PART2 PRODUCTS

2.1 MATERIALS

A. Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the Contractor may re-use existing materials that are removed.

PART 3- EXECUTION

3.1 INSTALLING AND MAINTAINING CONSTRUCTION WARNING SIGNS

A. Construction work zone traffic control shall be the contractor's responsibility. Generally, conformance with Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition, "Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations", will be considered to meet this requirement.

3.2 CROSSING AND RELOCATING EXISTING UTILITIES

A. This Item includes any extra work required in crossing culverts, water courses, including brooks and drainage ditches, storm drains, gas mains, water mains, electric, telephone, gas and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill (except screened gravel) and any other work required for crossing the utility or obstruction not included for payment in other items of this specification. Notification of Utility Companies shall be as specified in Section 01046.

B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as• shown on the Drawings, the Contractor shall remove and relocate the utility as directed by the Engineer or cooperate with the Utility Companies concerned if they relocate their own utility.

C. At pipe crossings and where designated by the Engineer, the Contractor shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid- diameter of the pipe crossed. Payment for screened gravel at pipe crossings will be made according to the unit price bid established in the Bid F01m.

RESTORING OF DRIVEWAYS AND SIDEWALKS

A. Existing public and private driveways disturbed by the construction shall be replaced. Paved drives shall be repaved to the limits and thickness existing prior to construction. Gravel drives shall be replaced and regraded.

B. Existing public and private sidewalks disturbed by the construction shall be replaced with sidewalks of equal quality and dimension. In general, sidewalks shall be 2-1/2

inches thick after rolling and compacting and the material shall be top course bituminous asphalt.

3.4 CLEANING UP

A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition. Any materials, and sand or concrete materials shall be cleaned out of the manholes and catch basins. Haybales and siltfence as well as any silt and debris retained by same shall be removed.

3.5 INCIDENTAL WORK

A. Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Drawings.

3.6 PHOTOGRAPHS OF PROJECT

A. Prior to commencing work, Contractor may document existing conditions using construction photographs. Photographs for this purpose shall be at the Contractors' expense.

3.7 RESTORATION AND REPLACEMENT OF SIGNS, LAMPPOSTS, FENCE POSTS, FENCING, AND MAILBOXES

A. Existing signs, lamp posts, fence posts, fencing and mailboxes which may be damaged by the Contractor or removed by the Contractor during the course of installing the new pipelines shall be reinstalled in a vertical position at the same location from which they were removed. Damaged items shall be replaced with an item equal to or better than the damaged items. A concrete anchor shall be provided as necessary, at no additional cost, to ensure a rigid alignment. Care shall be exercised in the reinstallation of all items to prevent damage to the newly installed pipelines.

3.8 RESTORATION AND REPLACEMENT OF CURBING

A. Existing concrete, bituminous, timber or granite curbing shall be protected. If necessary, curbing shall be removed and replaced after backfilling. Curbing which is damaged during construction shall be replaced with curbing of equal quality and dimension at the Contractor's expense. Granite curbing removed and reset shall

3.9 PROTECTION AND BRACING OF UTILITY POLES

A. The Contractor shall be responsible for making all arrangements with the proper utility companies for the bracing and protection of all utility poles that may be damaged or endangered by the Contractors operations. Work under this item shall include the related removal and reinstallation of guy wires, or support poles whether shown on the Drawings or not.

3.10 RAKING AND RE-SEEDING

A. Grass and landscaped areas disturbed by the Contractor shall be raked and replenished with loam if required. Areas shall be re-seeded as required.

END OF SECTION 02901

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1-GENERAL

1.1 SUMMARY

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the specifications and in accordance with good construction practice. Refer to the Contract Drawings for locations of work included in the contract.

A. Work Included - The work under this section generally includes the following:

1. Concrete building foundations
2. Concrete slabs
3. Exterior concrete stairs
4. Concrete retaining walls

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section, and:

1. Section 02200 Earthwork

1.3 SUBMITTALS

A. In addition to Product Data, submit design mixes for each concrete mix.

1.4 QUALITY ASSURANCE

A. Quality Assurance: Comply with ACI 301, "Specification for Structural Concrete," and ACI117, "Specifications for Tolerances for Concrete Construction and Materials."

1. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

2. Manufacturer Qualifications: A firm experienced in manufacturing ready-Mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

PART 2-PRODUCTS

2.1 MATERIALS

A. Steel Reinforcement: As follows:

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
2. Plain-Steel Wire: ASTM A 82, as drawn.
3. Deformed-Steel Wire: ASTM A 496.
4. Plain-Steel Welded Wire Fabric: ASTM A 185, flat sheets.

B. Concrete Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II.
2. Aggregate: ASTM C 33, uniformly graded, from a single source.
3. Water: ASTM C 94.
4. Air-Entraining Admixture: ASTM C 260.
5. Water-Reducing Admixture: ASTM C 494, Type A.
6. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
7. Water-Reducing and Accelerating Admixture: ASTM C 494, Type
8. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

B. Related Materials: As follows:

1. Vapor Retarder: ASTM E 1745, Class C, not less than 7.8 mils polyethylene sheet.
2. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
3. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
4. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, of class and grade to suit requirements.

D. Curing Materials: As follows:

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
   a. 2 coats Sonneborn "Kure-N-Seal" or equal.

2.2 CONCRETE MIXES

A. Concrete Mixes, General; - Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, with the following properties:

B. Footings, Foundations, Retaining Walls

1. Con1pressive Strength (28 Days): 3000 psi.
2. Slump: 4 inches.
3. Air Content: 4.5 to 7.0 percent.

C. Slabs

1. Compressive Strength (28 Days): 4000 psi.
2. Slump: 3 inches.
3. Air Content: 4.5 to 7.0 percent

D. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

PART 3 EXECUTION

3.1 FORMWORK

A. Design, construct, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

C. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved 28-day design compressive strength.

D. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

E. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTME 1643.

3.2 PLACING REINFORCEMENT

A. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

A. Locate and install construction, isolation, and contraction joints as indicated.

3.4 CONCRETE PLACEMENT

A. Deposit concrete continuously and avoid segregation. Deposit concrete in forms in horizontal layers no deeper than 24 inches, avoiding cold joints.

1. Consolidate concrete with mechanical vibrating equipment.
2. Screed and initial-float concrete floors and slabs using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
3. Comply with ACI 306.1 for cold-weather concrete placement.
4. Place concrete according to recommendations in ACI 305R when hot-weather conditions exist.

3.5 FINISHING

A. Finish formed surfaces as follows:

1. Apply rough-formed finish, defined in ACI 301, to concrete surfaces indicated or not exposed to public view.

B. Finishing Floors and Slabs: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.

1. Float Finish: Apply float finish, defined in ACI 301, to surfaces indicated, to surfaces to receive trowel finish,

2. Trowel Finish: Apply a trowel finish to surfaces indicated and to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

   a. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

   b. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following: 1/8 inch.

3. Trowel and Fine-Broon1 Finish: Apply a partial trowel finish, stopping second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

4. Broom Finish: Apply a broom finish to exterior concrete, bro01ning with fiber-bristle broom perpendicular to main traffic route, to platforms, steps, and ramps, and elsewhere as indicated.

3.6 CONCRETE PROTECTION AND CURING

A. Concrete Protection and Curing: Protect concrete from excessive cold or hot temperatures. Con1ply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

1. Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause excessive moisture loss.
2. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
3. Cure formed and unformed concrete for at least seven days by moisture curing, moisture-retaining-cover curing, or curing compound.
4. Cure and seal floors and slabs with a curing and sealing compound according to manufacturer's written instructions.

3.7 QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing and inspecting agency subject to Owner approval to sample materials, perform tests, and submit test reports during concrete placement. Tests shall be performed according to ACI 301.

B. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

END OF SECTION 03300

SECTION 03600

GROUT

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required to install grout for modifications to existing foundations, walls and manholes as shown on the Drawings and as specified herein.

1.2 RELATEDWORK

A. Cast-in-Place Concrete is included in Section 03300.

1.3 SUBMITTALS

A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installer for:

1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

B. Submit to Engineer, in accordance with Section 01300, proposed method of repairing penetrations of existing foundations (all types), including formwork arrangement and grout installation.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

2. ASTM C579- Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens for Cementitious Mixtures.

4. ASTM C1107- Standard Specification for Packaged D1y, Hydraulic-Cement Grout

B. U.S. Army Corps of Engineers (CRD)

1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout.

C. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

PART 2- PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the product of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout:

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be Portland cement based, contain a pre-proportioned blend of select aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co. NBEC Grout by U.S. Grout Corp. or equal.

b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Cotp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U.S. Grout Corp. or equal.

B. Water:

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

PART 3 EXECUTION

3.1 PREPARATION

A. Surfaces to receive grout shall be clean and sound; free of ice, frost ice, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.

B. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of lattice and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with the grout shall be the oilless type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

C. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.

3.2 INSTALLATION- GENERAL

A. Mix, apply and cure products In strict compliance with the manufacturer's recommendations and this section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the grout between 60 and 90 degrees F during grouting and until the grout compressive strength reaches 1000 psi or as recon1mended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of existing surfaces and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

3.3 INSTALLATION- NONSHRINK CEMENTITIOUS GROUT

A. Mix in accordance with the manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures.

B. When mixing, add premeasured amount of water for mixing, followed by the grout.

Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain the workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3-inches in depth shall include the addition of clean, washed pea-gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated• areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement shall proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to mix (retemper) after initial stiffening.

F. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

END OF SECTION 03600

!¢¢! / I a9b¢ !

59{ŁDb 5w! ² ŁbD{

CITY OF WALTHAM
STORM DRAIN IMPROVEMENTS

LOWELL STREET AND ASH STREET
WALTHAM, MASSACHUSETTS

JANUARY 2020

INDEX OF DRAWINGS		
SHEET	SHEET TITLE	DRAWING
1	G-001	TITLE SHEET AND INDEX OF DRAWINGS
2	G-002	LEGEND AND GENERAL NOTES
3	C-100	EXISTING CONDITIONS PLAN
4	C-101	PLAN AND PROFILE
5	C-102	PLAN
6	C-501	DETAILS
7	T-101	TRAFFIC DETOUR ROUTES
8	T-102	TRAFFIC DETAILS I
9	T-103	TRAFFIC DETAILS II

PROJECT LOCUS

Not To Scale

CITY ENGINEER
STEPHEN A. CASAZZA, P.E.

1/10/2020

SSV ENGINEERING INC.
609 WINTER STREET
FRAMINGHAM, MA

G-001

GENERAL NOTES

1. THE LOCATION AND DEPTH OF EXISTING UTILITIES HAVE BEEN PLOTTED FROM THE BEST AVAILABLE RECORD DATA SUPPLEMENTED WITH ON-LINE FIELD SURVEY. THE CONTRACTOR SHALL CHECK AND VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES AND NOTIFY THE STATE (DIF SAFE) MASSACHUSETTS UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM AT 1-888-344-7233, AS REQUIRED BY LAW.
2. UTILITY DATA HAS BEEN PLOTTED FROM A COMBINATION OF FIELD DATA AND MUNICIPAL LOCATION PLANS. THE LOCATION OF UTILITIES IS NOT WARRANTED TO BE CORRECT. THE CONTRACTOR IS HELD RESPONSIBLE FOR DETERMINING THE ACCURATE LOCATION OF UTILITIES IN THE FIELD.
3. EXISTING UTILITIES INTERFERING WITH WORK SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER IN THE FIELD, UNLESS OTHERWISE INDICATED OR SPECIFIED.
4. DAMAGE TO ANY UTILITY WILL BE REPAIRED BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, IN A TIMELY MANNER SO THAT DISRUPTION OF SERVICE TO ANY UTILITY WILL NOT BE LONGER THAT PRACTICALLY NECESSARY TO REPAIR DAMAGE. THE CONTRACTOR SHALL COORDINATE REPAIR WITH THE APPROPRIATE UTILITY COMPANY / OWNER.
5. THE ACTUAL NUMBER AND LOCATIONS OF TEST PITS TO BE EXCAVATED BY THE CONTRACTOR SHALL BE DETERMINED IN THE FILED BY THE ENGINEER, UNLESS OTHERWISE INDICATED OR SPECIFIED.
6. THE CONTRACTOR SHOULD BE AWARE THAT TEST PITS MAY UNCOVER CONFLICTS BETWEEN THE PROPOSED WORK AND EXISTING UTILITIES. REALIGNMENT OF PROPOSED WORK MAY BE NECESSARY, AS A RESULT, PARTICULARLY IN THOSE AREAS WHERE TEST PITS ARE INDICATED ON THE DRAWINGS. TEST PITS AND UTILITY COORDINATION SHALL BE PERFORMED AT LEAST TWO WEEKS IN ADVANCE OF CONSTRUCTION.
7. IN ADDITION TO COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS, THE CONTRACTOR SHALL TAKE ALL NECESSARY AND PROPER MEASURES AND SHALL PROVIDE ALL NECESSARY CONTINUOUS BARRIERS OF SUFFICIENT TYPE, SIZE AND STRENGTH TO PREVENT ACCESS TO ALL OPEN EXCAVATIONS AT THE COMPLETION OF EACH DAYS WORK. BARRIERS AND EQUIPMENTS SHALL BE PROVIDED WITH ALL LIGHTING NECESSARY TO PROTECT THE PUBLIC DURING WORKING AND NON-WORKING HOURS.
8. THE CONTRACTOR SHALL CONDUCT HIS CONSTRUCTION OPERATIONS SUCH THAT A MINIMUM OF ONE LANE OF TRAFFIC REMAINS OPEN AT ALL TIMES ON TRAVELLED WAYS. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION, TRAFFIC CONTROL , AND DETOURS WITH THE POLICE DEPARTMENT TO MINIMIZE OBSTRCUTION OF TRAFFIC.
9. WALLS, SIGNS, LIGHT POSTS AND GUARDRAILS AND ANY OTHER PUBLIC OR PRIVATE OBJECT DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION IN A TIMELY MANNER.
10. SEWER MANHOLE COVERS SHALL HAVE THE WORD "SEWER"CAST IN PROMINENT 3 INCH LETTERS RAISED ON THE EXTERIOR SURFACE. DRAIN MANHOLE COVERS SHALL HAVE THE WORD "DRAIN" CAST IN PROMINENT 3 INCH LETTERS RAISED ON THE EXTERIOR SURFACE.
11. MANHOLE INVERTS SHALL BE FORMED AND FILLETED AS REQUIRED TO DIRECT THE FLOW AS INDICATED, AND TO PREVENT DEPOSITION OF SOLIDS.
12. ALL EXTERIOR SURFACES OF MANHOLES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATERPROOFING BY THE CONTRACTOR.
13. OPENINGS AND KNOCKOUTS FOR PIPE IN PRECAST MANHOLE BASES SHALL BE CAST IN THE REQUIRED LOCATION DURING MANUFACTURE. FIELD CUT OPENINGS WILL NOT BE PERMITTED, UNLESS DIRECTED BY THE ENGINEER.
14. ALL EXTERIOR SURFACES OF MANHOLES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATERPROOFING BY THE CONTRACTOR.
15. "FILL CONCRETE IS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C=2000 PSI. ALL OTHER CONCRETE IS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C=3000 PSI.
16. SEWER TRENCHES EXCAVATED WIDER THAN THE TRENCH WIDTH Ws/Wu ABOVE THE "LINE OF NARROW TRENCH LIMIT" SHALL BE DONE AT THE CONTRACTOR'S OWN EXPENSE AND SHALL NOT BE MEASURED FOR PAYMENT.
17. BELOW THE "LINE OF NARROW TRENCH LIMIT" THE TRENCH SHALL NOT BE EXCAVATED BEYOND THE TRENCH WIDTH Ws/Wu.
18. IF EXCAVATION AND BACKFILL BELOW NORMAL DEPTH IS REQUIRED , SHEETING MAY BE ORDERED BY THE ENGINEER AND WILL BE PAID FOR UNDER THE BID ITEM FOR SHEETING DIRECTED TO BE LEFT IN PLACE.
19. SHEETING LEFT IN PLACE MAY BE USED WHERE DIRECTED BY THE ENGINEER. IN ALL CASES, SHEETING LEFT IN PLACE SHALL BE CUT OFF A MINIMUM OF 4'-0" BELOW TOP OF TRENCH, BUT IN NO CASE LESS THAN 1 FEET ABOVE THE CROWN OF THE PIPE, AND LEFT IN PLACE.
20. SERVICE CONNECTIONS HAVE NOT BEEN SHOWN FOR ALL UTILITIES AND THOSE SHOWN ON PLAN ARE APPROXIMATE ONLY. THE CONTRACTOR MUST COORDINATE THE LOCATION OF ALL SERVICE CONNECTIONS WITH THE WALTHAM WATER/SEWER DIVISION PRIOR TO EXCAVATION.
21. EXISTING SEWER AND MANHOLES TO BE ABANDONED AS DESCRIBED IN SECTION 01025 MEASUREMENT AND PAYMENT.
22. HEIGHT OF CHIMNEY SEWER SERVICES TO BE ADJUSTED IN THE FIELD BY THE CONTRACTOR.
23. IN LOCATION WHERE THE NEW SURFACE COURSE PAVEMENT DOES NOT JOIN INTO THE EXISTING PAVING OR CURBING, THE EXISTING GROUND SURFACE SHALL BE GRADED, LOAMED AND SEEDED TO ENSURE A GRADUAL SLOPE FROM THE TOP OF THE NEW PAVEMENT OVERLAY TO THE EXISTING GROUND SURFACE.
24. EXCAVATED MATERIALS SHALL NOT BE PLACED OR STORED WITH IN 100 FEET OF A WETLAND.
25. GROUNDWATER REMOVED FROM TRENCHES DURING CONSTRUCTION SHALL BE TREATED TO REMOVE FINES PRIOR TO DISCHARGE AS SPECIFIED OR AS DIRECTED BY THE ENGINEER.

UTILITY CONTACTS:

THE CITY OF WALTHAM - WATER/SEWER/DRAIN
WATER & SEWER FOREMAN (7AM-3PM): 781-314-3826
DAYTIME OFFICE: 781-314-3820
AFTER HOURS EMERGENCY: 781-893-3700
THE CITY OF WALTHAM - WIRES DEPARTMENT
TIM KELLY, INSPECTOR OF WIRES: 781-389-6044
VERIZON - TELEPHONE
FREDERICK WAGNER, AREA PROJECT COORDINATOR: 781-376-5067
COMCAST - CABLE
MANUEL FURTADO, AREA PROJECT COORDINATOR: 774-644-9104
NATIONAL GRID - GAS
KEITH WALTERS, AREA PROJECT COORDINATOR: 516-924-4602
EVERSOURCE - ELECTRIC
N.E. SERVICE NUMBER: 800-592-2000

SYMBOLS

EXISTING	PROPOSED	
□ ..... CATCH BASIN	□ CB	CATCH BASIN (GUTTER INLET)
	CBCI	CATCH BASIN WITH CURB INLET
(S) ..... SEWER MANHOLE		CURB (OR BERM)-TYPE NOTED
(D) ..... DRAIN MANHOLE		EDGE OF ROAD
(E) ..... ELECTRIC MANHOLE	●EHH	ELECTRIC HANDHOLE
MB ..... MAIL BOX	●EMH	ELECTRIC MANHOLE
..... GAS VALVE	●TMH	TELEPHONE MANHOLE
..... WATER VALVE	●WMH	WATER MANHOLE
VGC ..... VERTICAL GRANITE CURB	●SMH	SEWER MANHOLE
▭ ..... HAND HOLE	◉ DMH	DRAINAGE MANHOLE
15.00TC ..... TOP OF CURB	●GG	GAS GATE
14.00BC ..... BOTTOM OF CURB	◉WG	WATER GATE AND GATE BOX
14.50CL ..... CENTERLINE	●CS	CURB STOP
TT ..... TOP OF TRAP		HYDRANT
..... WROUGHT IRON FENCE		STREET LIGHT
..... UTILITY POLE		UTILITY POLE
		GUY POLE
		DRAIN PIPE
	S	SEWER MAIN
	UE	ELECTRIC DUCT
	G	GAS MAIN
	W	WATER MAIN

COMMONWEALTH OF MASSACHUSETTS
SAMUEL S. VARTIAN
REGISTERED PROFESSIONAL ENGINEER
1/10/2020

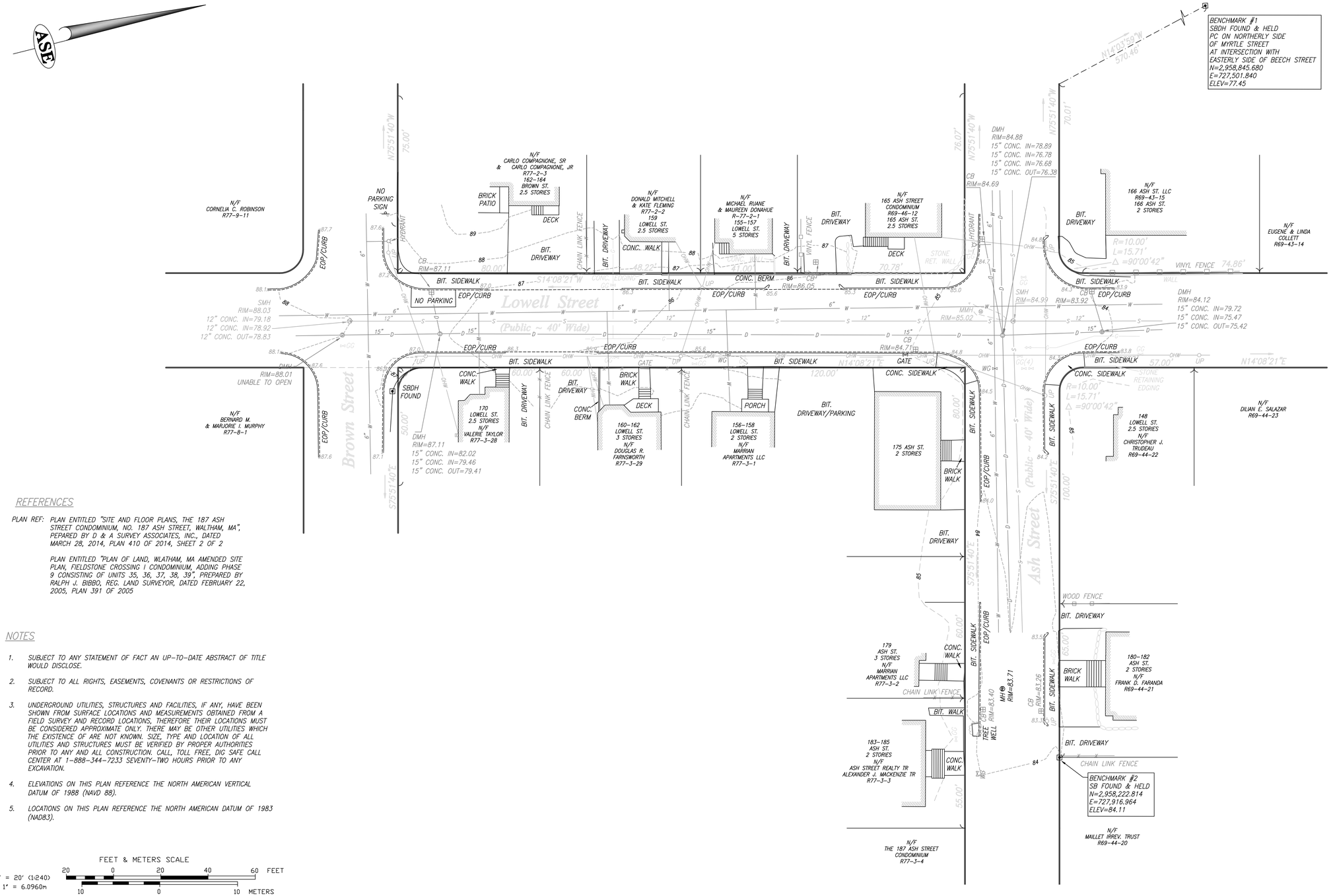
SSV ENGINEERING INC.
SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

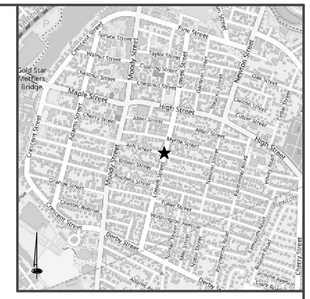
No.	Revision/Issue	Date
1	Review Comments	12/4/19

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS
LOWELL STREET & ASH STREET
WALTHAM, MA
GENERAL NOTES & LEGENDS

Project	Sheet
Date: NOV 2019	G-002
Scale	





LOCUS MAP
SCALE: 1" = 1,200'

LEGEND

SB	STONE BOUND
SBDH	STONE BOUND DRILL HOLE
EOP	EDGE OF PAVEMENT
84.3x	SPOT ELEVATION
CB	CATCH BASIN
DMH	DRAIN MANHOLE
—D—D—	DRAIN LINE
UP	UTILITY POLE
—OHW—	OVERHEAD WIRES
E	ELECTRIC METER
MH	MANHOLE
MMH	MEDIA MANHOLE
GG	GAS GATE
—G—G—	GAS PAINT
WG	WATER GATE
—W—W—	WATER LINE
SMH	SEWER MANHOLE
—S—S—	SEWER LINE
PC	POINT OF CURVATURE
R77-3-1	CITY OF WALTHAM MAP-BLOCK-LOT

REFERENCES

PLAN REF: PLAN ENTITLED "SITE AND FLOOR PLANS, THE 187 ASH STREET CONDOMINIUM, NO. 187 ASH STREET, WALTHAM, MA", PEPARED BY D & A SURVEY ASSOCIATES, INC., DATED MARCH 28, 2014, PLAN 410 OF 2014, SHEET 2 OF 2

PLAN ENTITLED "PLAN OF LAND, WLATHAM, MA AMENDED SITE PLAN, FIELDSTONE CROSSING I CONDOMINIUM, ADDING PHASE 9 CONSISTING OF UNITS 35, 36, 37, 38, 39", PREPARED BY RALPH J. BIBBO, REG. LAND SURVEYOR, DATED FEBRUARY 22, 2005, PLAN 391 OF 2005

NOTES

1. SUBJECT TO ANY STATEMENT OF FACT AN UP-TO-DATE ABSTRACT OF TITLE WOULD DISCLOSE.
2. SUBJECT TO ALL RIGHTS, EASEMENTS, COVENANTS OR RESTRICTIONS OF RECORD.
3. UNDERGROUND UTILITIES, STRUCTURES AND FACILITIES, IF ANY, HAVE BEEN SHOWN FROM SURFACE LOCATIONS AND MEASUREMENTS OBTAINED FROM A FIELD SURVEY AND RECORD LOCATIONS, THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHER UTILITIES WHICH THE EXISTENCE OF ARE NOT KNOWN. SIZE, TYPE AND LOCATION OF ALL UTILITIES AND STRUCTURES MUST BE VERIFIED BY PROPER AUTHORITIES PRIOR TO ANY AND ALL CONSTRUCTION. CALL, TOLL FREE, DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO ANY EXCAVATION.
4. ELEVATIONS ON THIS PLAN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. LOCATIONS ON THIS PLAN REFERENCE THE NORTH AMERICAN DATUM OF 1983 (NAD83).

FEET & METERS SCALE
1" = 20' (1:240)
1" = 6.0960m
20 0 20 40 60 FEET
10 0 10 METERS

C-100

ZONING DESIGNATION:
CITY OF WALTHAM ZONING DISTRICT
RESIDENCE B

I CERTIFY THAT THIS PLAN IS BASED ON A FIELD SURVEY PERFORMED ON THE GROUND ON SEPTEMBER 5, 2019, AND THE LATEST PLANS AND DEEDS OF RECORD.

I CERTIFY THAT THE PORTION OF ROADWAYS SHOWN HEREON LIES IN A ZONE "X", SHOWN ON MAP NUMBER 25017C0551E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

REVISIONS

DATE	DESCRIPTION

FIELD: MRI/BMD
CALCS: EJP/SMI
DRAWN BY: SMI
FIELD EDIT: N/A
CHECKED: EJP
APPROVED:
JOB #: 191743

PROFESSIONAL LAND SURVEYOR DATE

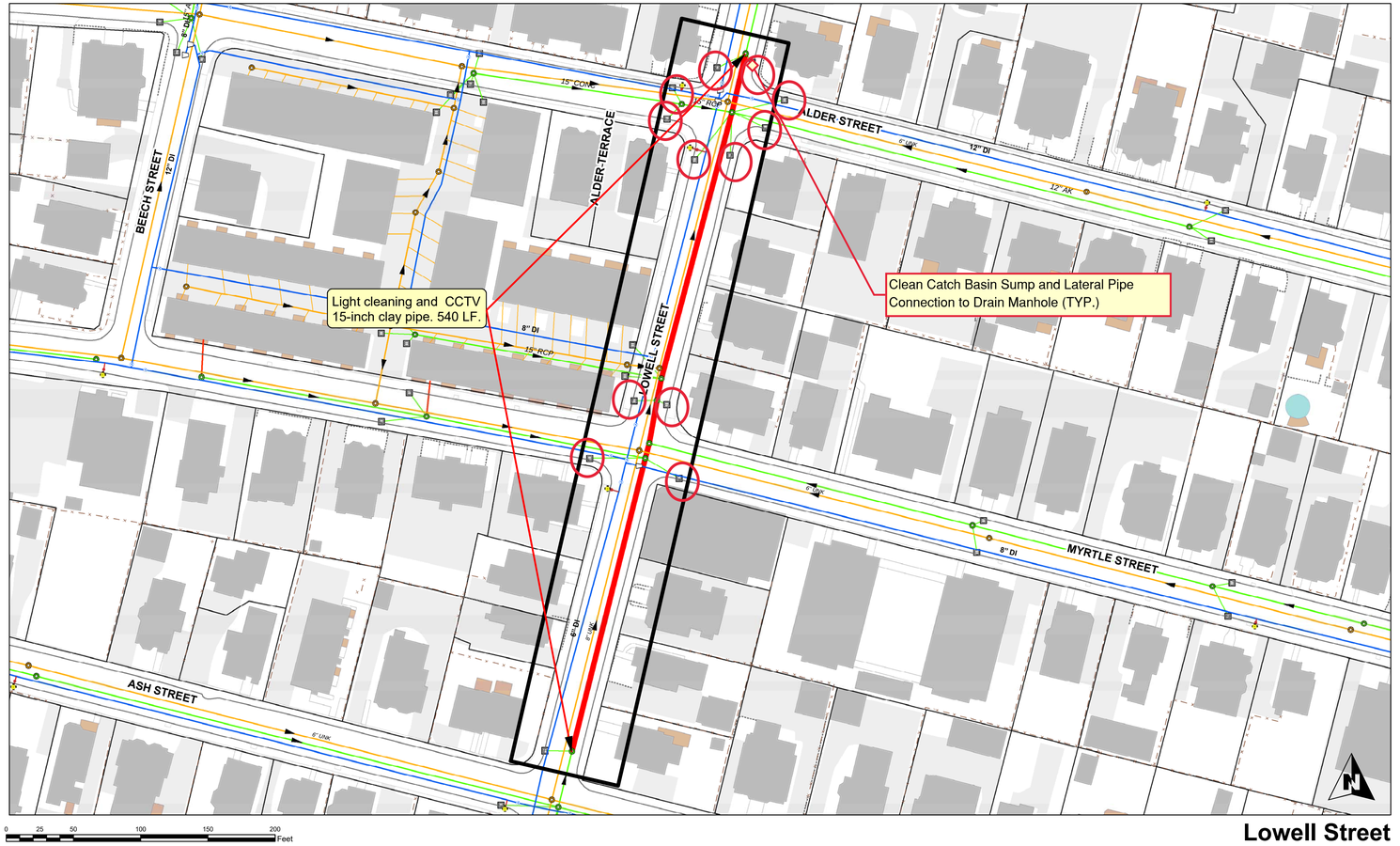
A.S. Elliott & Associates
Professional Land Surveyors
P.O. BOX 85 ~ HOPEDALE, MA 01747
(508) 634-0256
www.aselliott.com

Existing Conditions Plan of Land

LOWELL STREET, ASH STREET
WALTHAM, MASSACHUSETTS
PREPARED FOR: SAM BADE
SCALE: 1" = 20' DATE: SEPTEMBER 5, 2019

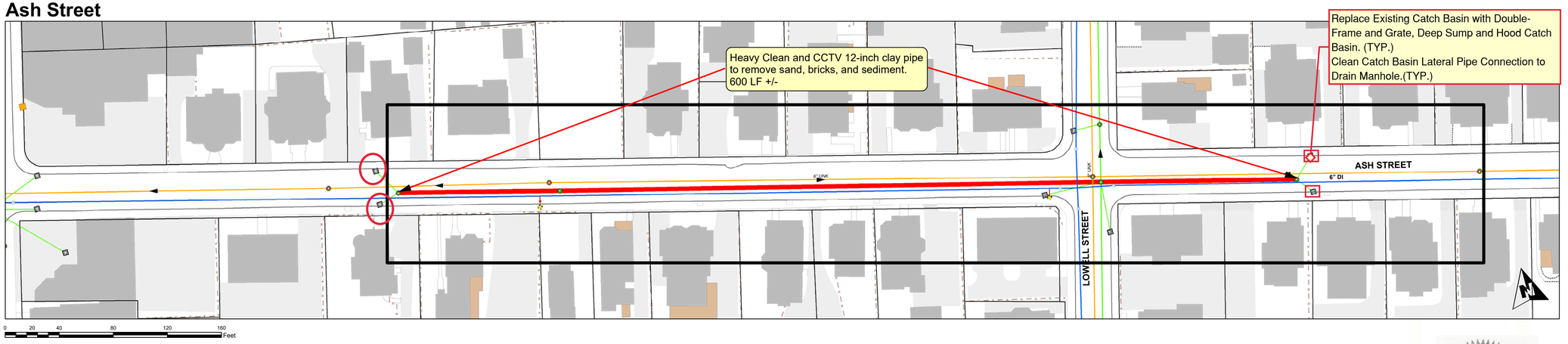
Legend

Hydrants	Fence	Parcel Lines
Gate Valve	Retaining Wall	Walkway/Sidewalk
Hydrant Gate	Edge of Pavement	Building Footprint
Hydrant Lateral	Catch Basins	Deck
Water Main	Drain Manholes	Paved Area
Grease Trap	Pipes to be cleaned	
Sewer Manhole	Catch Basin Lateral	
Sewer Main	Gravity	



Lowell Street

Ash Street



SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.	Revision/Issue	Date

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

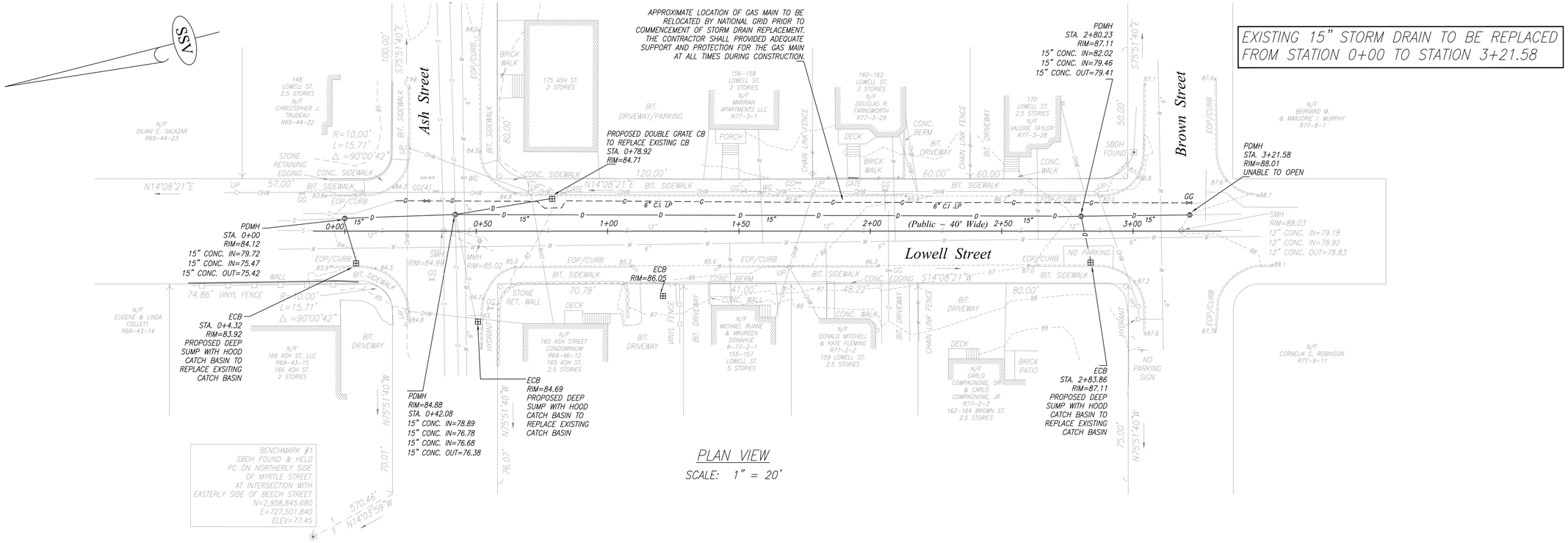
STORM DRAIN IMPROVEMENTS
LOWELL STREET & ASH STREET
WALTHAM, MA
PLAN

Project	Sheet
Date: NOV 2019	C-102
Scale	

COMMONWEALTH OF MASSACHUSETTS
JAMES P. SMITH
REGISTERED PROFESSIONAL ENGINEER
11/10/2020

Document Path: G:\Maps\Ash Street @ Lowell Street - Drainage Improvements - Panels.mxd

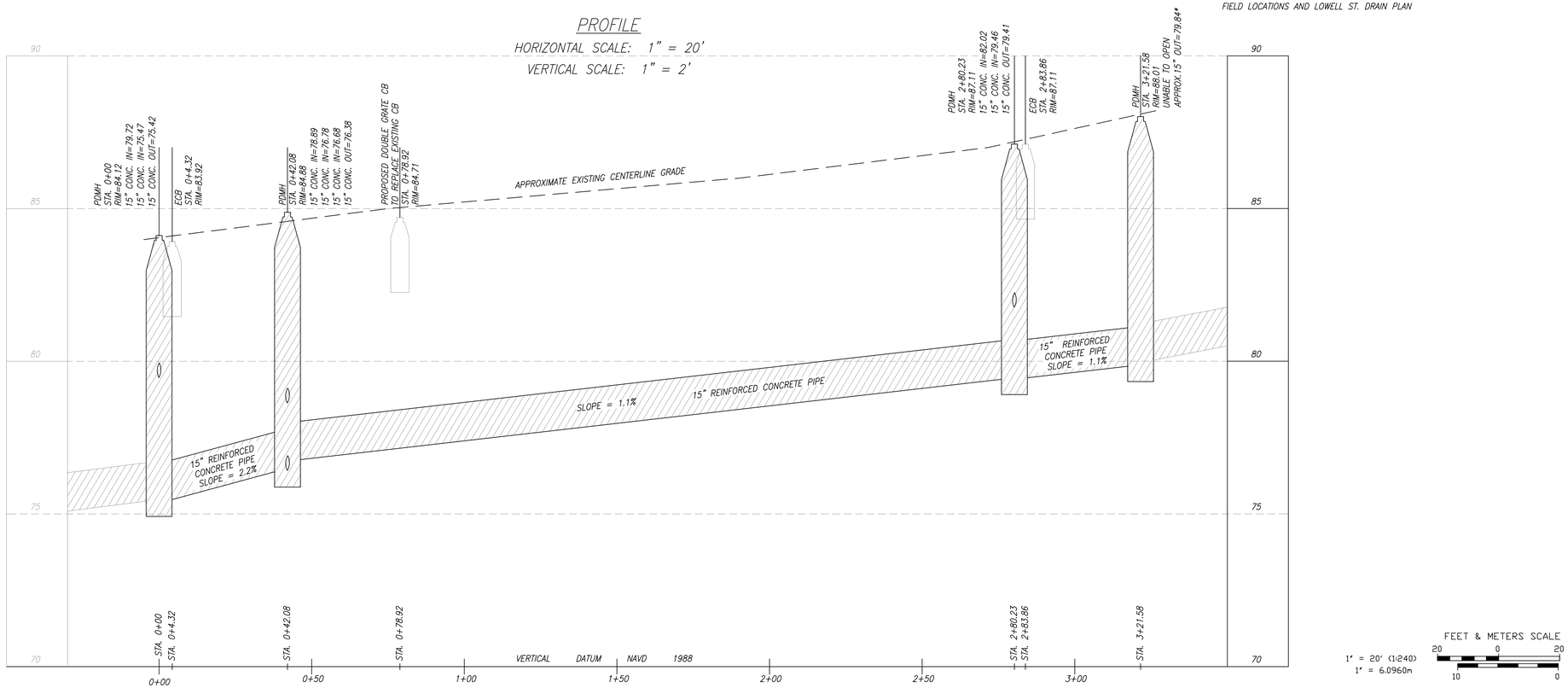
EXISTING 15" STORM DRAIN TO BE REPLACED FROM STATION 0+00 TO STATION 3+21.58



PLAN VIEW
SCALE: 1" = 20'

* APPROXIMATE INVERT DATA CALCULATED FROM FIELD LOCATIONS AND LOWELL ST. DRAIN PLAN

PROFILE
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 2'



FEET & METERS SCALE
1" = 20' (1:240)
1" = 6.0960m
20 0 20
10 0

SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.	Revision/Issue	Date
1	ADD NOTES	12/11/19

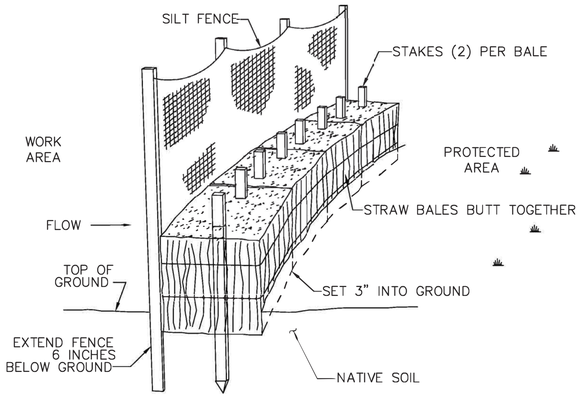
ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS

WALTHAM, MASSACHUSETTS

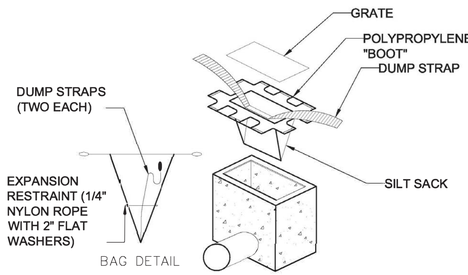
PLAN AND PROFILE

Project	Sheet
Date	
Scale 1" = 20'	



SEDIMENTATION CONTROL BARRIER

NOT TO SCALE



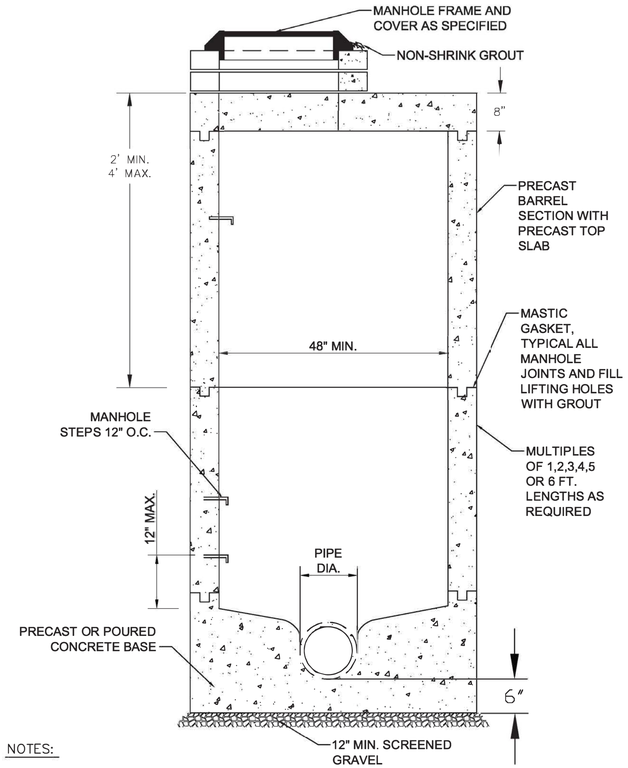
INSTALLATION DETAIL

NOTES:

1. TEMPORARY INLET SEDIMENT FILTER TO BE INSTALLED ON ALL CATCH BASINS OR STORM INLETS WITHIN THE PROJECT LIMITS.
2. INLET FILTER TO BE SIMILAR TO "STREAMGUARD" AS MANUFACTURED BY STORMWATER SERVICES CORPORATION (206–767–0441), "SILTSACK" AS MANUFACTURED BY GEO–SYNTHETICS, LLC (800–444–5523), OR "SILTSACK" AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS, INC. (800–448–3636).
3. INSPECT FILTER REGULARLY AND CLEAN AS NEEDED.

INLET PROTECTION DETAIL

NOT TO SCALE

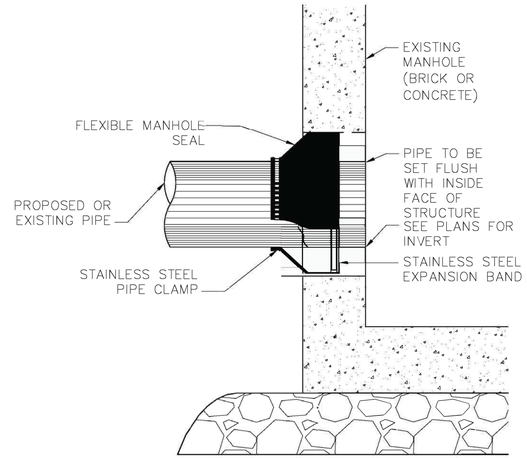


NOTES:

1. FLAT TOP MANHOLE IS REQUIRED WHEN THE CONNECTING PIPE HAS LESS THAN 3 FEET OF COVER.
2. FOR MANHOLES WITH DIAMETERS GREATER THAN 4' THE WALL AND BASE THICKNESS SHALL BE PER PRECAST MANUFACTURER'S STANDARD STRUCTURE FOR THE INDICATED DIAMETER. IN ADDITION THE MANUFACTURER'S STANDARD REDUCER SECTION FOR EACH DIAMETER SHALL BE USED WHERE REQUIRED TO MEET 4' DIAMETER ECCENTRIC CONE.
3. PROVIDE RESILIENT CONNECTOR WHERE PIPE ENTERS MANHOLE.
4. DESIGN LIVE LOAD HS20–44.

DRAIN MANHOLE - FLAT TOP

NOT TO SCALE



NOTES:

1. ALL METAL FIXTURES SHALL BE STAINLESS STEEL.
2. SERVICE LINE SHALL BE FLUSH WITH THE INSIDE OF THE MANHOLE.
3. FOR MANHOLE INSTALLATION AT EXISTING PIPE, CONTRACTOR SHALL EXTEND PIPE INTO NEW MANHOLE USING A SPOOL PIECE (OF SAME PIPE MATERIAL) WITH FERNCO COUPLES.

CONNECTION TO MANHOLE

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
JOHN H. SMITH
REGISTERED PROFESSIONAL ENGINEER
1/10/2020

SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.		Date

INCORPORATED A TOWN 1738 · WALTHAM · INCORPORATED A CITY 1884

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS

LOWELL STREET & ASH STREET
WALTHAM MA
DETAILS

Project	Sheet
Date: OCT 2019	C-501
Scale	

PHASE 1 DETOUR ROUTE

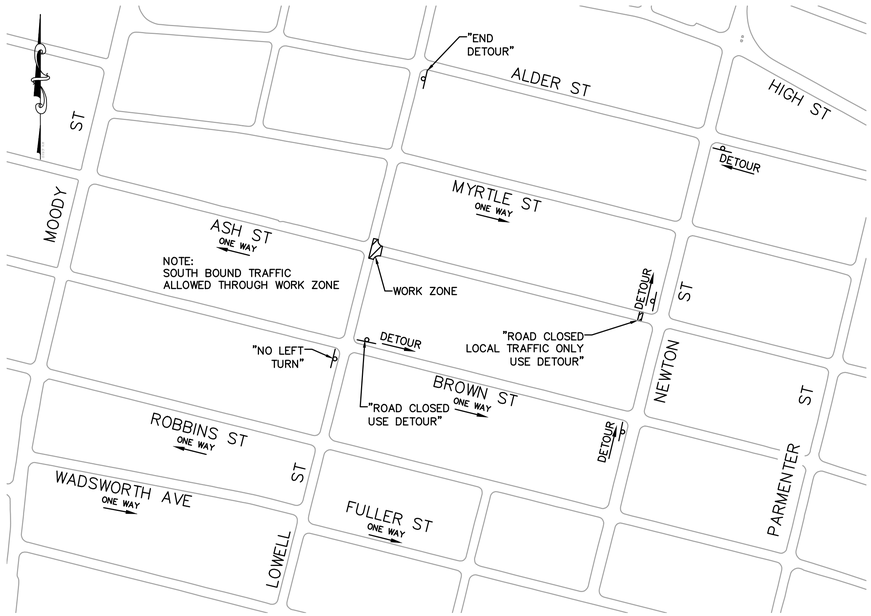
N.T.S.

PHASE 2 DETOUR ROUTE

N.T.S.

GENERAL TRAFFIC DETOUR NOTES:

1. WORK HOURS SHALL BE LIMITED BETWEEN 7:30AM AND 4:30PM OVER THE ENTIRE PROJECT AREA UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE CITY.
2. ALL TRENCHES AND OPEN CUTS SHALL BE MADE PASSABLE BY THE END OF EACH WORKDAY.
3. DETOUR ROUTES SHOWN WITHIN THESE PLANS ARE FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO SUBMIT A TRAFFIC MANAGEMENT PLAN (TMP) FOR APPROVAL AT THE PRE-CONSTRUCTION MEETING.
4. CONTRACTOR TO INSTALL TEMPORARY CONSTRUCTION SIGNS PRIOR TO THE IMPLEMENTATION OF ANY ALTERATIONS IN NORMAL TRAFFIC PATTERNS.
5. SIGNS SHALL BE COVERED OR BAGGED AT THE END OF EACH WORKDAY WHEN NOT IN USE. ALL SIGNS SHALL BE REMOVED ONCE NO LONGER APPLICABLE.
6. SIGNS SHALL BE INSTALLED IN SUCH A MANNER AS TO NOT BLOCK OR IMPEDE PEDESTRIAN TRAFFIC ALONG SIDEWALKS OR OTHER WALKWAYS.
7. CONTRACTOR SHALL SEQUENCE ALL WORK AS TO MAINTAIN SIMILAR TRAFFIC PATTERN ALTERATIONS FROM DAY TO DAY. WORK SHALL BE DONE IN SEGMENTS TO MINIMIZE THE CHANGES IN TRAFFIC PATTERN ALTERATIONS. CONTRACTOR IS TO SUBMIT PROPOSED SEQUENCE OF WORK AT THE PRE-CONSTRUCTION MEETING FOR APPROVAL.
8. ALL CONSTRUCTION SIGNS ARE TO BE MADE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, MUTCD. HAND PAINTED OR MARKED SIGNS WILL BE REJECTED.
9. DETOUR ARROWS DEPICTED ON THESE DRAWINGS INDICATE THE DIRECTION OF TRAFFIC FLOW. DETOUR SIGNS FURNISHED AND INSTALLED SHALL DIRECT TRAFFIC IN THE PROPER DIRECTION.
10. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING PROPER DETOUR SIGNS FOR USE IN DIRECTING TRAFFIC IN THE INTENDED DIRECTION. SIGNS SHALL NOT BE FLIPPED OR ROTATED TO CHANGE THE SIGNS DIRECTION. THE "DETOUR" TEXT SHALL BE ORIENTED IN A READABLE FASHION WHILE THE ARROW IS IN THE PROPER DIRECTION.
11. SIGNS SHALL BE AFFIXED TO A PERMANENT OR SEMI-PERMANENT BASE THAT IS RESISTANT TO TIPPING AND / OR MOVEMENT IN GENERAL. THE USE OF TRAFFIC CONES TO SUPPORT SIGNS WILL NOT BE PERMITTED.
12. SIGNS THAT ARE, IN THE OPINION OF THE ENGINEER, IN POOR CONDITION SHALL BE PROMPTLY REMOVED FROM THE JOB SITE AND REPLACED WITH A SIGN IN GOOD CONDITION BY THE CONTRACTOR.



PHASE 3 DETOUR ROUTE

N.T.S.

SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:			
DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV

DATE: 12/31/2019
SCALE: N.T.S.
FILE: ASH&LOWELL

T-101 DETOUR ROUTES

TRAFFIC MANAGEMENT NOTES:

GENERAL:

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE MHD STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TRAFFIC MANAGEMENT PLANS.
2. THE TRAFFIC MANAGEMENT PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D. AND AS APPROVED OR REQUIRED BY THE CITY. THE CONTRACTOR SHALL SUBMIT ALTERNATE TRAFFIC CONTROL PLANS FOR APPROVAL WHEN NECESSARY.
3. WORK WITHIN THE TRAVELED WAY SHALL BE DETERMINED DURING THE PRE-CONSTRUCTION MEETING.
4. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
5. TEMPORARY CONSTRUCTION SIGNING, BARRICADES AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
6. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
7. CONTRACTOR SHALL MAINTAIN ABUTTER ACCESS AT ALL TIMES EXCEPT FOR VERY SHORT PERIODS APPROVED BY THE TOWN. CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
8. THE FIRST THREE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
9. THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE AS SHOWN ON THESE PLANS OR AS DETERMINED BY THE ENGINEER.
10. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
11. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
12. MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER. ONE (1) THROUGH TRAVEL LANE HAVING A MINIMUM WIDTH OF 11 FEET MAY BE PROVIDED FOR BOTH DIRECTIONS(LANE TO BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE IN SOME SITUATIONS UNDER POLICE CONTROL) EXCEPT WHERE ROAD CLOSURE IS SHOWN ON THE DRAWINGS OR OTHERWISE PERMITTED BY ENGINEER.
13. LANE RESTRICTIONS MAY NOT REMAIN DURING NON-WORKING HOURS. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS.
14. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
15. IF APPROVED BY OWNER & AGENCY WITH JURISDICTION, NIGHT WORK OPERATIONS SHALL INCLUDE PROPERLY LIT & PLACED LUMINAIRES MEETING THE REQUIREMENTS OF THE MUTCD AND MASSDOT.
16. ALL TRAFFIC MANAGEMENT SETUPS SHOULD ACCOMMODATE LARGE VEHICLES (WB-50) UNLESS A TRUCK EXCLUSION IS PRESENT.
17. ALL WORK ZONE AREAS SHOULD BE PROTECTED APPROPRIATELY. ALL EXPOSED WORK ZONES SHOULD BE STEEL PLATED OR BACK FILLED WHEN NO WORK IS UNDERWAY/PERFORMED AND APPROPRIATELY SIGNED.

GRADE DIFFERENCES:

1. WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN THE EXISTING PAVEMENT AND COLD PLANED OR NEW PAVEMENT, THE CONTRACTOR SHALL PATCH A TEMPORARY HOT MIX ASPHALT WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.
2. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.
3. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.
4. A MINIMUM SLOPE OF 4:1 MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, NEXT SHEET). A MINIMUM SLOPE OF 8:1 MUST BE MAINTAINED ON ALL ABUTTED ACCESS DRIVES AND A MINIMUM SLOPE OF 12:1 MUST BE MAINTAINED ON ALL SIDEWALKS.

CONSTRUCTION SIGNING:

1. THE FIRST CONSTRUCTION SIGN IN A SERIES ON EACH APPROACH TO THE PROJECT SHALL BE FLUORESCENT ORANGE, HIGH PERFORMANCE (OR HIGH DENSITY) SHEETING.
2. ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED AND SHALL CONFORM TO THE MUTCD.
3. EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS REQUIRED BY THE TOWN.
4. ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.
5. IF USED, W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY LANE RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT IN ACCORDANCE WITH NOTE ABOVE.
6. USE W20-8 SIGNS ONLY WHILE POLICE ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH WORK DAY.
7. SIGNS MUST BE PROFESSIONALLY LETTERED. NO HANDWRITTEN/PAINTED SIGNS SHALL BE ALLOWED.
8. WHERE LANE SHIFTS, WORK ZONES, OR OTHER CONSTRUCTION ACTIVITIES INFRINGE UPON ON-STREET PARKING AREAS, THE CONTRACTOR SHALL INSTALL TEMPORARY 'NO PARKING/TOW AWAY ZONE' SIGNS (R8-3/R7-201) AS APPROPRIATE AT LEAST 24 HOURS IN ADVANCE. THE R8-3/R7-201 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY UNLESS PARKING RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT AS REQUIRED BY THE TOWN.

PAVEMENT MARKINGS:

1. PAVEMENT MARKINGS WHICH ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TRAFFIC MANAGEMENT PLANS AND AS REQUIRED BY THE TOWN.
2. ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT TAPE, AS REQUIRED BY THE TOWN. FOR THE FULL DURATION OF THE PHASE IN PROGRESS. TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

FORMULAS FOR DETERMINING TAPER LENGTHS

Speed Limit (S)	Taper Length (L) Feet
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR MORE	$L = WS$

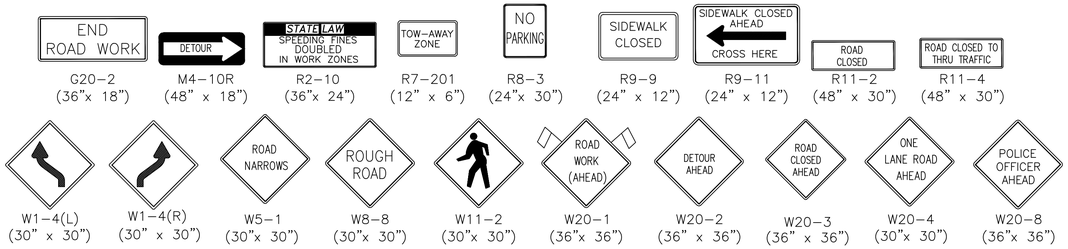
WHERE: L = TAPER LENGTH IN FEET (METERS)

W = WIDTH OF OFFSET IN FEET (METERS)

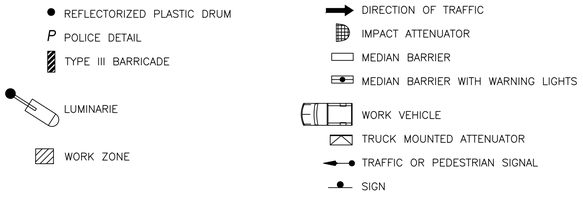
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 2003 MUTCD

SIGN LEGEND:



LEGEND:



TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

Type of Taper	Taper Length (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	100 FT MAXIMUM
DOWNSTREAM TAPER	100 FT PER LANE

Source: Table 6C-3 2003 MUTCD

SUGGESTED WORK ZONE WARNING SIGN SPACING

Road Type	Distance Between Signs**		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350	350	350
MOST OTHER ROADWAYS*	500	500	500
FREEWAYS AND EXPRESSWAYS*	1,000	1,500	2,640

* SPEED CATEGORY TO BE DETERMINED BY MASSDOT.

** DISTANCES ARE SHOWN IN FEET. THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/ TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS REFERRED TO AS THE INITIAL ADVANCE WARNING SIGN ON THE TMP SETUPS. IT IS THE ONE WHICH MAY OFTEN HAVE THE "STANDARD RED OR RED-ORANGE FLAGS (16 in. X 16 in.)" MOUNTED ON IT. THESE INITIAL ADVANCE WARNING SIGNS ARE LOCATED AT THE PROJECT LIMITS ON ALL APPROACHES (i.e. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10 SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS.

R2-10, W20-1 AND G20-2 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

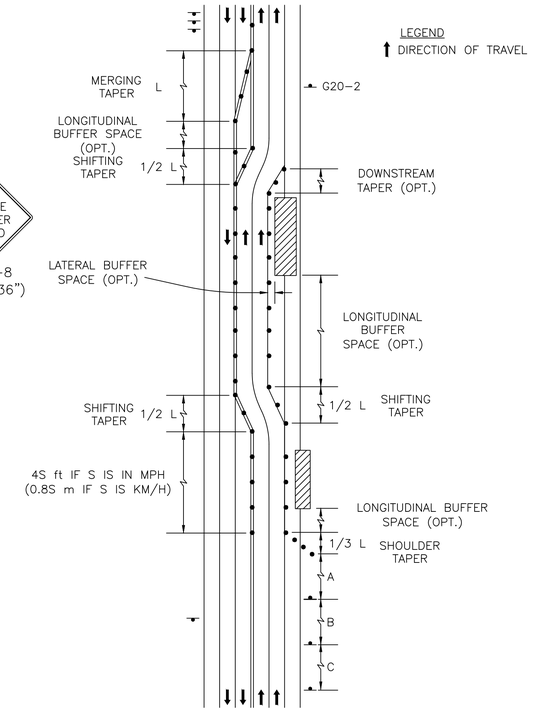
SPEED* (mph)	DISTANCE (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

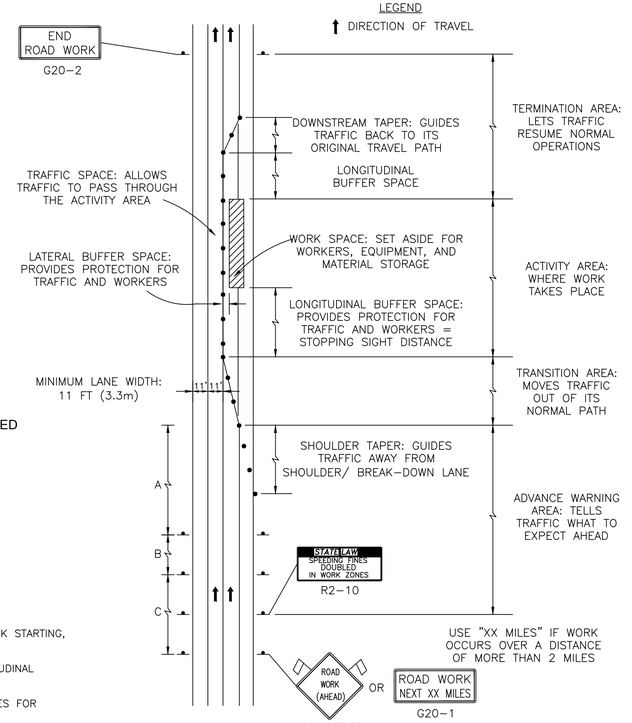
THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 2003 MUTCD



TYPES OF TAPERS AND BUFFER SPACES

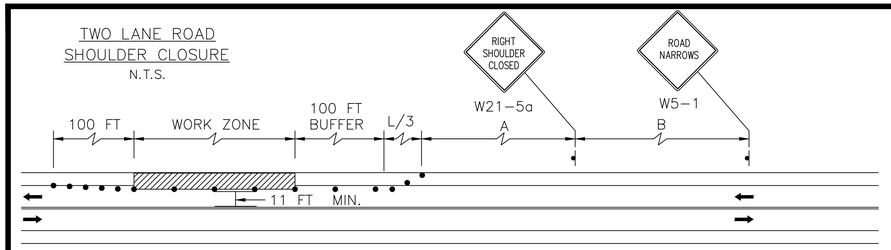


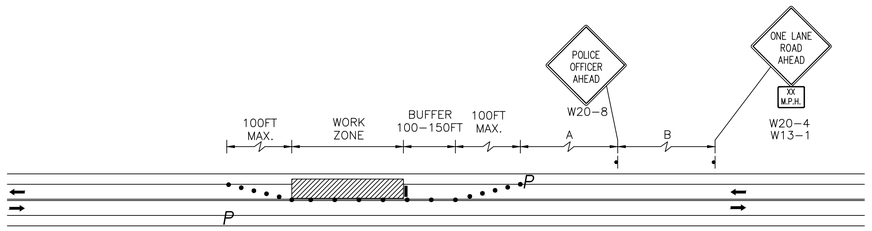
COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL ZONE

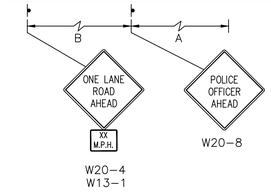
SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:	DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV
	DATE: 12/31/2019	SCALE: N.T.S.	FILE: ASH&LOWELL	**T-102 TRAFFIC DETAILS I**

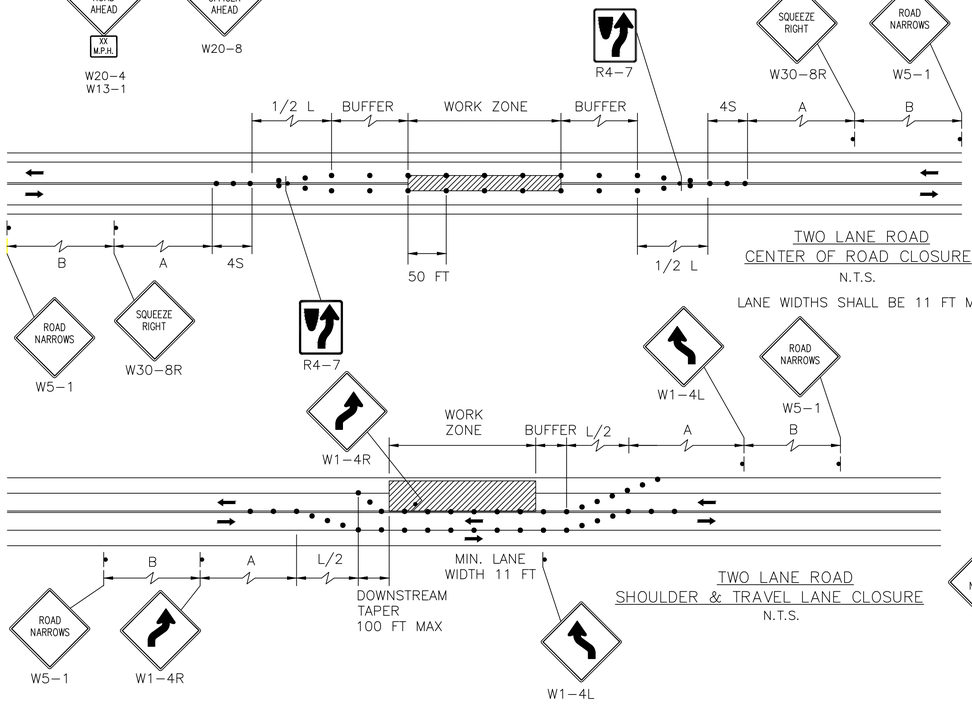
TWO LANE ROAD SHOULDER CLOSURE
N.T.S.







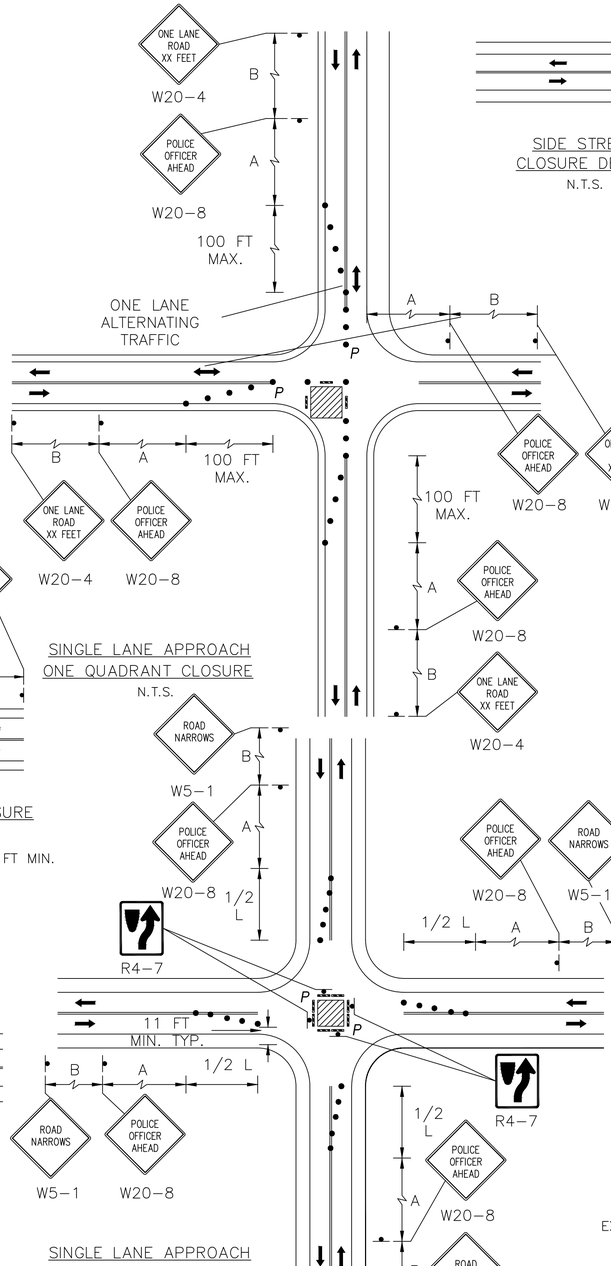
TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC WITH POLICE DETAIL
N.T.S.



TWO LANE ROAD SHOULDER & TRAVEL LANE CLOSURE
N.T.S.

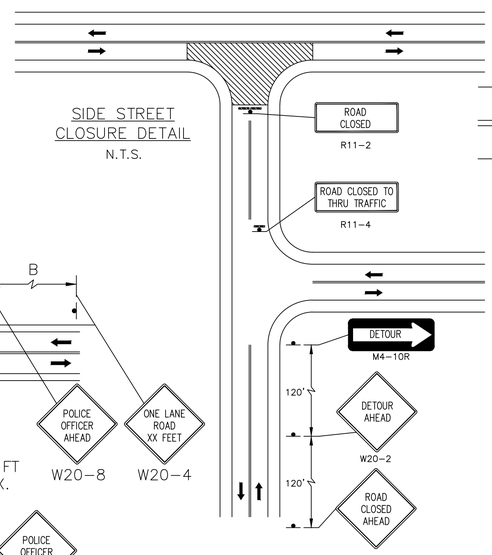
TWO LANE ROAD CENTER OF ROAD CLOSURE
N.T.S.

LANE WIDTHS SHALL BE 11 FT MIN.

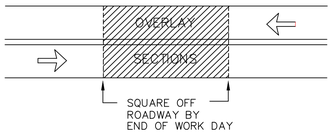


SINGLE LANE APPROACH ONE QUADRANT CLOSURE
N.T.S.

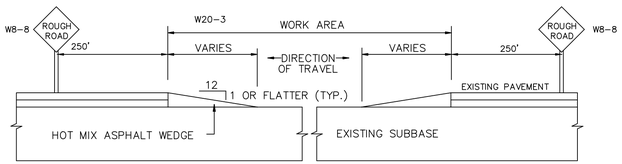
SINGLE LANE APPROACH CENTER CLOSURE
N.T.S.



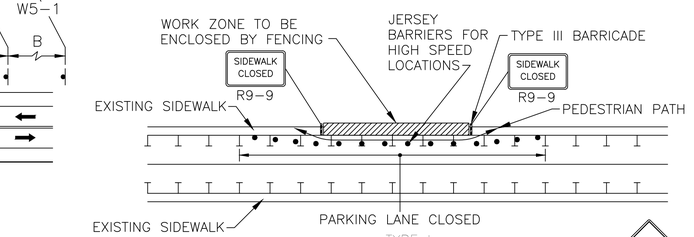
SIDE STREET CLOSURE DETAIL
N.T.S.



AFTER WORK HOURS TREATMENT FOR AREAS RECEIVING OVERLAY
N.T.S.



TEMPORARY RAMP
N.T.S.



PEDESTRIAN BYPASS
N.T.S.

NOTES

1. ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
2. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE TOWN.
5. BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE TOWN.

GUIDELINE FOR CHANNELIZATION

TAPER LENGTH (ft.)	MINIMUM NUMBER OF CHANNELIZING DEVICES NEEDED								
	20 MPH			35 MPH			45 MPH		
	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA
100	5	3		5	3		5	3	
150	8	4		6	3		6	3	
200	10	5	ONE	7	4	ONE	6	4	ONE
250	12	6		9	5		7	4	
300	15	7	DRUM	10	5	DRUM	8	4	DRUM
350	18	9		11	6		9	5	
400	20	10	EVERY	13	7	EVERY	10	6	EVERY
450	22	11	20'	14	7	35'	11	6	45'
500	25	12		16	8		13	7	
550	27	13	(MAX.)	17	8	(MAX.)	14	7	(MAX.)
600	30	15		19	10		15	9	
650	32	16		20	10		16	9	

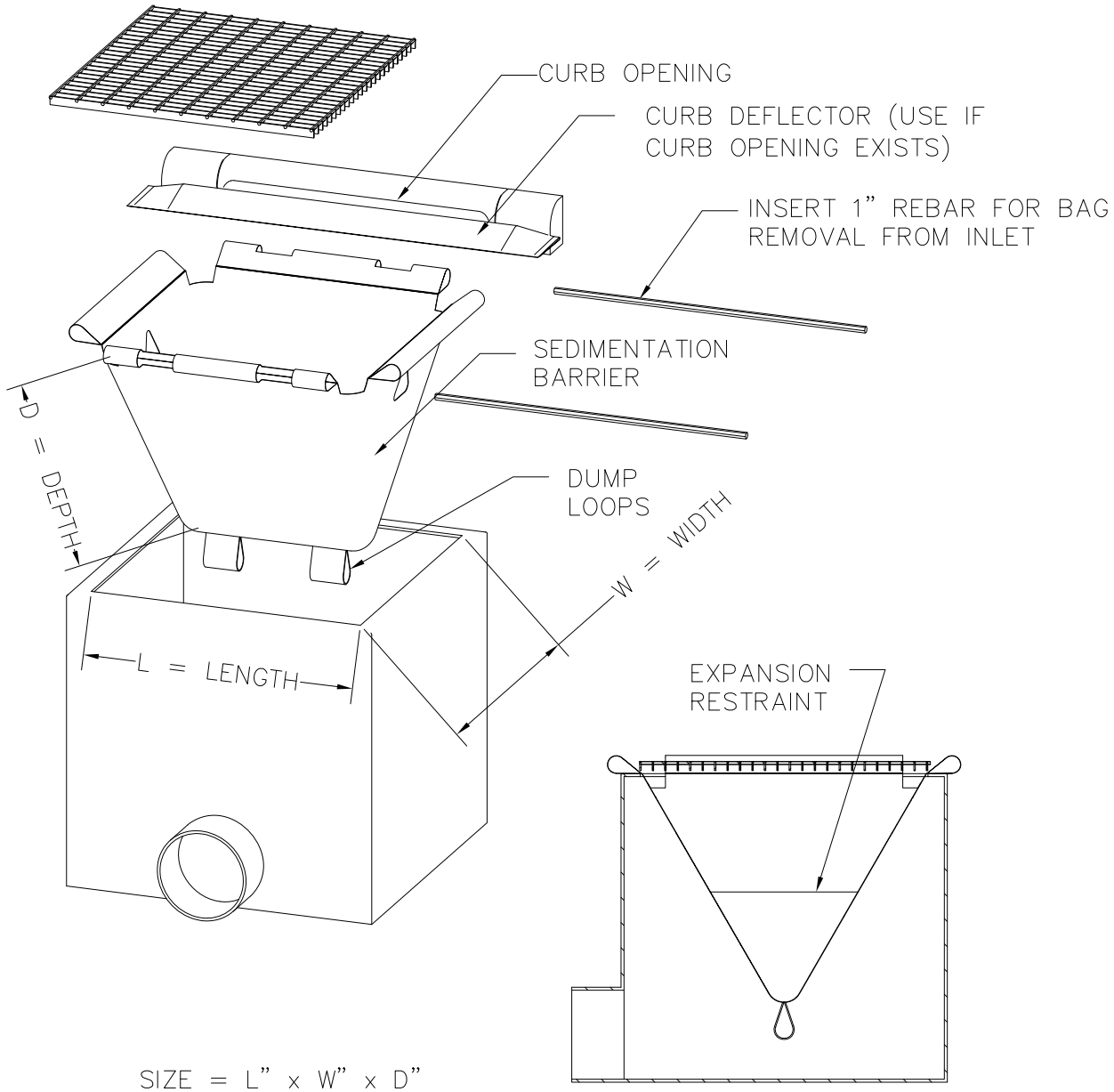
NOTE: MINIMUM SPACING OF DRUMS MAY VARY AND SHALL BE DETERMINED IN THE FIELD.

SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:			
DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV
DATE: 12/31/2019	SCALE: N.T.S.	FILE: ASH&LOWELL	**T-103 TRAFFIC DETAILS II**

ATTACHMENT B

Construction Standard Details



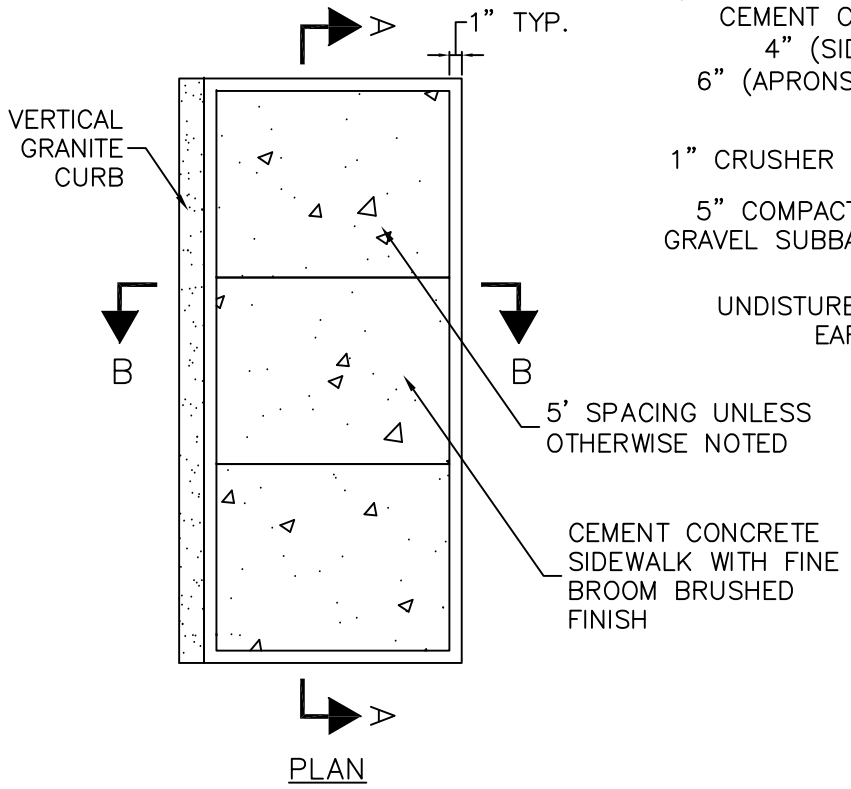
SIZE = L" x W" x D"

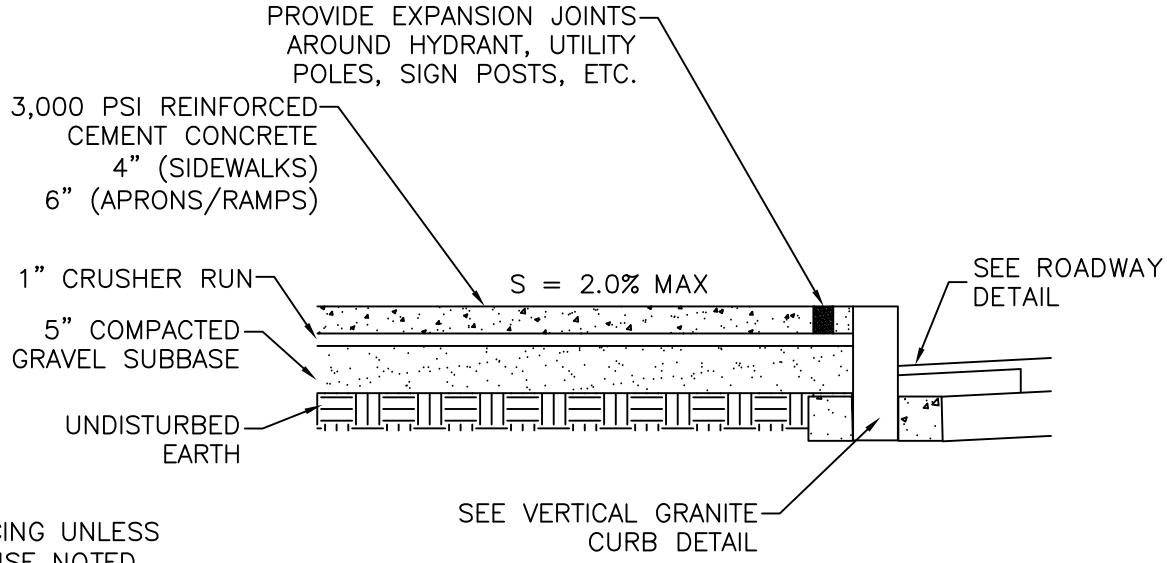
SEDIMENTATION BARRIER SHALL BE MANUFACTURED TO FIT THE OPENING OF THE CATCH BASIN OR DROP INLET. SEDIMENTATION BARRIER SHALL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE GEOTEXTILE WITH AN ALLOWABLE FLOW RATE OF 50 GPM/SF

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

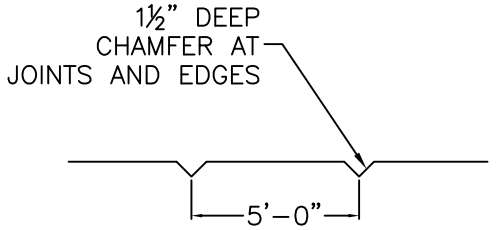
STANDARD DETAILS	Sheet No. 110.001
SEDIMENTATION BARRIER	Scale NTS
110.000	

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg





SECTION B–B

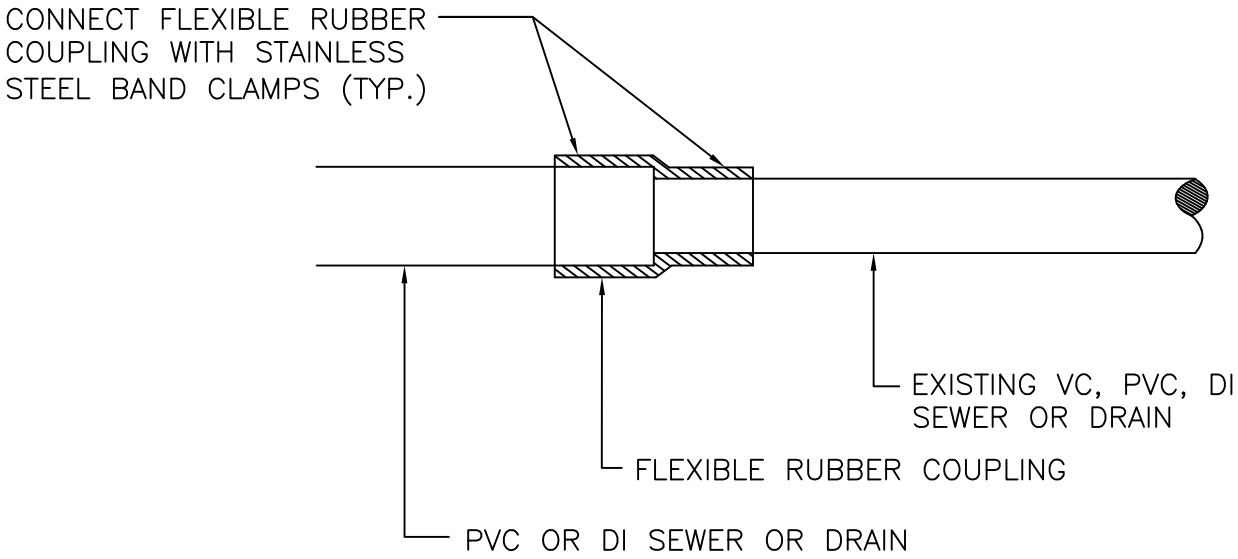


SECTION A–A

SIDEWALK NOTES:
1. NEW SIDEWALKS SHALL MATCH WIDTH OF EXISTING SIDEWALK UNLESS OTHERWISE NOTED.
2. SIDEWALK MATERIAL TO MATCH EXISTING SIDEWALK. FOR EXISTING ASPHALT SIDEWALK, SUBSTITUTE 4" CONCRETE.
3. SIDEWALKS TO BE BUILT ACCORDING TO ADA AND MA AAB REGULATIONS, 2.0% MAX (0% TOLERANCE) CROSS SLOPE.
4. SEE CONSTRUCTION PLANS AND GRADING PLANS FOR SIDEWALK WIDTHS AND GRADES.

CONCRETE SIDEWALK DETAIL

	FIGURE NAME: 701.000 – 4"&6" CEMENT CONCRETE SIDEWALK	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



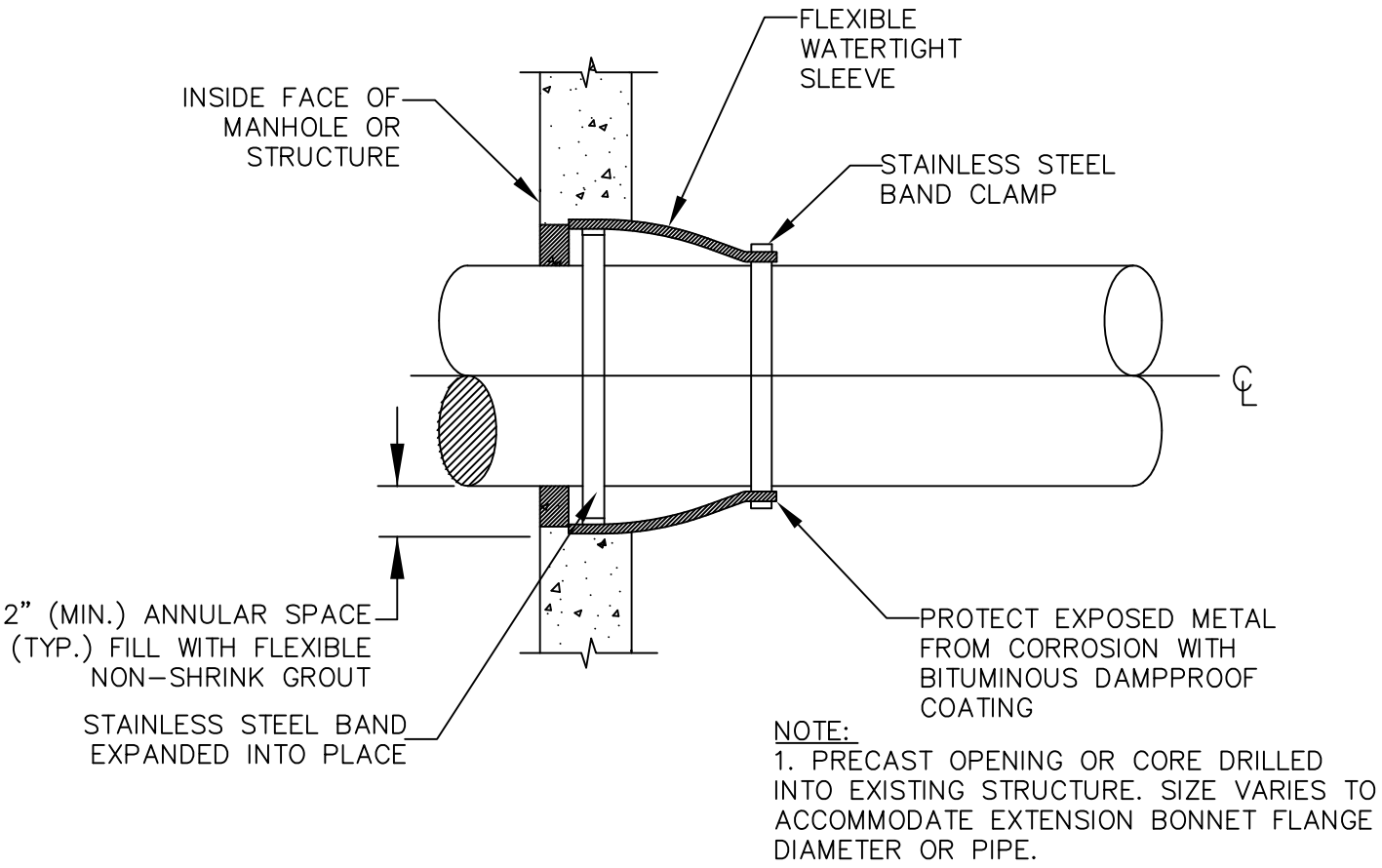
NOTES:

1. GRAVITY LATERAL PIPES (SEWERS OR DRAINS)
2. SEE SPECIFICATIONS FOR MATERIALS AND REQUIREMENTS.

PIPE FIELD CLOSURE (FLEXIBLE RUBBER COUPLING) DETAIL

FOR NON-PRESSURE PIPES OF DIFFERENT MATERIALS OR SIZES

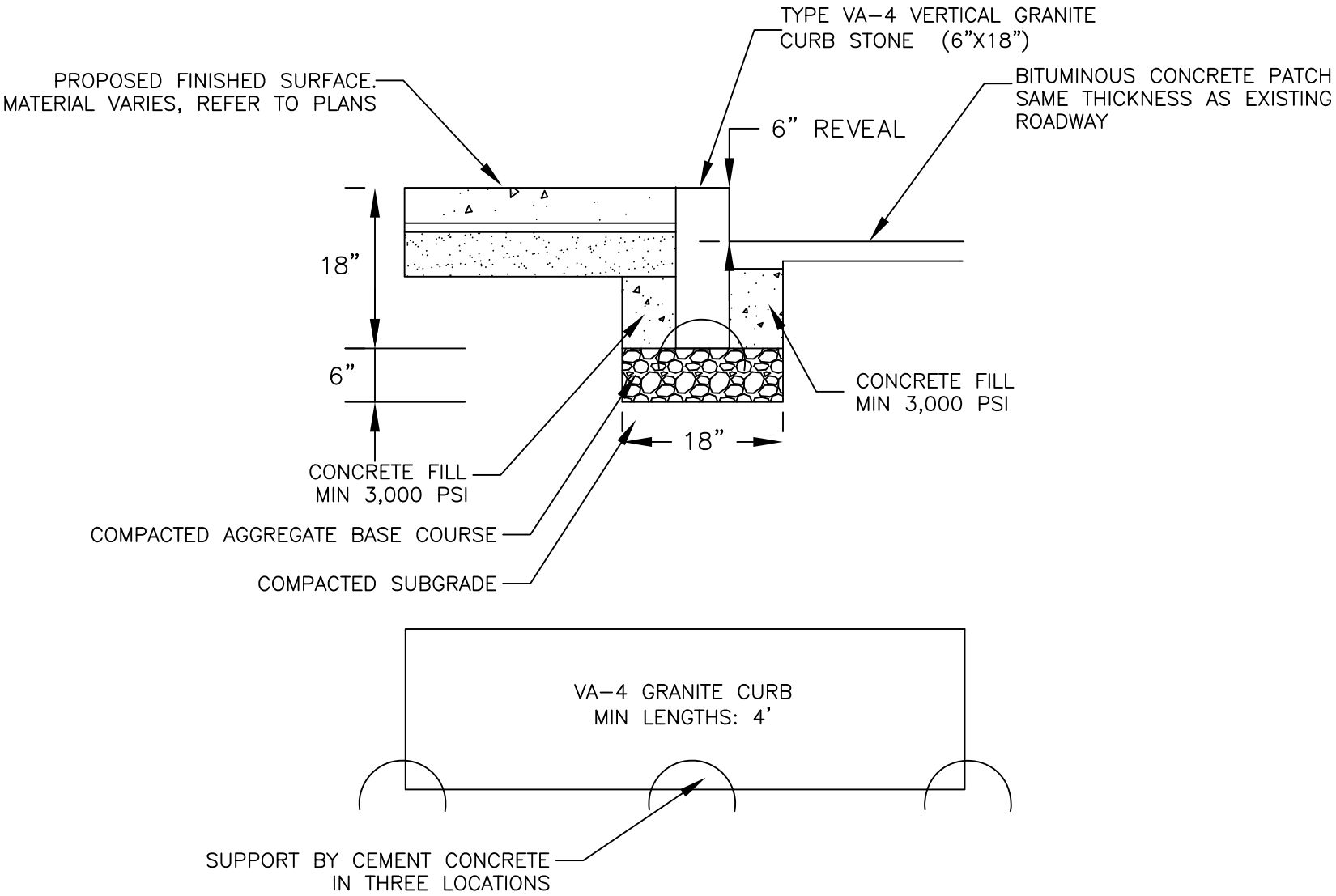
	FIGURE NAME: 999.100 – FERNCO CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



NOTE:
1. PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.

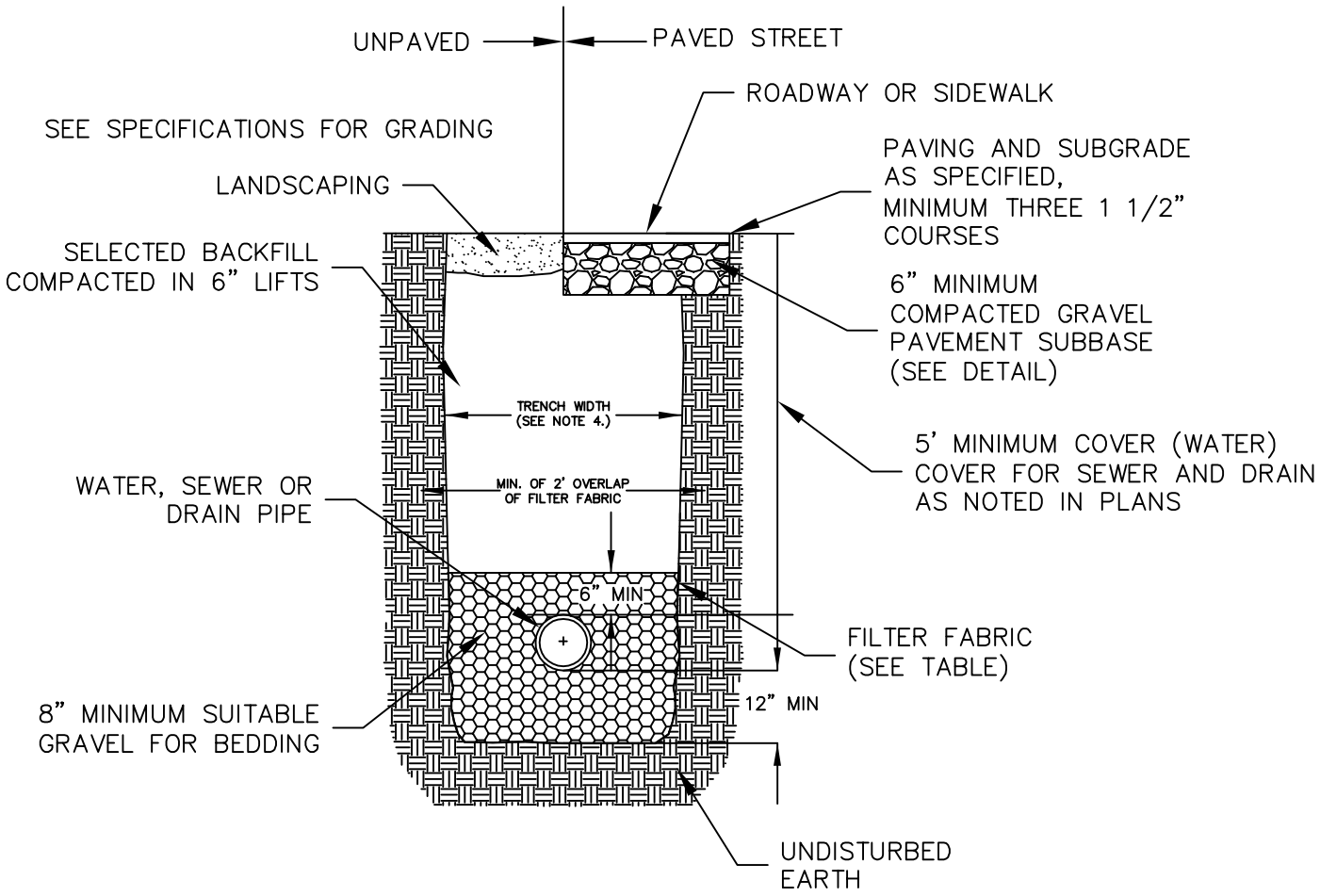
FLEXIBLE SLEEVE CONNECTION DETAIL

	FIGURE NAME: 202.000.A – FLEXIBLE SLEEVE CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TYPICAL VERTICAL GRANITE CURB DETAIL

	FIGURE NAME: 504.000 – TYPICAL VERTICAL GRANITE CURB DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:

   LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET

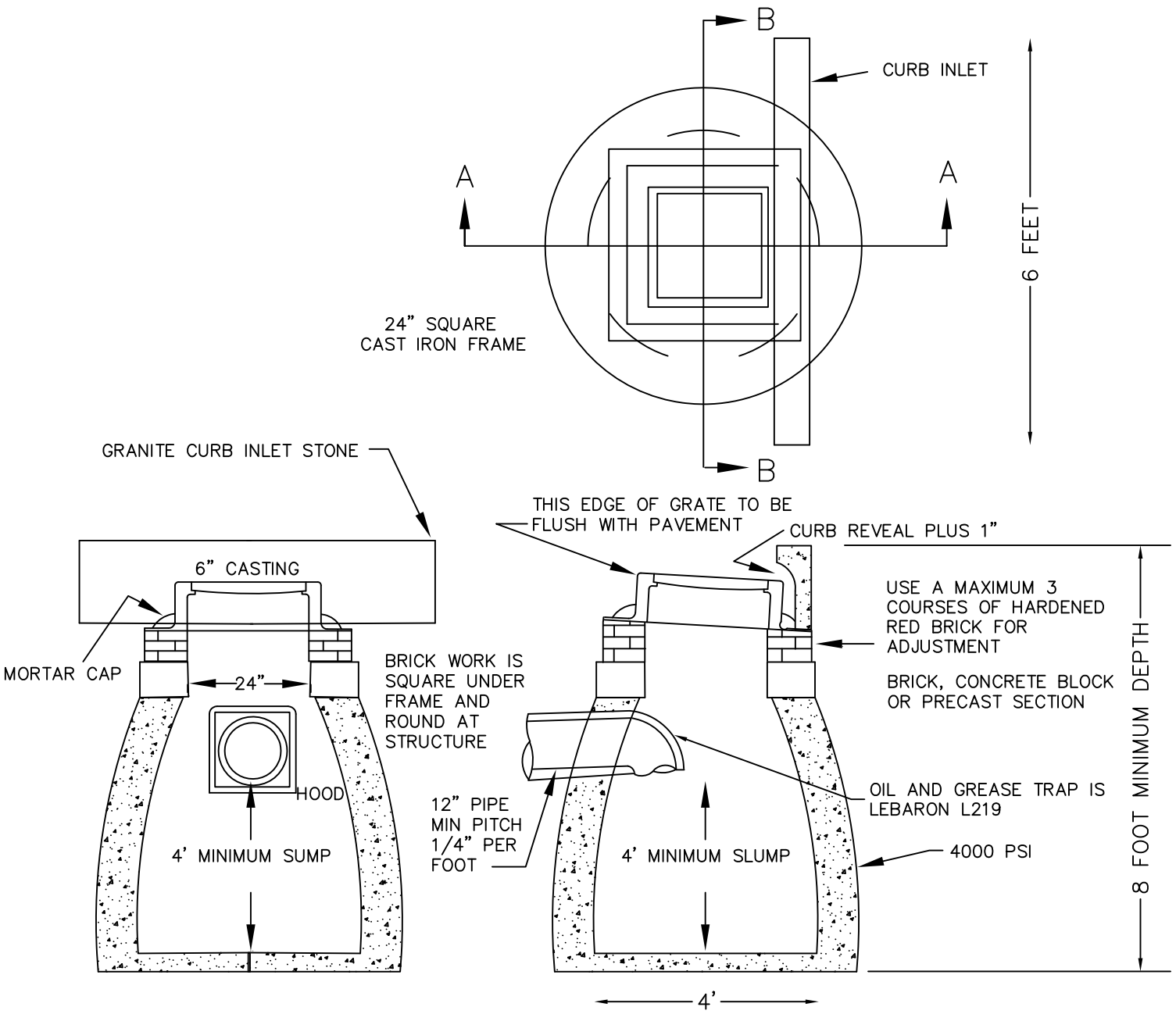
   EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL

	FIGURE NAME: 141.000.A – TRENCH DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



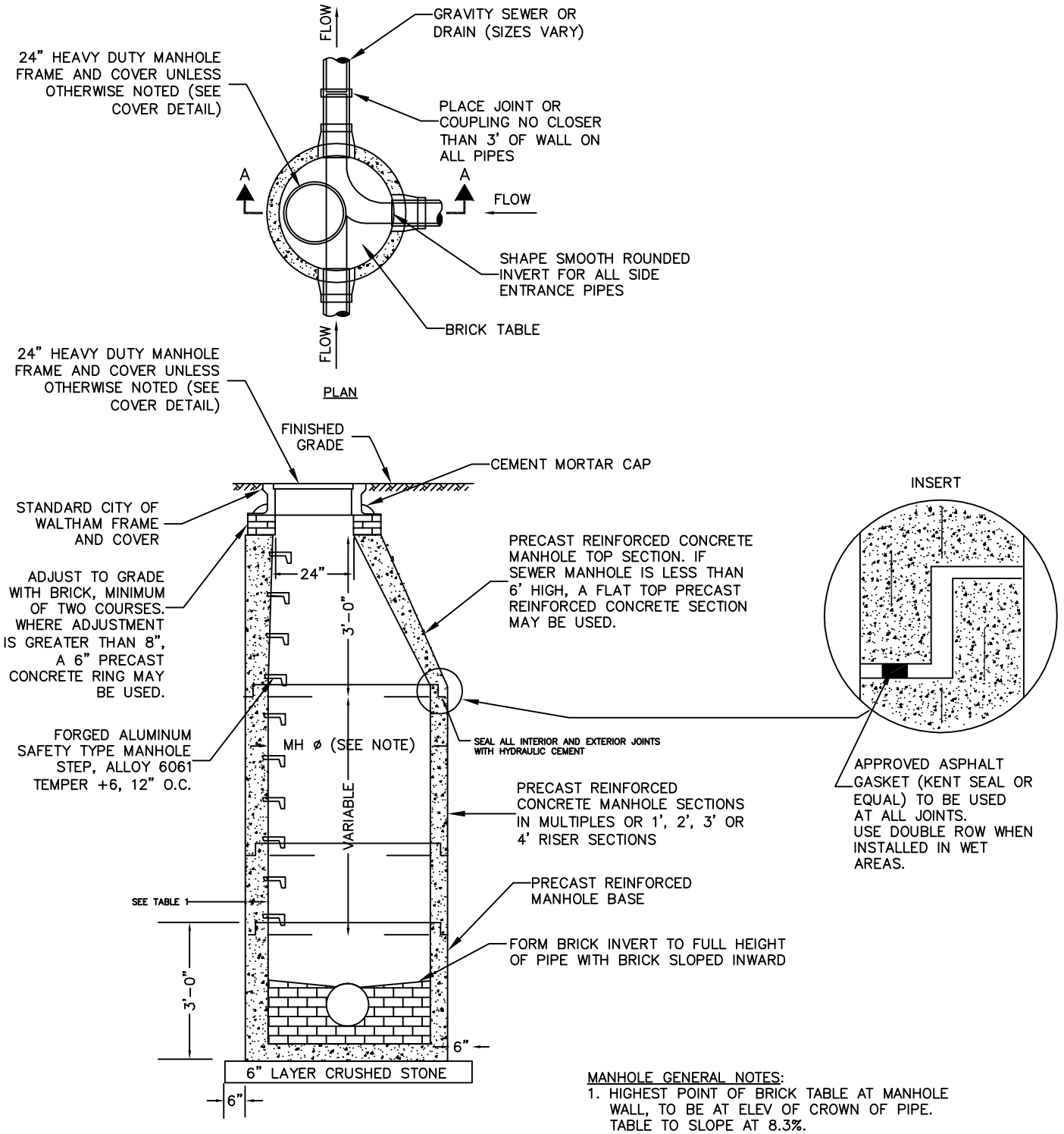
SECTION B–B

SECTION A–A

MAY BE CONSTRUCTED WITH 8" CONCRETE BLOCKS,
A COMPLETE 5" PRECAST STRUCTURE, OR A
COMBINATION OF 5" TO 8" PRECAST BASE SECTION
AND 8" CONCRETE BLOCKS LAID ABOVE.

STANDARD CATCH BASIN

	FIGURE NAME: 201.500.A – STANDARD CATCH BASIN DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



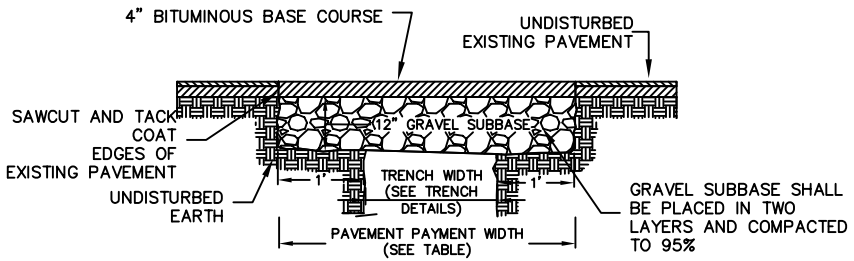
SECTION A–A

STANDARD MUNICIPAL MANHOLE

MANHOLE GENERAL NOTES:

1. HIGHEST POINT OF BRICK TABLE AT MANHOLE WALL, TO BE AT ELEV OF CROWN OF PIPE. TABLE TO SLOPE AT 8.3%.
2. SEWER OR DRAIN MANHOLE DIAMETER SHALL BE 4', 5', 6', 8' OR 10' AS SHOWN ON PLAN/PROFILE VIEWS.
3. DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS. UNLESS OTHERWISE NOTED
4. PRECAST MANHOLES SHALL BE PRE–ORDERED WITH PENETRATIONS AT ELEVATIONS INDICATED ON CONTRACT DRAWINGS.

	FIGURE NAME: 202.000.B – STANDARD MUNICIPAL MANHOLE DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TRENCH PAY LIMIT TABLE FOR TEMPORARY PAVEMENT

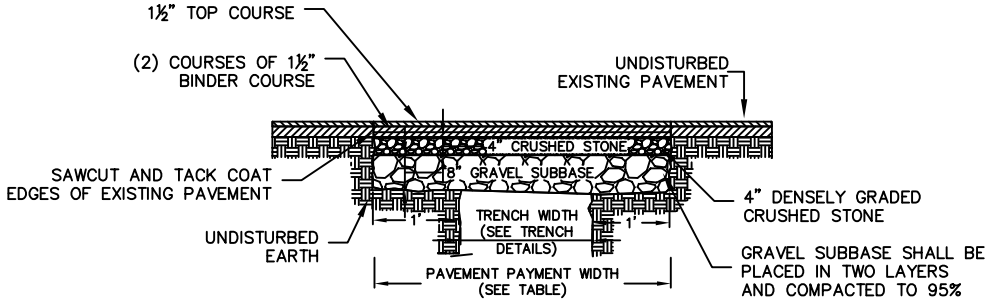
	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	6'–6"	9'–6"	12'–6"	15'–6"	PAY WIDTH
OVER 24"	O.D. + 4'–0"	O.D. + 7'–0"	O.D. + 10'–0"	O.D. + 13'–0"	

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

TEMPORARY PAVEMENT DEPTH SHALL BE 3–IN.

TEMPORARY TRENCH PAVEMENT DETAIL



TRENCH PAY LIMIT TABLE FOR PERMANENT PAVEMENT

	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	8'–6"	11'–6"	14'–6"	17'–6"	PAY WIDTH
OVER 24"	O.D. + 6'–0"	O.D. + 9'–0"	O.D. + 12'–0"	O.D. + 15'–0"	

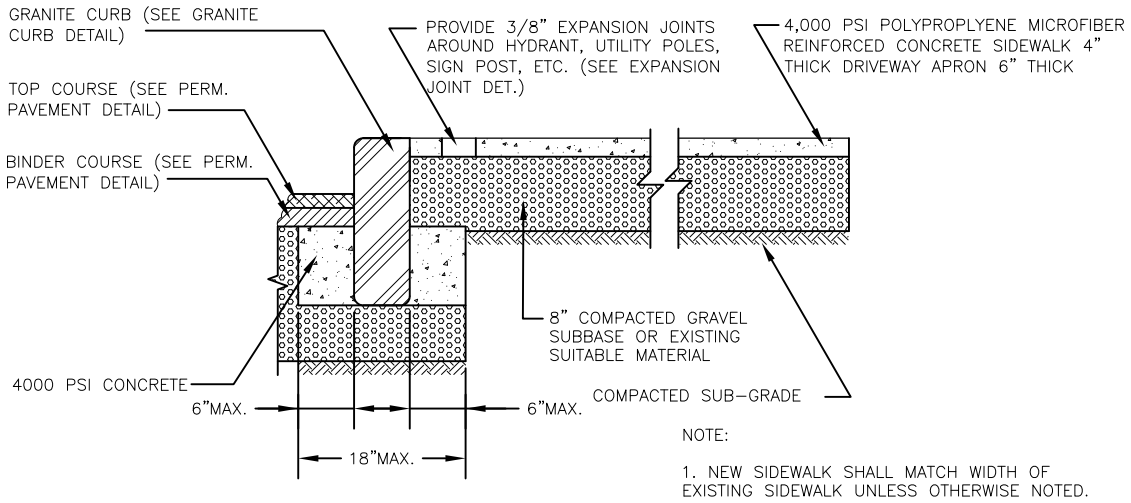
I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

PERMANENT TRENCH PAVEMENT DETAIL

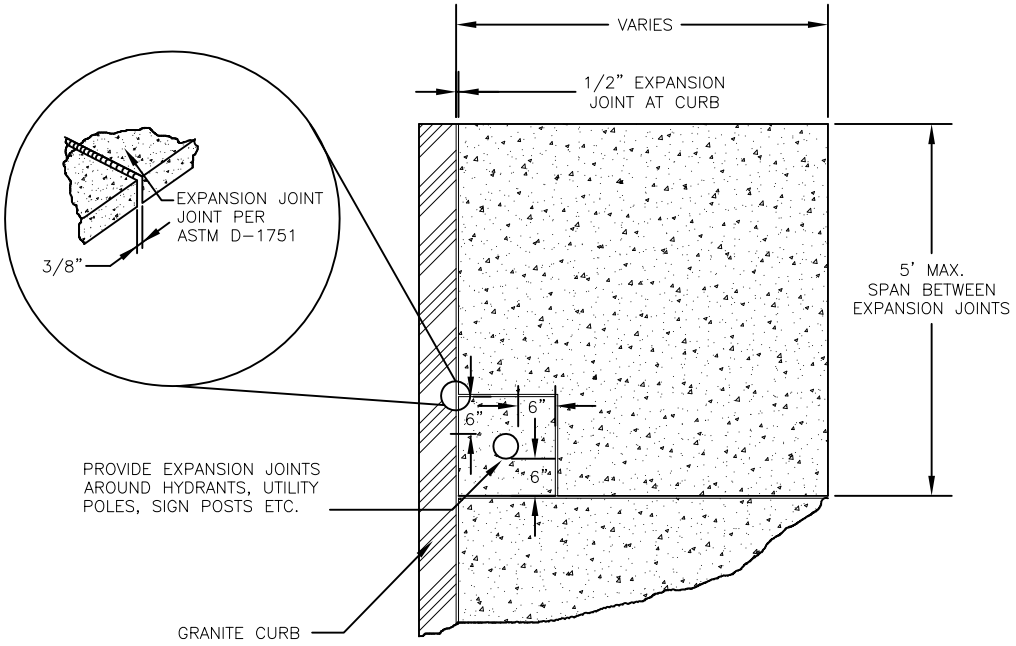
TEMPORARY AND PERMANENT TRENCH PAVEMENT NOTES:
1. PERMANENT TRENCH PAVEMENT PAYMENT WIDTH SHALL BE THE TRENCH PAY LIMIT PLUS 2 FEET
2. TEMPORARY TRENCH PAVEMENT PAYMENT WIDTH SHALL BE EQUAL TO THE TRENCH PAYMENT LIMIT
3. REMOVE AND DISPOSE ALL TEMPORARY PAVEMENT AS REQUIRED. RESTORE AND COMPACT SUBBASE AS REQUIRED PRIOR TO PERMANENT TRENCH PAVEMENT.
4. DEPTH OF PERMANENT TRENCH PAVEMENT SHALL BE THE SAME THICKNESS AS THE EXISTING PAVEMENT.

	FIGURE NAME: 141.000.B – TRENCH PAVEMENT DETAILS	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



CONCRETE SIDEWALK DETAIL

NOT TO SCALE



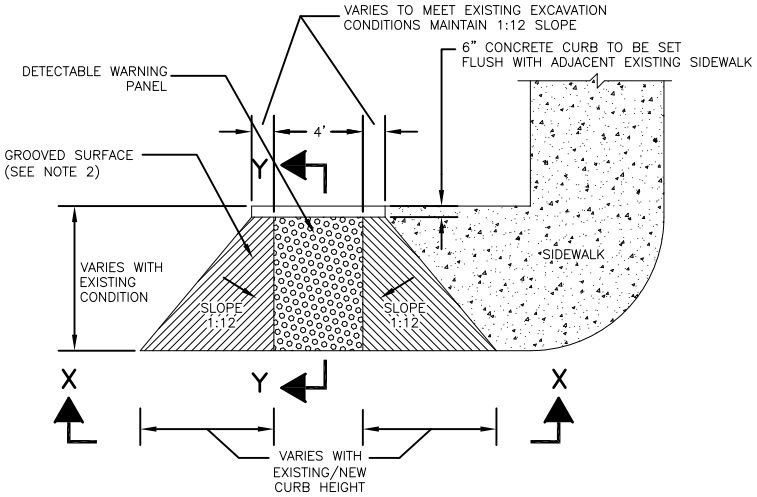
CONCRETE SIDEWALK EXPANSION JOINT DETAIL

NOT TO SCALE

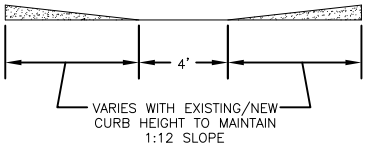
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS	Sheet No. 701.000.1
CONCRETE SIDEWALK	Scale NTS
701.000.1	

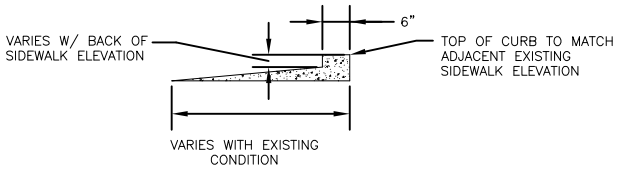
DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg



PLAN



SECTION X–X



SECTION Y–Y

HANDICAP RAMP DETAIL

NOT TO SCALE

GENERAL HANDICAP NOTES:
1. REINFORCEMENT FOR HANDICAP RAMP SHALL BE THE SAME AS MICROFIBER REINFORCED CONCRETE FOR SIDE WALK.

2. THE FINISHED SURFACE OF HANDICAP RAMP IS TO BE GROOVED LATERALLY WITH 1/4" WIDE BY 1/4" DEEP GROOVES. SPACED 2–1/4" AND ROUGHENED WITH NO LESS THAN A BROOM FINISH TO PREVENT SLIPPING AND TO DIFFERENTIATE ITS TEXTURE FROM THAT OF STANDARD SIDEWALK.

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

CONCRETE WHEELCHAIR RAMP

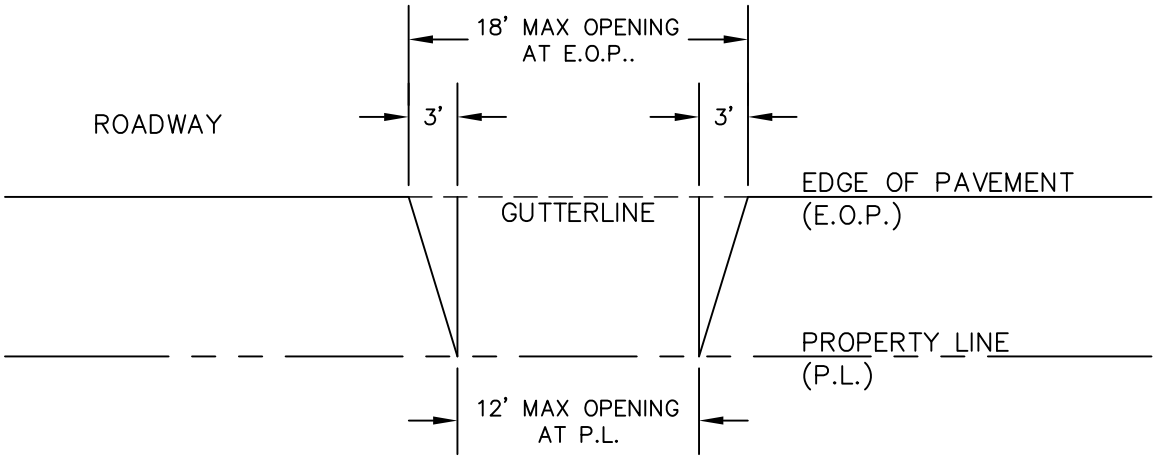
701.000 - 701.101

Sheet No.
701.000.2

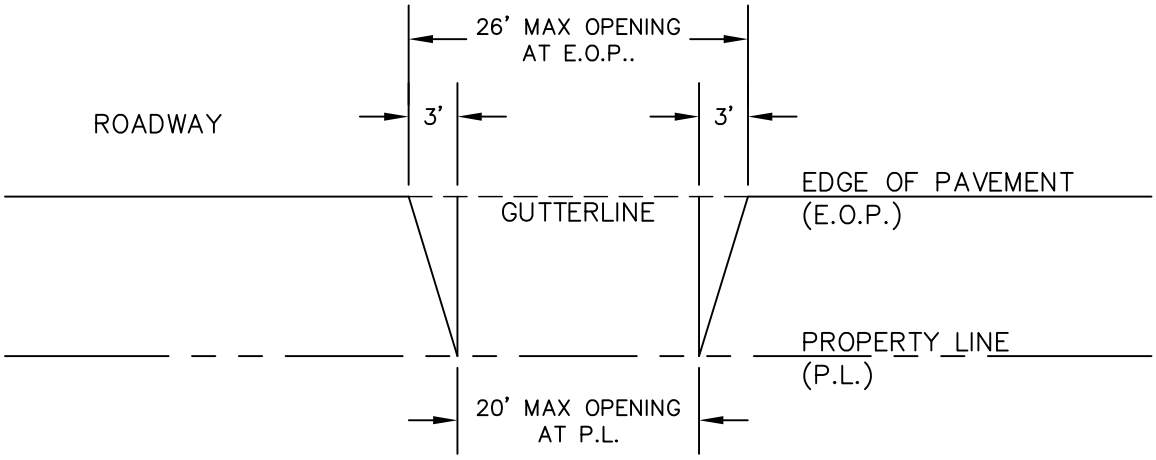
Scale
NTS

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

12' DRIVEWAY OPENING
WITHOUT CURBING



20' DRIVEWAY OPENING
WITHOUT CURBING



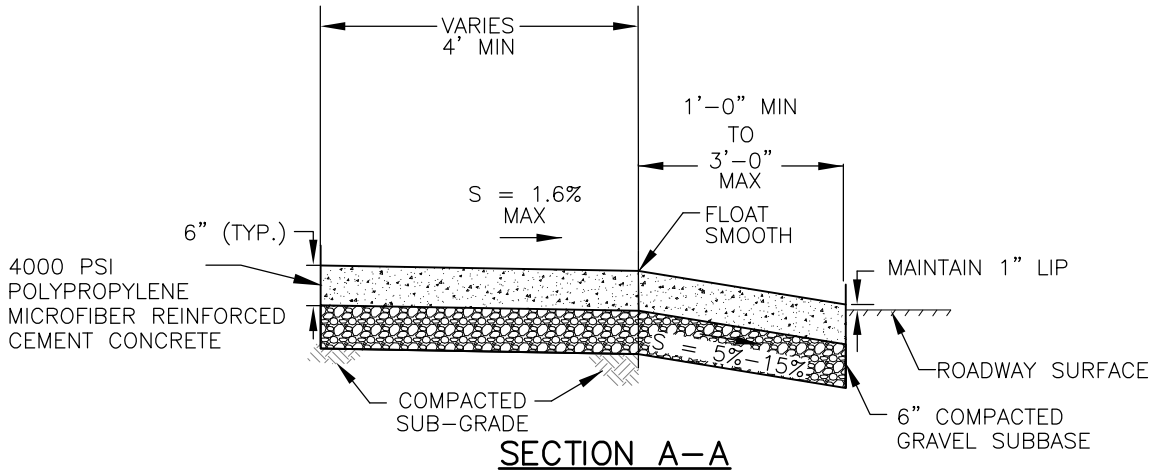
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

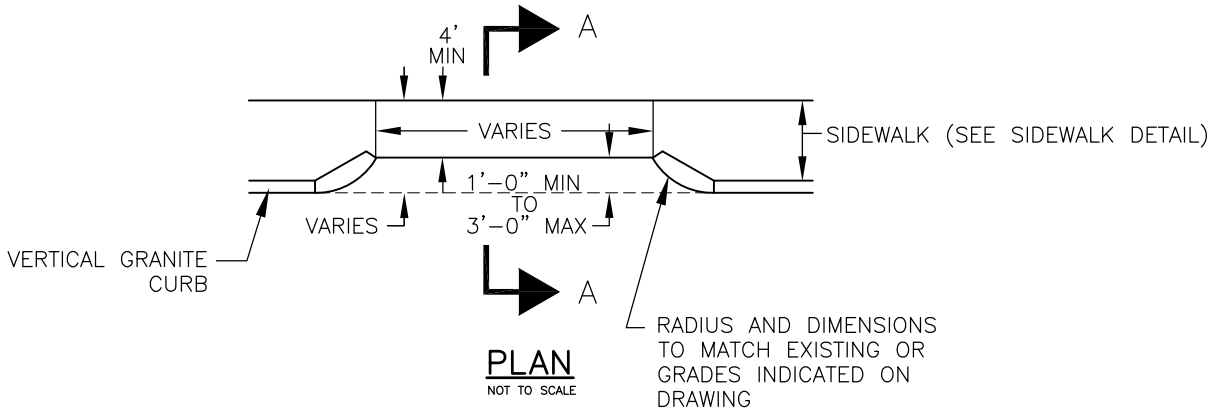
DRIVEWAY OPENINGS
WITHOUT CURBING

Sheet No.

Scale
NTS



SECTION A–A



PLAN
NOT TO SCALE

CEMENT CONCRETE DRIVEWAY APRON
NOT TO SCALE

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

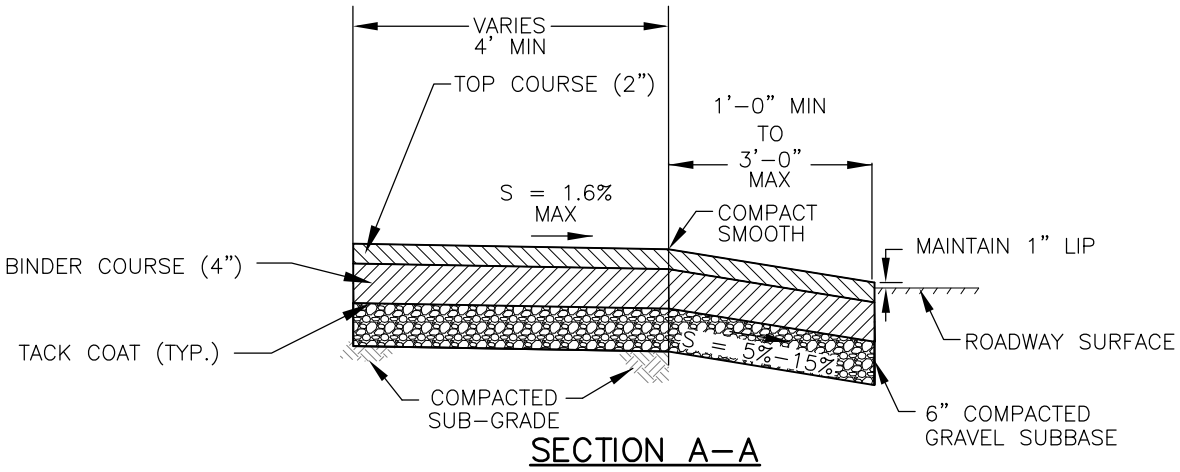
STANDARD DETAILS

CEMENT CONCRETE
DRIVEWAY APRON

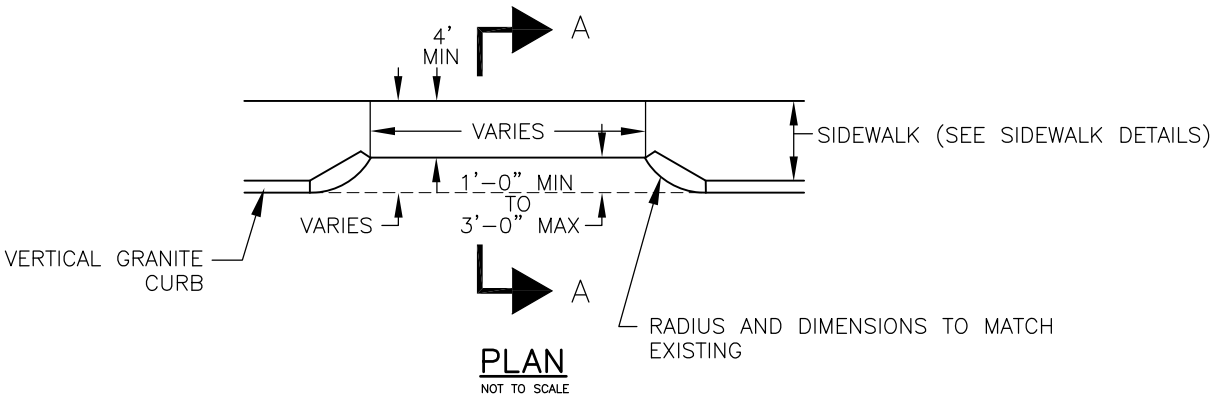
701.002

Sheet No.
701.002

Scale
NTS



SECTION A-A

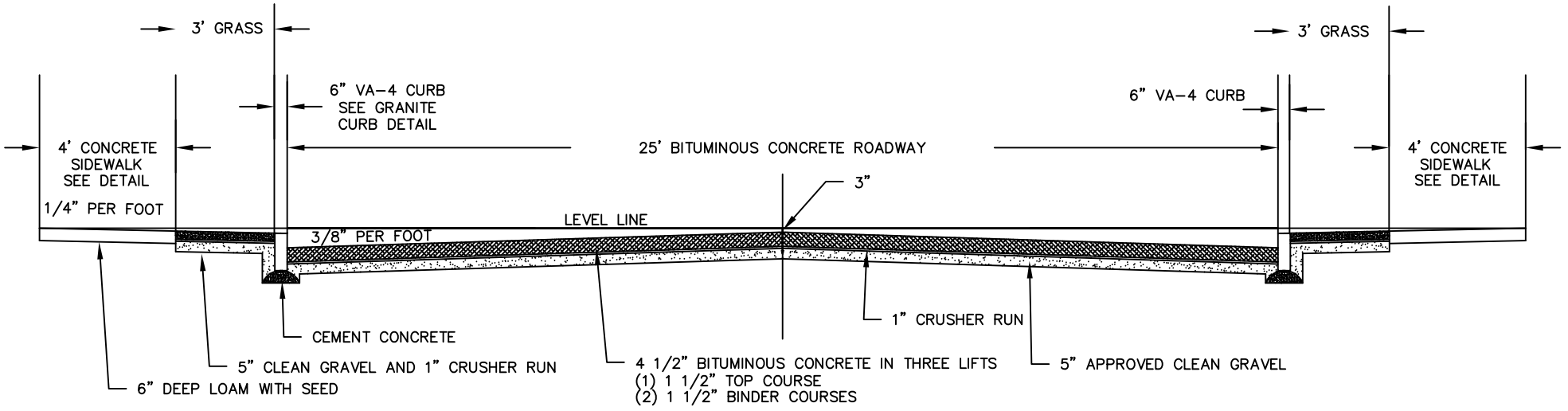


PLAN
NOT TO SCALE

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

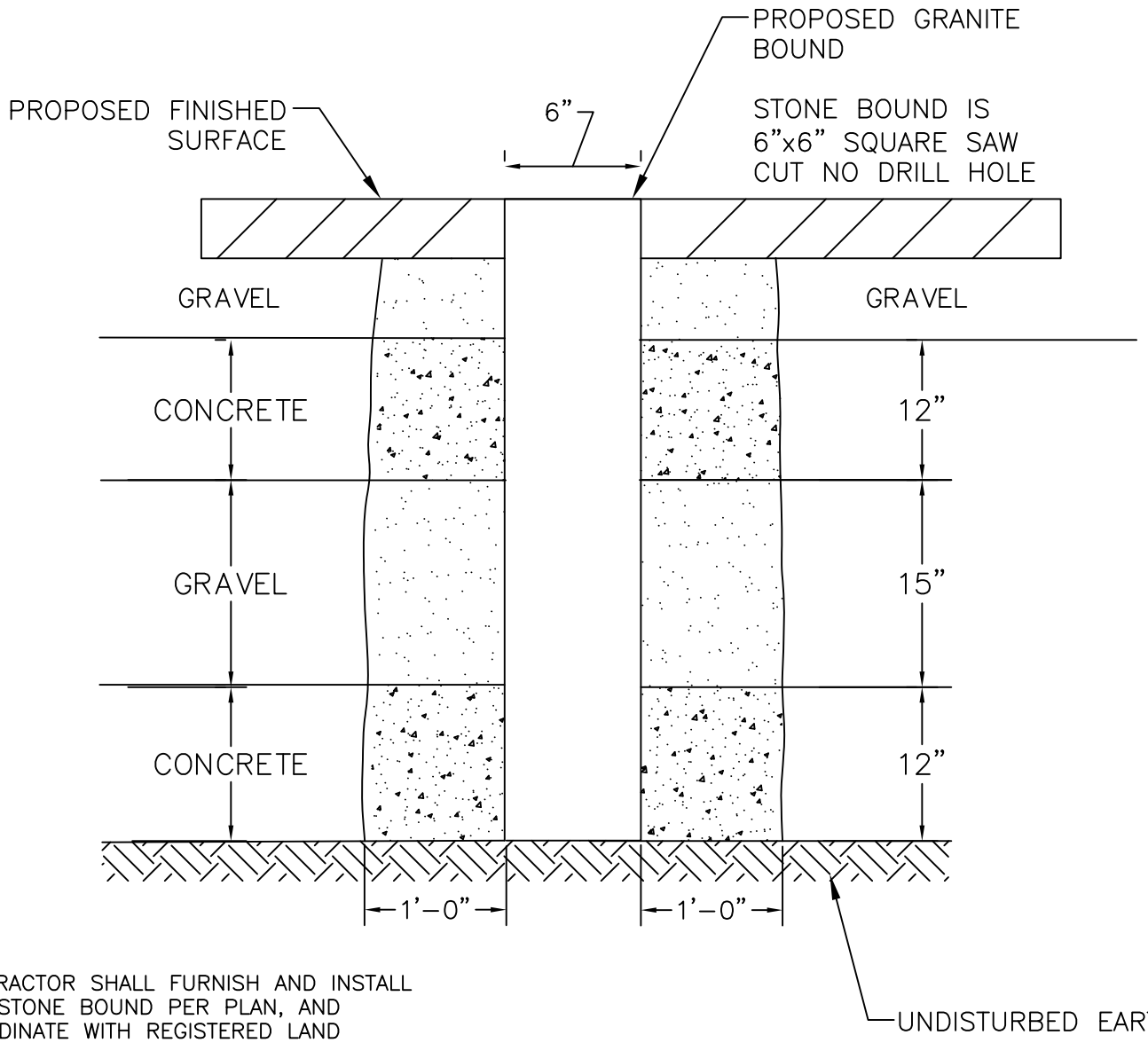
STANDARD DETAILS	Sheet No. 460.001.1
BITUMINOUS CONCRETE APRON	Scale NTS
460.001.1	



TYPICAL CROSS SECTION FOR 40 FOOT LAYOUT

N.T.S.

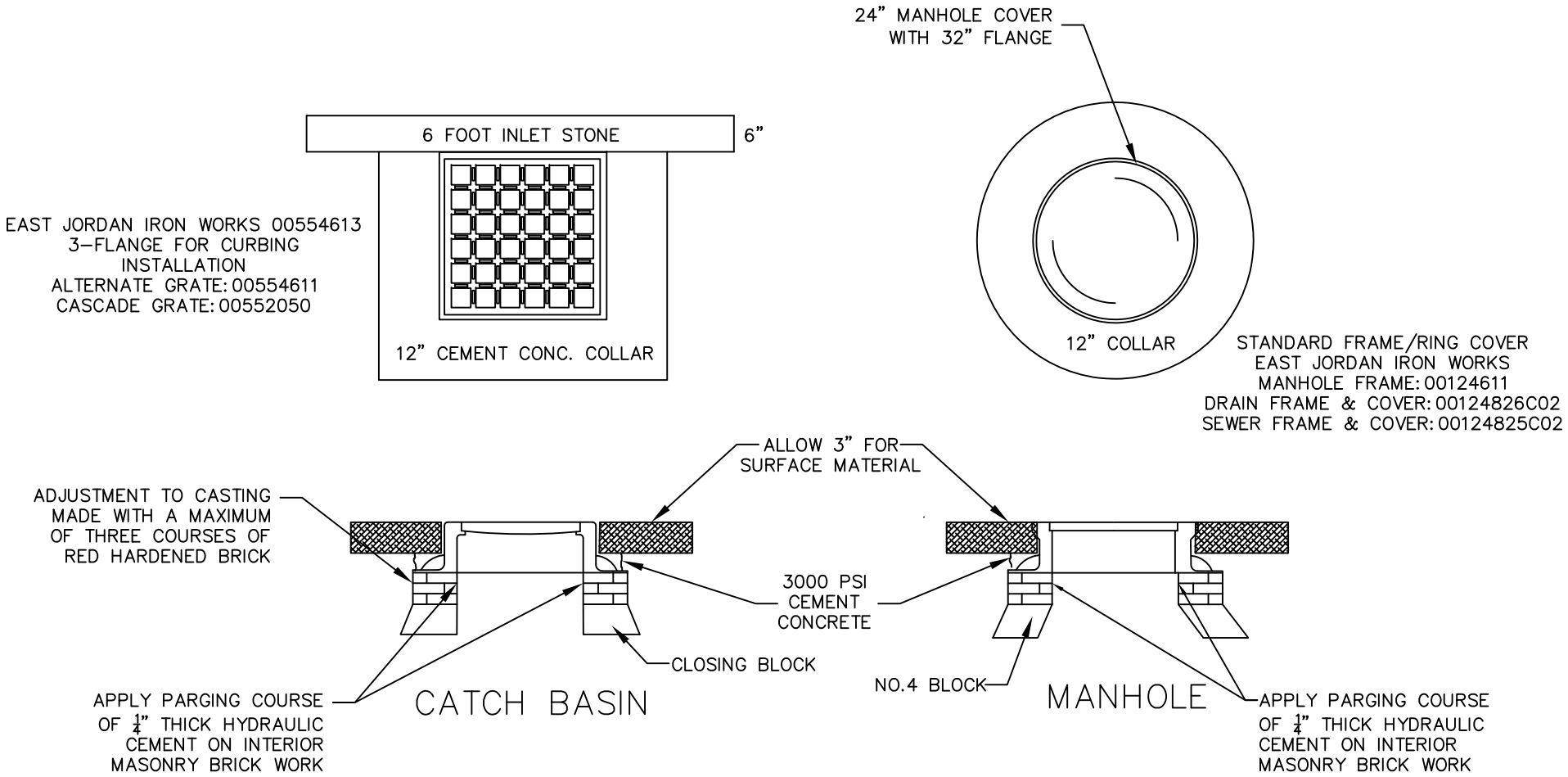
	FIGURE NAME: 460.000.A – TYPICAL 40–FOOT ROAD CROSS SECTION	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



NOTES:
1. CONTRACTOR SHALL FURNISH AND INSTALL NEW STONE BOUND PER PLAN, AND COORDINATE WITH REGISTERED LAND SURVEYOR FOR EACH LOCATION.
2. DRILL HOLES SHALL BE SET BY REGISTERED PROFESSIONAL LAND SURVEYOR.

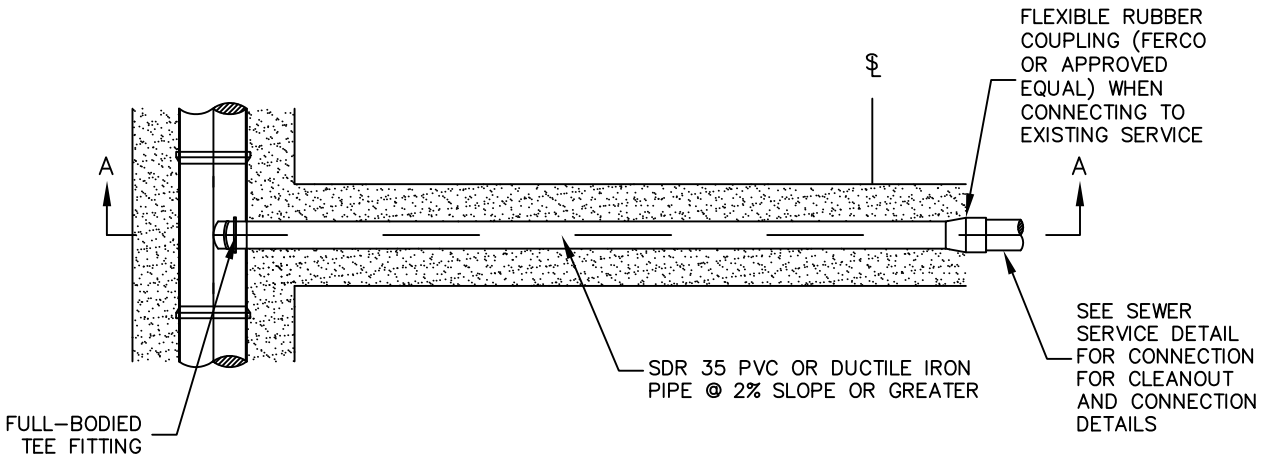
STONE BOUND DETAIL

	FIGURE NAME: 711.100 – STONE BOUND DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011

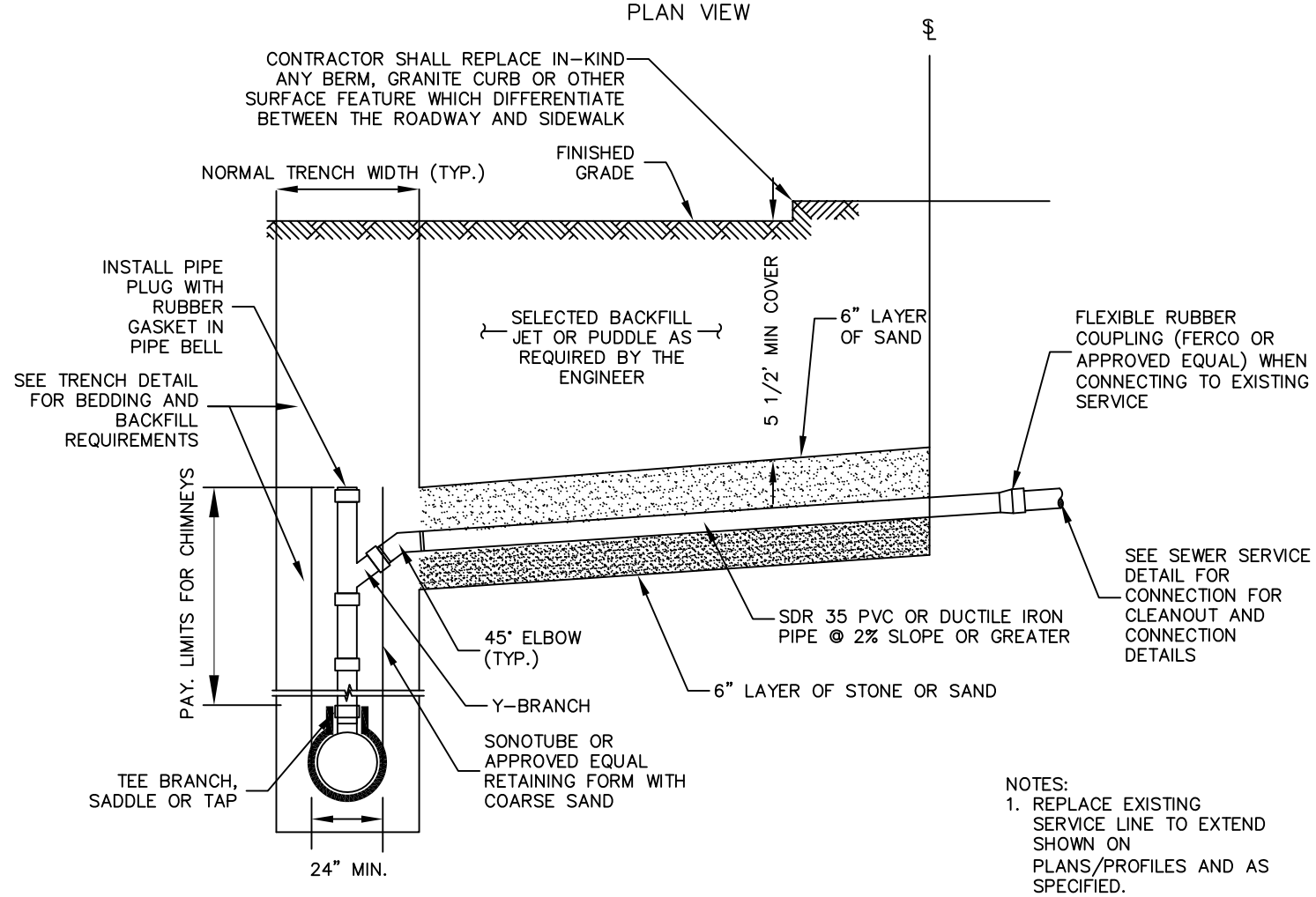


CEMENT CONCRETE COLLARS
FOR MANHOLES AND CATCH BASINS

	FIGURE NAME: 222.010 – FRAMES, GRATES & CONCRETE COLLARS DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



PLAN VIEW

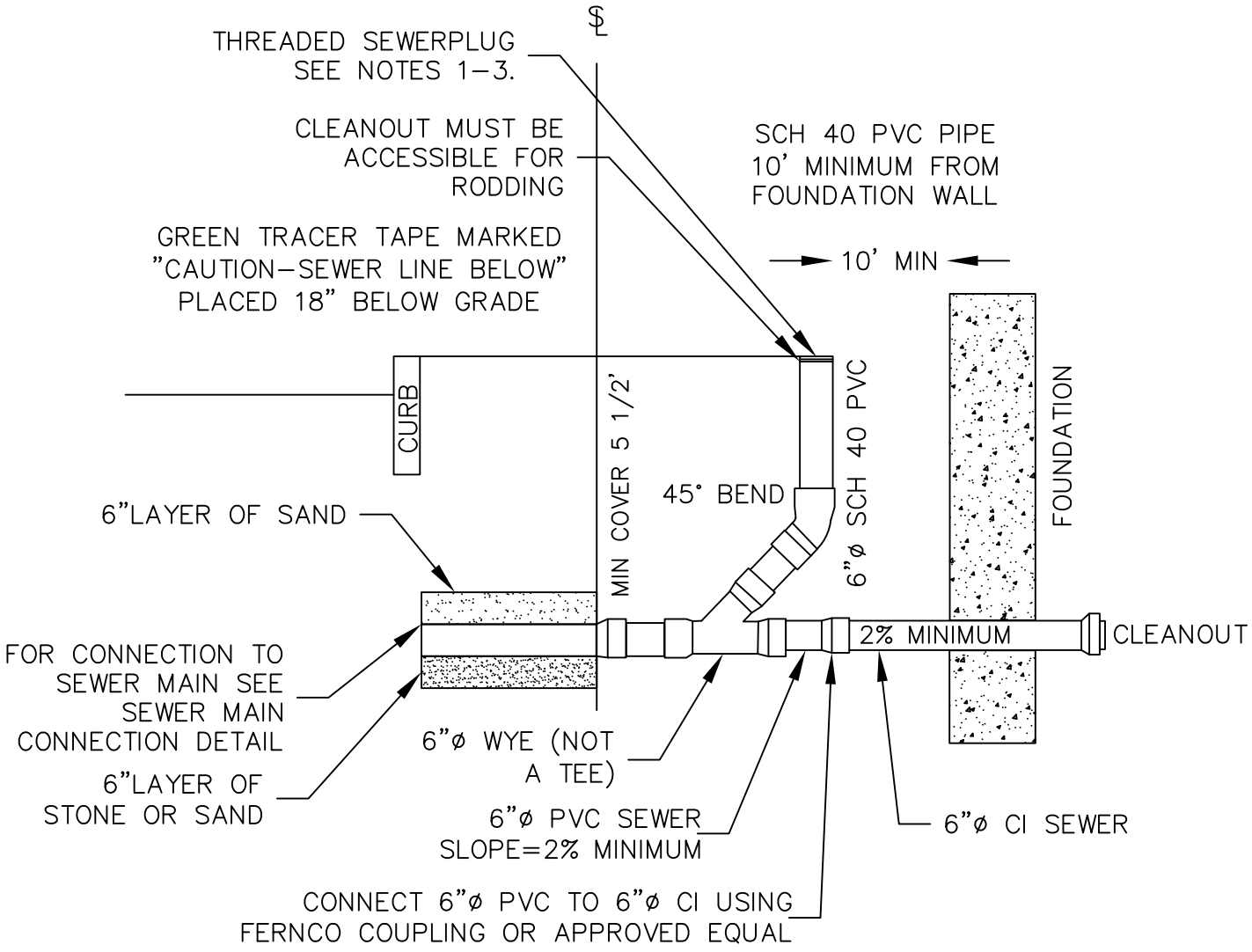


NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

SEWER OR DRAIN
CONNECTION DETAIL WITH CHIMNEY >12' DEEP

	FIGURE NAME: 269.000.B – SEWER OR DRAIN CONNECTION DETAIL CHIMNEY	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

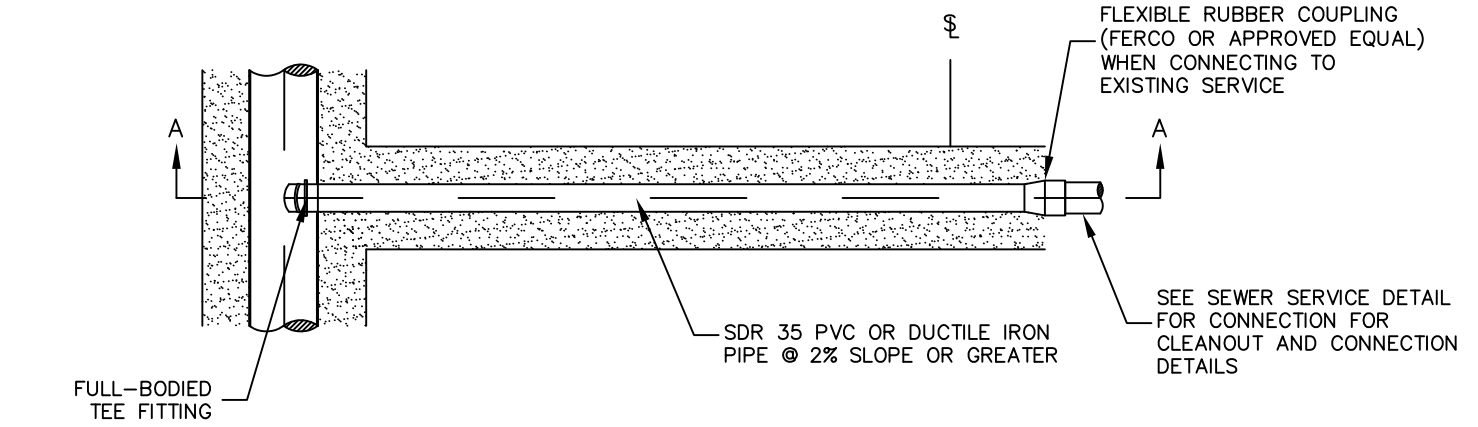


NOTES:

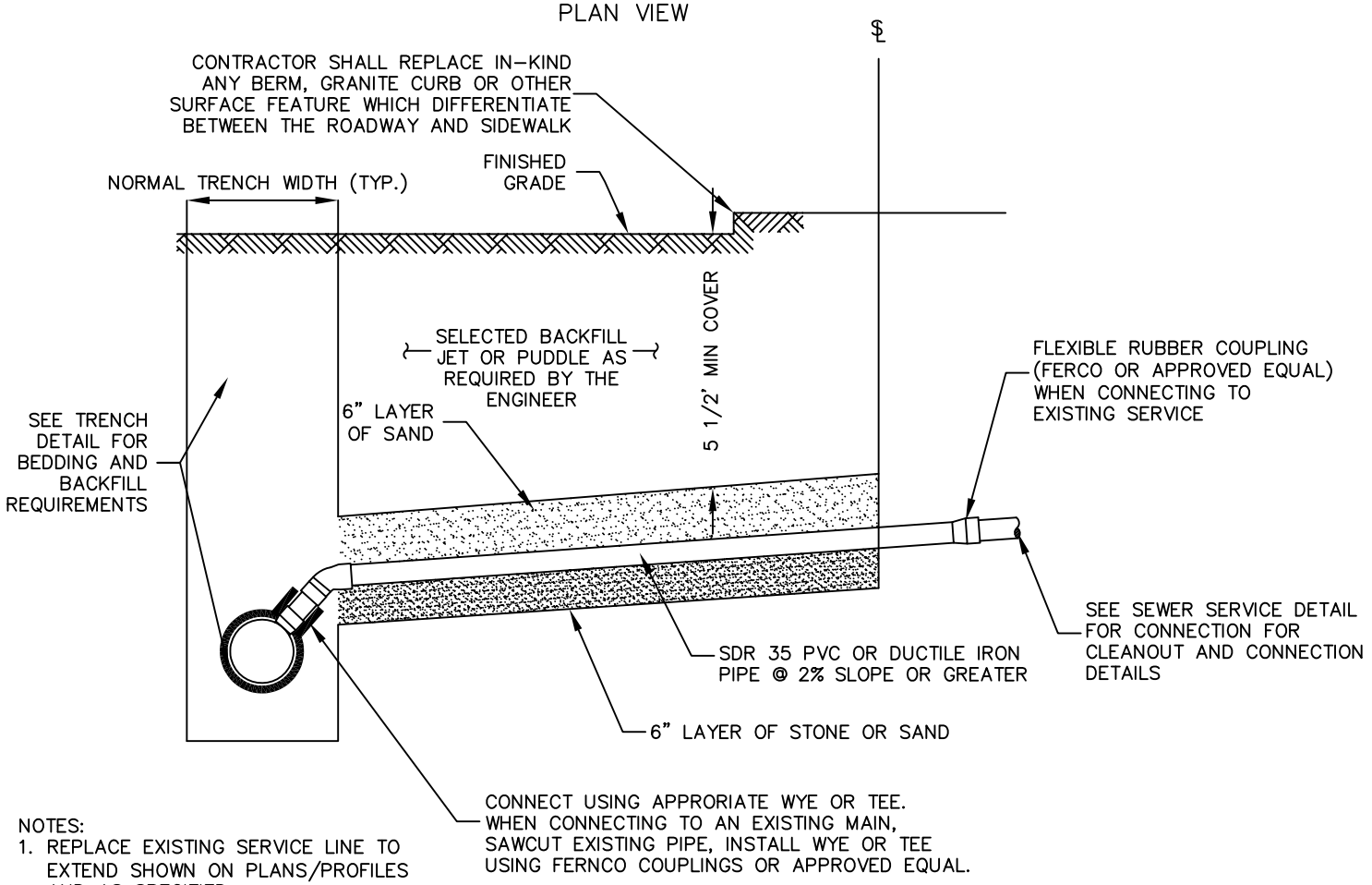
1. CLEANOUT SHALL BE HEAVY DUTY, H20 LOADING IF IN ROADWAY (EJ PRESCOTT PRODUCT NO.45005 600 OR APPROVED EQUAL).
2. CLEANOUTS LOCATED IN DRIVEWAYS SHALL BE (EJ PRESCOTT PRODUCT NO.65004 6S 600 OR APPROVED EQUAL.
3. ALL CLEANOUT SHALL BE LEVEL WITH FINAL GRADE

6"ø SEWER SERVICE CONNECTION WITH CLEANOUT

	FIGURE NAME: 269.000.C – SEWER CONNECTION CLEANOUT	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



PLAN VIEW



NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

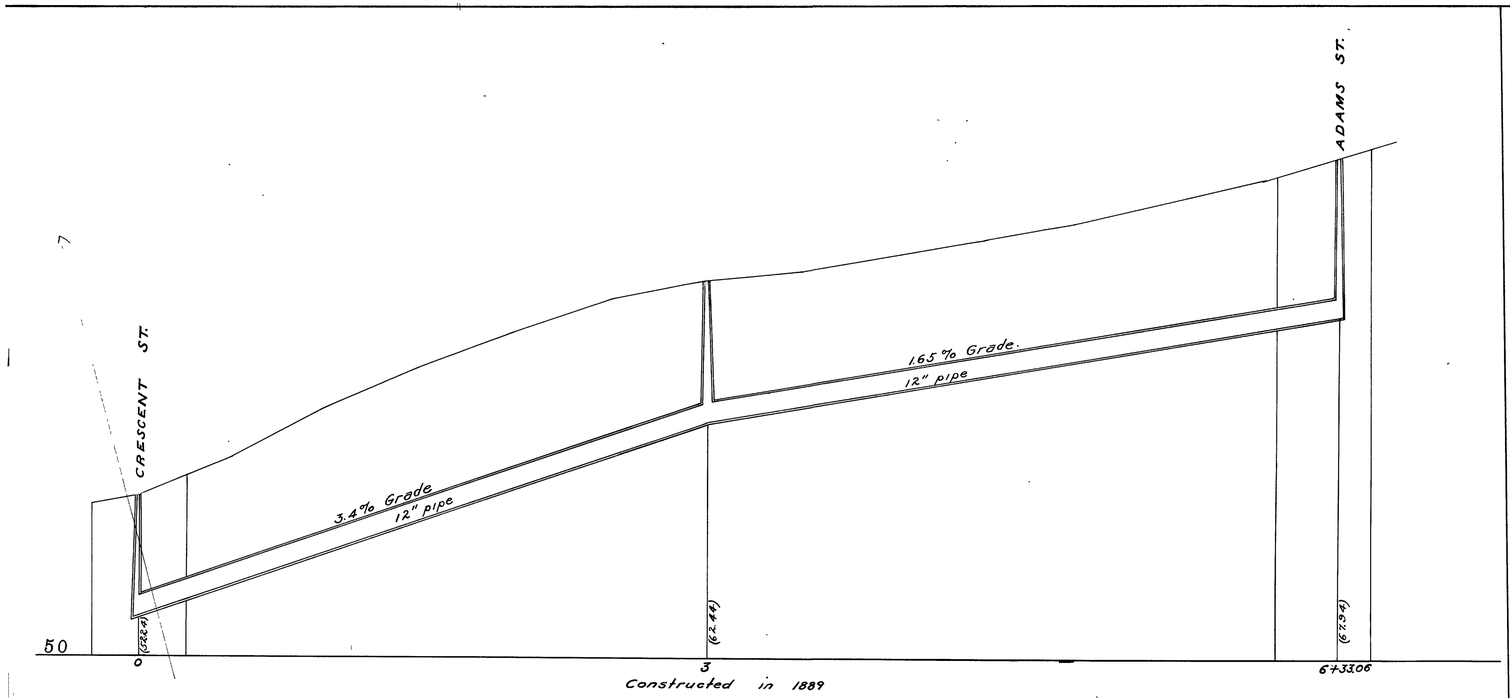
SEWER OR DRAIN
CONNECTION DETAIL <12' DEEP

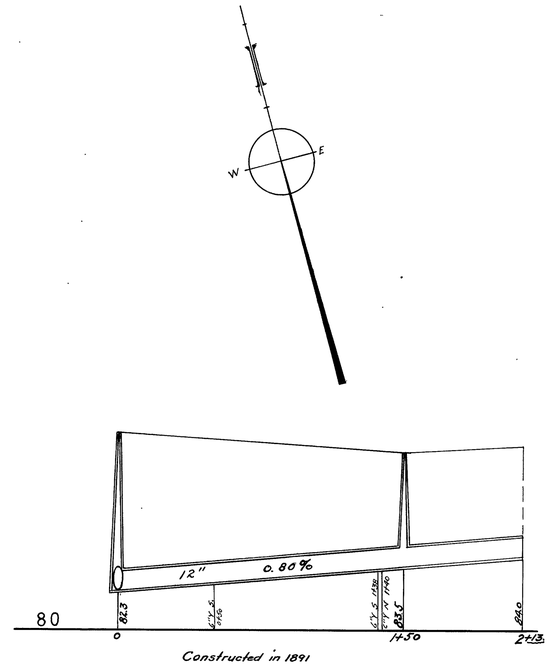
	FIGURE NAME: 269.000.A – SEWER OR DRAIN CONNECTION DETAIL <12' DEEP	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

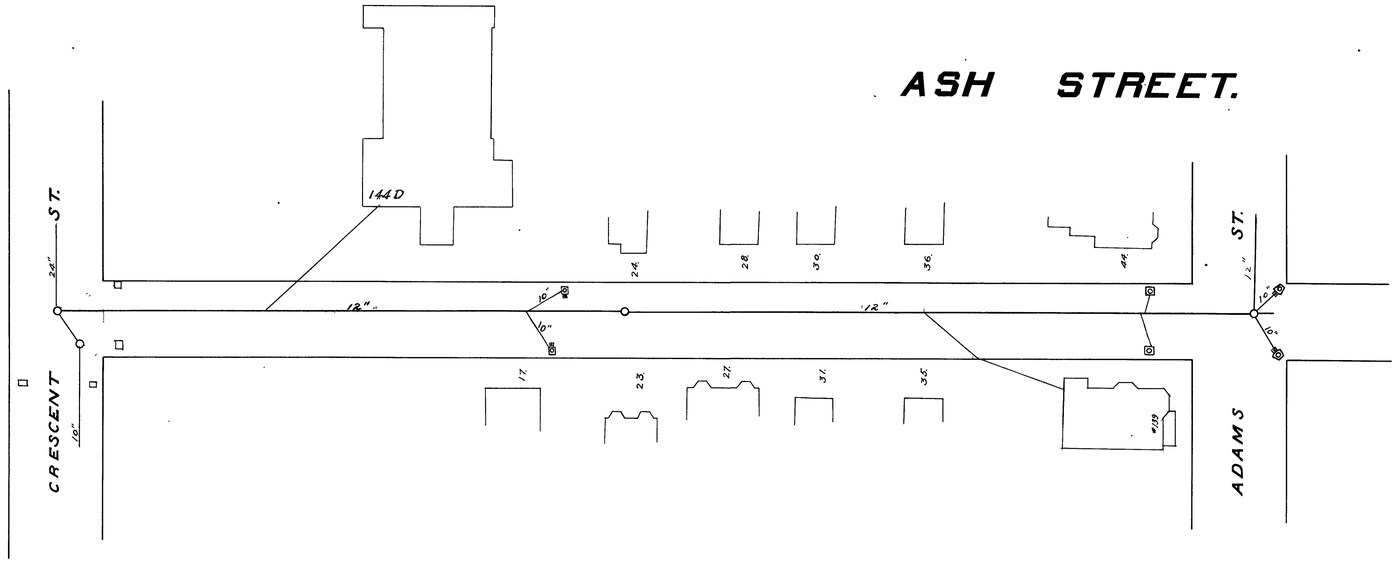
ATTACHMENT C

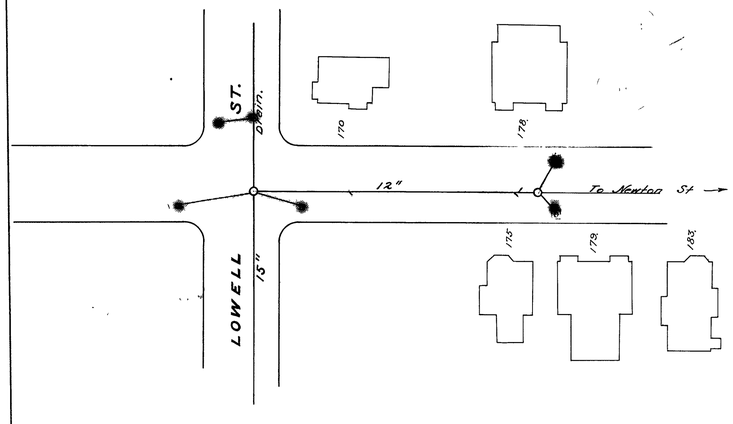
Existing Utility Record Drawings

Ash Street
Drain
17 - # 44





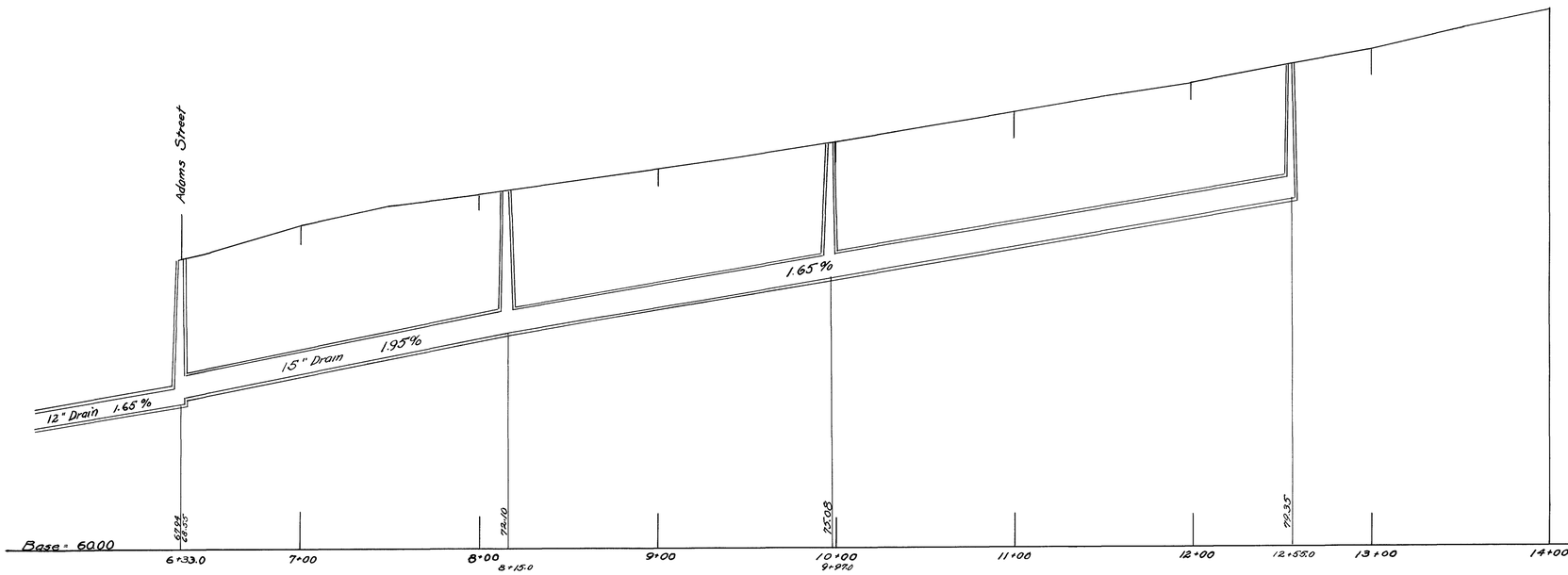




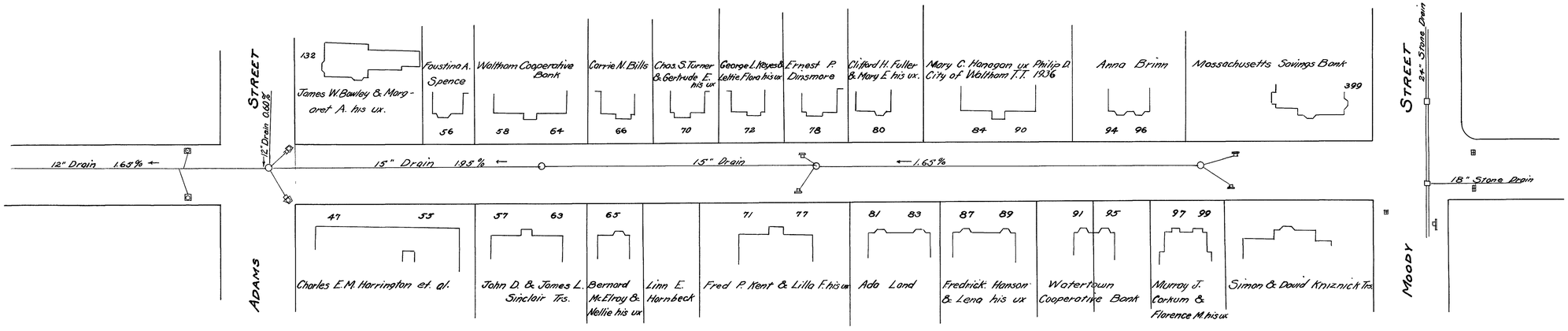
ASH ST
22-36.

ASH ST. DRAIN

Scales: 40 ft. Hor. & 4 ft. Ver. per inch



W.P.A. Project 1938 Construction



Ash Street
Drain
93 - # 179

ASH ST. DRAIN.

MOODY ST.

LOWELL ST.

12" 1.2%

Constructed Apr. 1907.

12" .8%

12" .8%

Constructed 1891.

6"Y - South 10.38
8"Y - North 7.46

82.3

83.3

0.22

1.50

70.00

MOODY ST.

6"x6" Stone Drain

4.5 Elbow Bend

18" Stone Drain

This drain is N.G. 11/19/40 mm

Connected

Connected

12"

12"

12" old 6.3 to end

LOWELL ST.

6"

93

117

122

125

128

131

132

137

138

139

142

143

146

149

150

153

154

157

158

162

163

170

175

178

179

ASH ST. B.

Ash Street
Water & Sewer
165 - # 91

ASH STREET.

MOODY ST.

LOWELL ST.

4" Ys

6" 2.00 %

6" 1.0%

6" 3.0%

11+50 | 13+89.22 | 16+50 | 19+12.50 = 2+87.5 | 0

N

E

W

S

37

8" Water

6" Chap Gate

6" Water

4" Chap Hyd & Hose Stm.

6" Eddy

6" Smith Hyd.

Bradshaw S. Tolman, Tr.

Frank W. Maynard

Elise C. Heuter

John P. Noble

Eliza J. Patrick

Mary E. Brown ux Leroy

Edm. P. Wadsworth

Clark C. Hight

Clark C. Hight

Martha S. Higgin ux E. C.

Emma K. Vinal ux Chas. W.

Abijah A. Morse

Chas. H. & E. Mann ux Wm. W.

Timothy F. Buckley

Mary H. Bergin

Mary E. Beal ux John D.

David W. Farnum

Ray G. Withredge

Mrs. Mary T. Nichols

Lewis E. Haven

Harry W. Mehring

Edward Kenney

Wm. G. Henry

Emma F. & Heirs Chauncy Hartwell

ASH ST. B

Ash Street
Water & Sewer
179 - # 267

ASH STREET.

NEWTON STREET.

PARMENTER ROAD

NEWTON ST.

CRANBERRY ST.

Base-75.

4" Y's 1.0%

6" 1.0%

75 00

+62.95 = 2+72.58

(83.39=8.2") (84.07=6.7)

(86.59) (84.59)

+52.92 = 1+18.53

Donald McLeod

Henry H. Cook

Frances A. Littlefield and Margret A. Wright

Mary A. Hill ux Wm. E.

Fred A. Buell

Fred E. Swett

Marshall C. Jackson

Albert M. Newbert

Chas. P. Ricker

John S. Alcorn

Maude S. and Frank W. Bishop

Harvey S. Hartwell

John W. Tayler

Emery

H. Brower
Geo. E. Boynton

Herbert L. Jackson

Mary J. Chase, ux Chas. E.

Ned K. and Byron L. Marsh

Martha L. Farnham

Clara F. Sargent

Arthur G. Smith

John E. Clough
Geo. E. Armstrong (Lessee)

Dexter H. Hawley

Chas E. Wright

Emily S. Davis ux Frank E.

Edward A. Safford

Ed A. Safford

Albert M. Smith

Willard B. Jones

Pryor Fulton

Julia M. Plummer

Calvin C. Hosse

Shop Mary E. Spear

Waltham Coop Bank

Hattie K. Rice & Eva M. Reed ux Sd.

Newton Chymical

Newton Chymical Company

12" Water

6" Water

8" DI WATER (1986)

ABANDONED 4"

6" Water

6" Gas

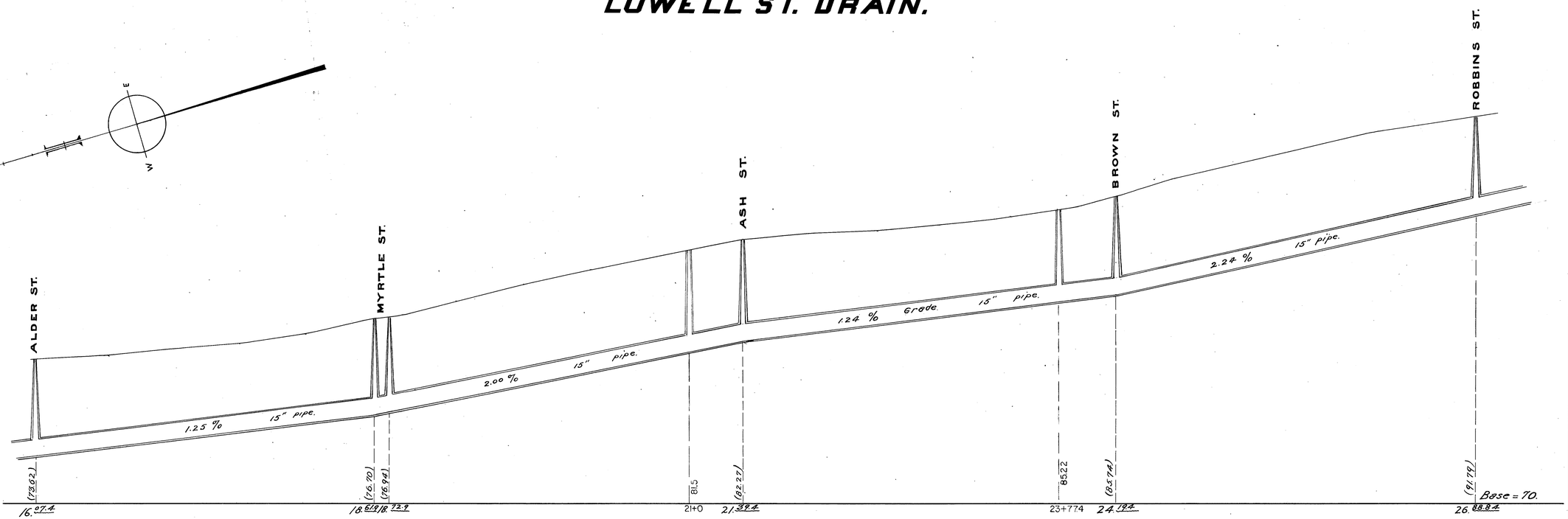
(1924) 6" Water

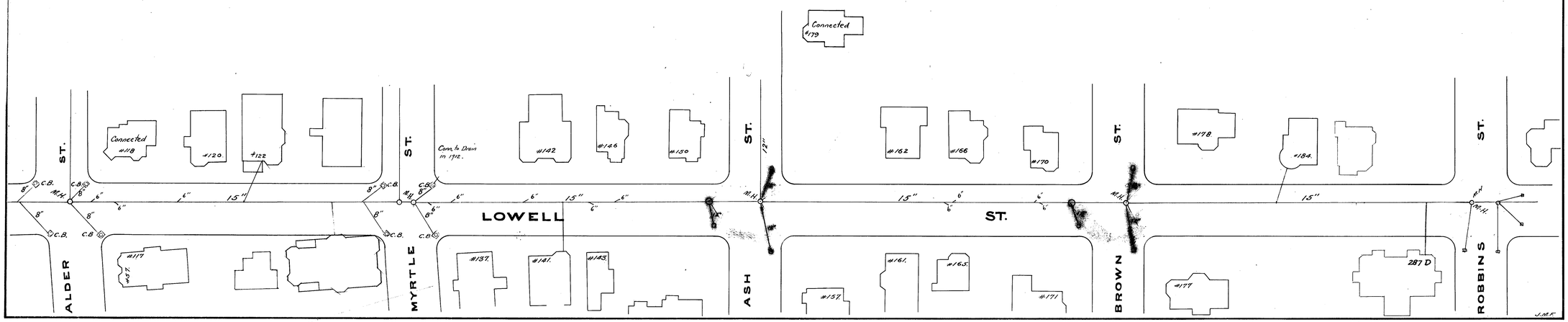
(5" Chap. Hyd. & Hose Stat.)

8x12" TS+V

Lowell Street
Drain
Alder St – Robbins St

LOWELL ST. DRAIN.





LOWELL ST.-C.
22-65.

Lowell Street
Water & Sewer
76 - # 144

LOWELL STREET

CHESTNUT ST · HEM ST · ALDEN ST · MYRTLE ST · ASH ST

8" · 0.6 % · 8" · 0.80 % · 4" Ys 8" · 1.2 % · 8" · 1.6 %

Gardner St

60.00

9+93.68 · 13+34.65 · 15+91.16 · 18+58.86 · 21+26.83

Robert M. Starh · Helen P. Edwards · Carrie W. McAllister et al · Lucy M. Lane ux L. C. · Est. Bardwell A. Goodell · Freedom F. & Heirs Arethusa H. Daniels · John L. Knox · Eugene L. Bacon · Ruth Ann Weeks ux Enoch · Heirs of Andrew Henry · Emma K. Vinal ux Chas. W. · Henry H. Cook

8" Pipe · 6" Water · 4" Water · 8" Water

5" Chap. Hyd. 3 Hose · 6" Chap. Hyd. 2 Hose Strm. · 6" Smith Gate 6" Eddy Hyd

Stand Pipe

City of Waltham · Eliza G. Derbyshire · Carrie A. Cummings · Jane L. Morton ux Geo. W. · Est. Bardwell A. Goodell · Lillian M. Kingsbury · Martha S. Hight ux Clark C. · Clark C. Hight

CHESTNUT · HIGH · ALDEN · MYRTLE · ASH

LOWELL ST. B

Lowell Street
Water & Sewer
156 - # 229

LOWELL STREET

LOWELLST-C

CALL BEFORE YOU DIG
1-888-DIG-SAFE
NOTE
THE LOCATION OF SURFACE AND
UNDERGROUND OBJECTS SHOWN
ARE NOT WARRANTED TO BE CORRECT

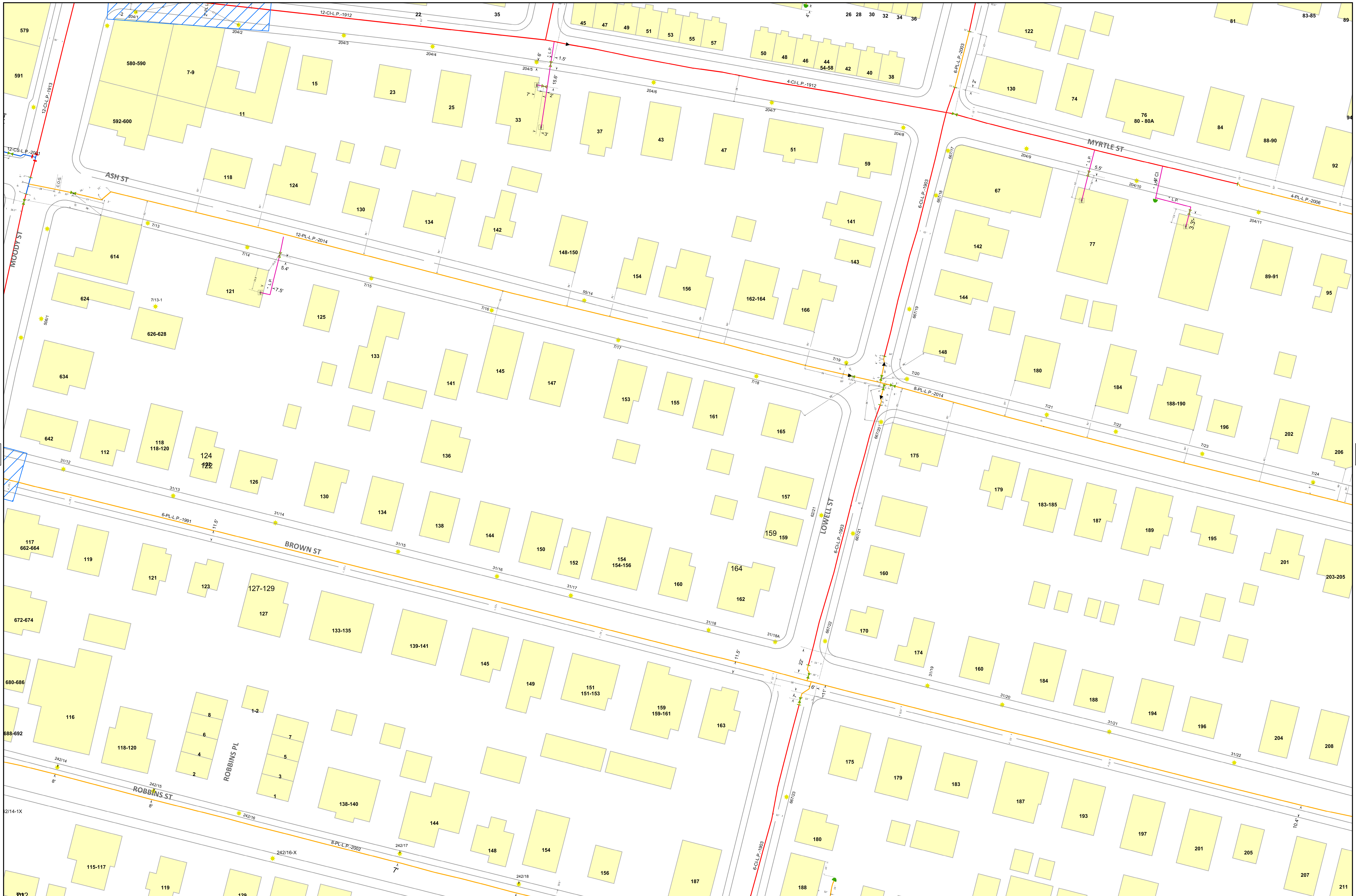
NATIONAL GRID

WAL2756

Generated by brecbrial 10/22/2019 11:01:48 AM on 10/22/2019

WAL2766

WAL2768



WAL2778

WAL

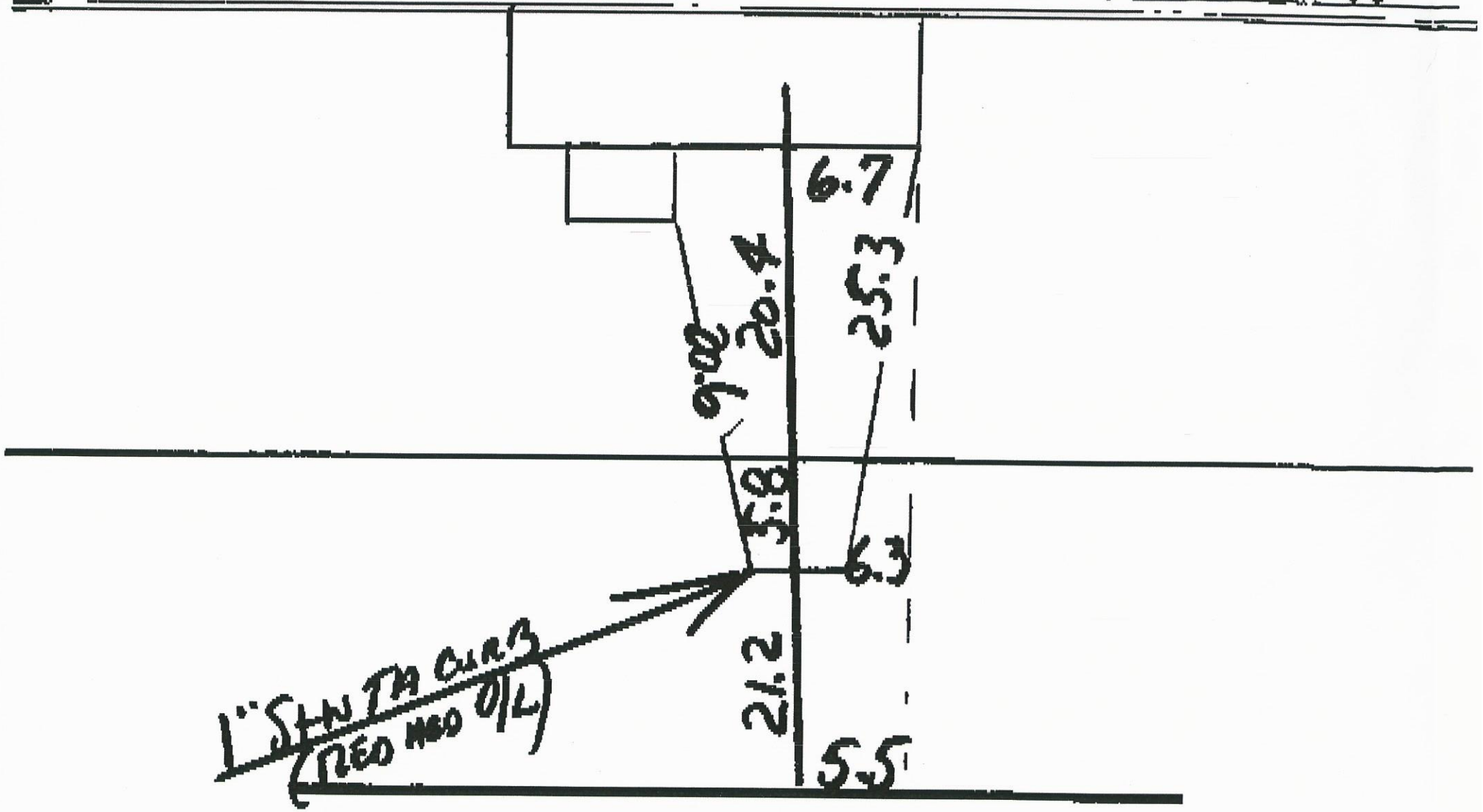
N
W E
S

NOTE1: *The location of service pipes and corrosion components are not guaranteed to be correct. SPIPE, as well as original record documents, should be utilized for this information.*

NOTE2: *The mains in NH without dimensions are not drawn to scale. These mains are intended to show the existence of gas main on the street and do not reflect the exact location of the main in the street.*

2767

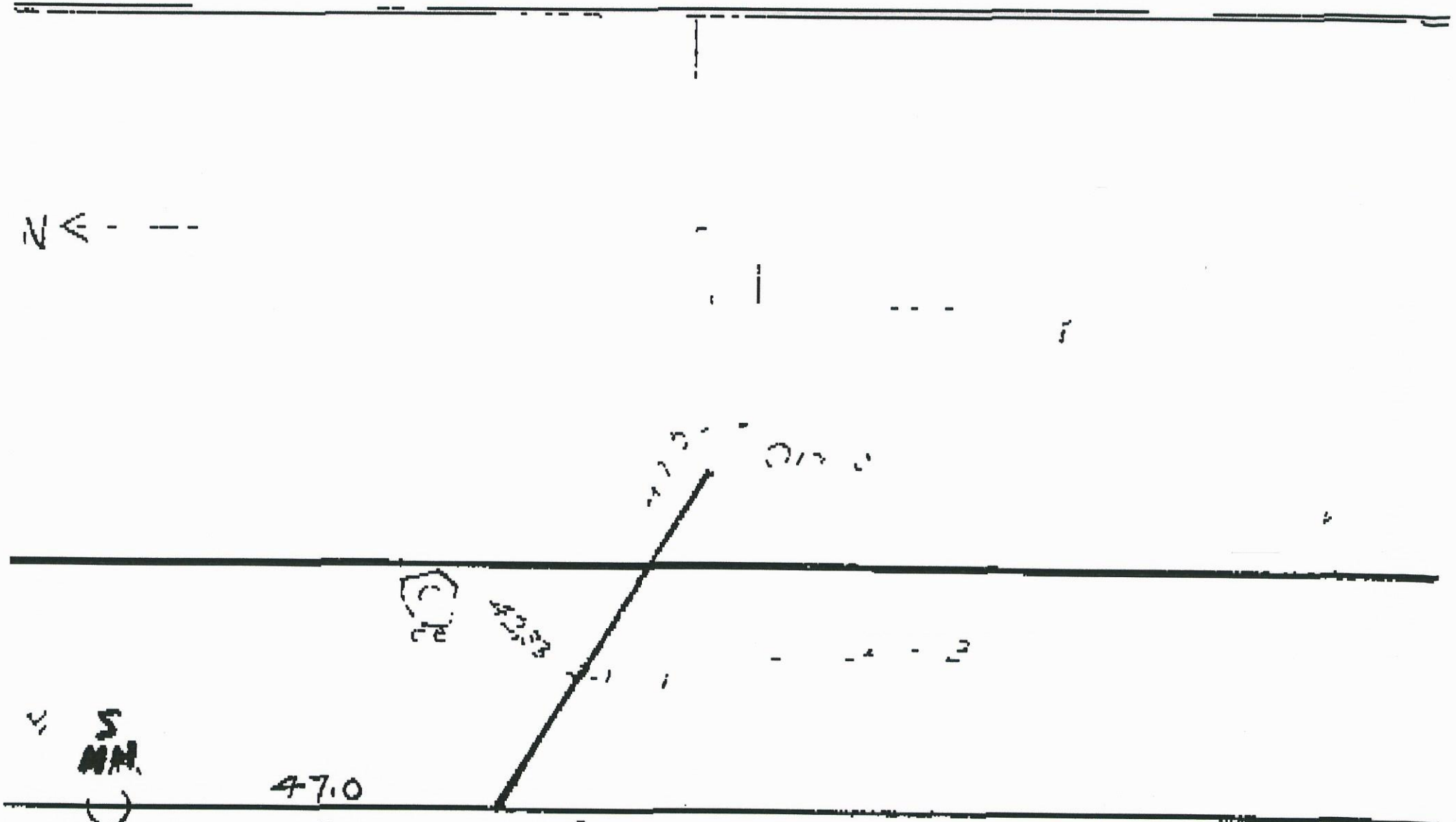
NO 156-158 LONELL ST SERVICE NO 2565-W



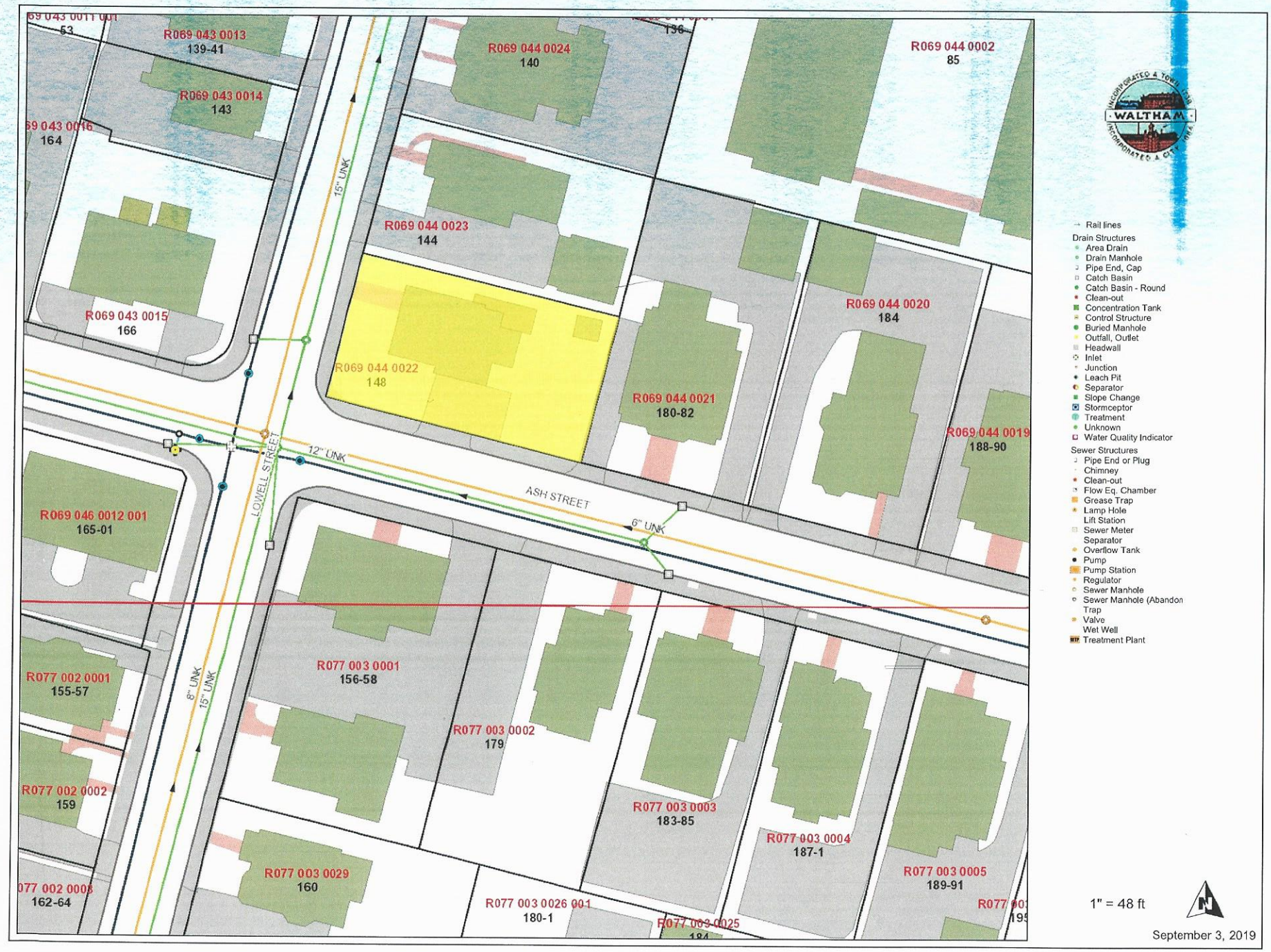
4/20/80 REPAIRED AT CURB — NEW 1" [illegible] TO CURB (2 [illegible])

(1) 1" 2 BOLT CLAMP)

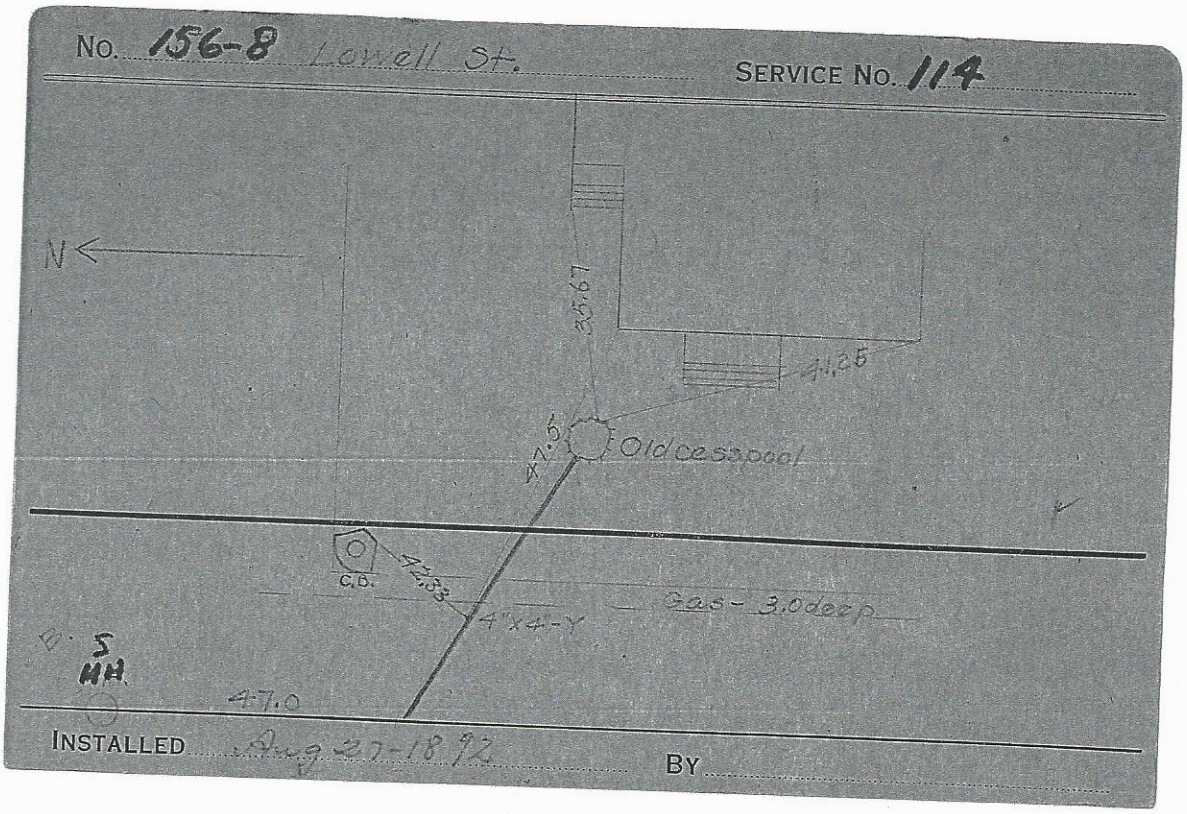
NO 156-8 ...ell St. SERVICE NO 114



INSTALLED Aug 27-1892 BY

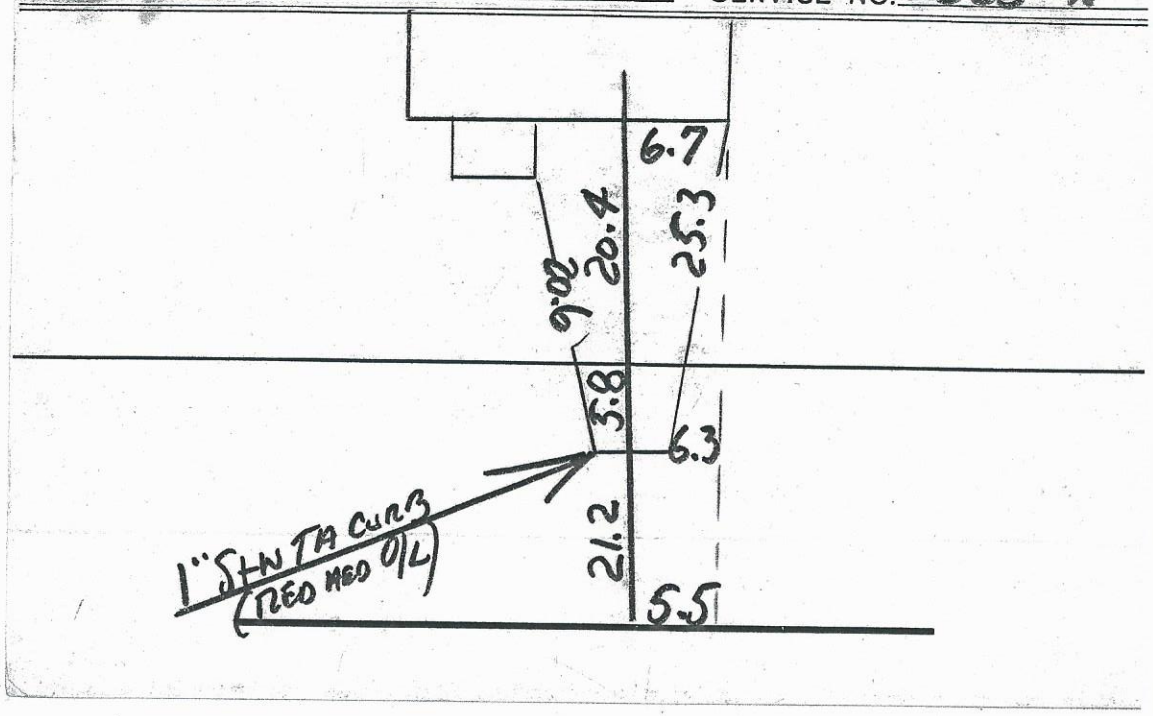

R069 043 0013
139-41
R069 043 0014
143
R069 043 0016
164
R069 043 0015
166
R069 044 0024
140
R069 044 0002
85
R069 044 0023
144
R069 044 0022
148
R069 044 0020
184
R069 044 0021
180-82
R069 044 0019
188-90
15" UNK
12" UNK
6" UNK
LOWELL STREET
ASH STREET
R069 046 0012 001
165-01
R077 002 0001
155-57
R077 003 0001
156-58
R077 003 0002
179
R077 002 0002
159
R077 003 0003
183-85
R077 003 0004
187-1
R077 003 0005
189-91
R077 003 0029
160
R077 003 0026 001
180-1
R077 003 0025
Rail lines
Drain Structures
Area Drain
Drain Manhole
Pipe End, Cap
Catch Basin
Catch Basin - Round
Clean-out
Concentration Tank
Control Structure
Buried Manhole
Outfall, Outlet
Headwall
Inlet
Junction
Leach Pit
Separator
Slope Change
Stormceptor
Treatment
Unknown
Water Quality Indicator
Sewer Structures
Pipe End or Plug
Chimney
Clean-out
Flow Eq. Chamber
Grease Trap
Lamp Hole
Lift Station
Sewer Meter
Separator
Overflow Tank
Pump
Pump Station
Regulator
Sewer Manhole
Sewer Manhole (Abandon
Trap
Valve
Wet Well
Treatment Plant
1" = 48 ft
September 3, 2019

No. 156-8 Lowell St. SERVICE No. 114

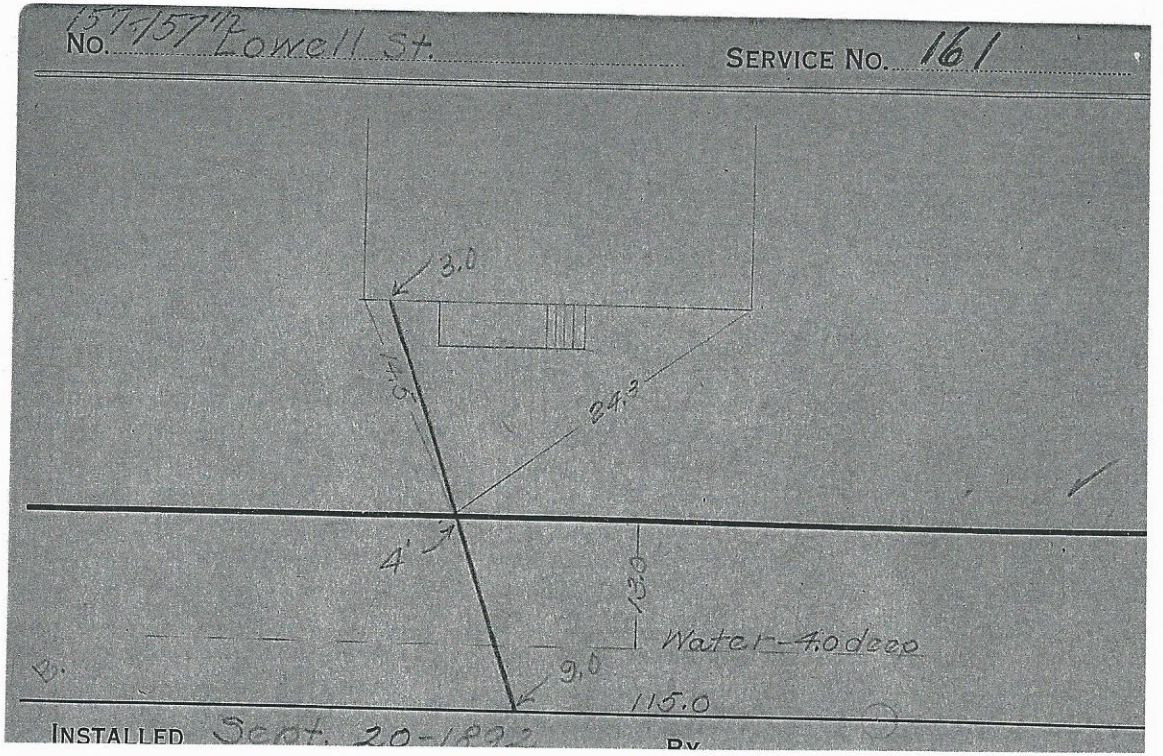


INSTALLED Aug 27-1892 BY

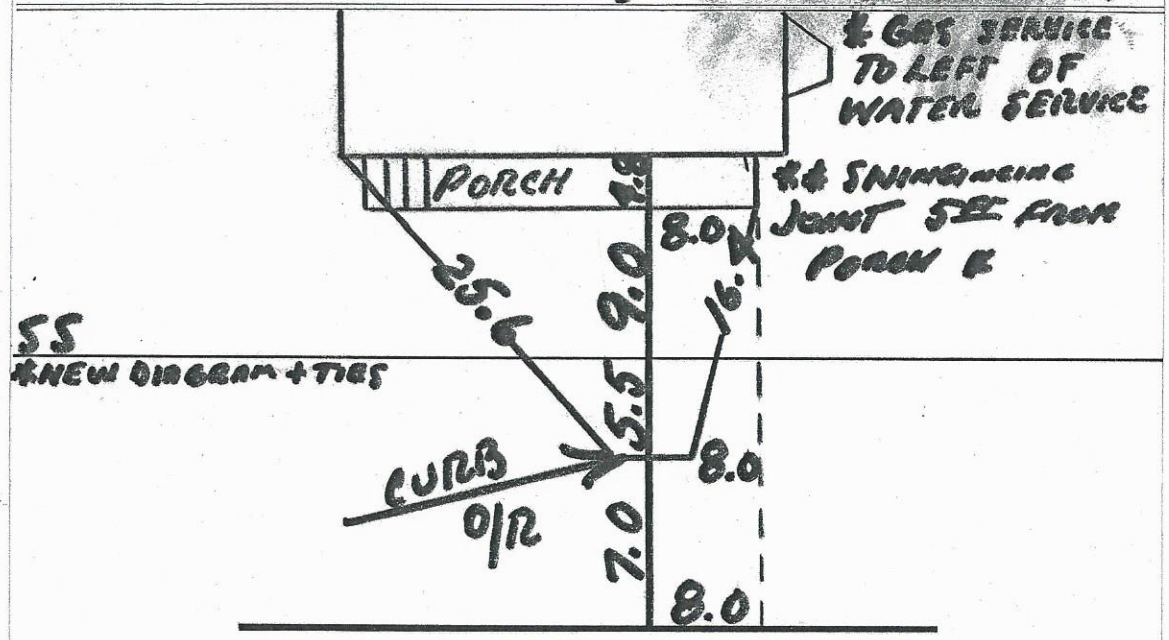
NO. 156-158 LOWELL ST SERVICE NO. 2565-W



NO. 157-157 Lowell St. SERVICE NO. 161

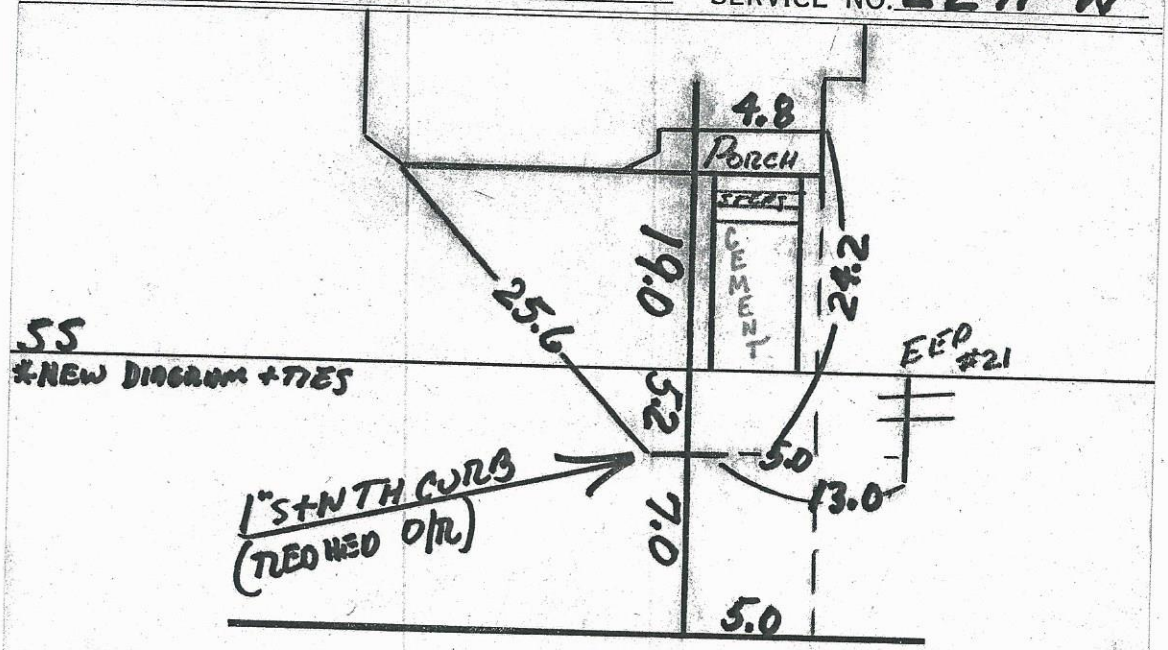


NO. 157 LONELL ST SERVICE NO. 2426-W



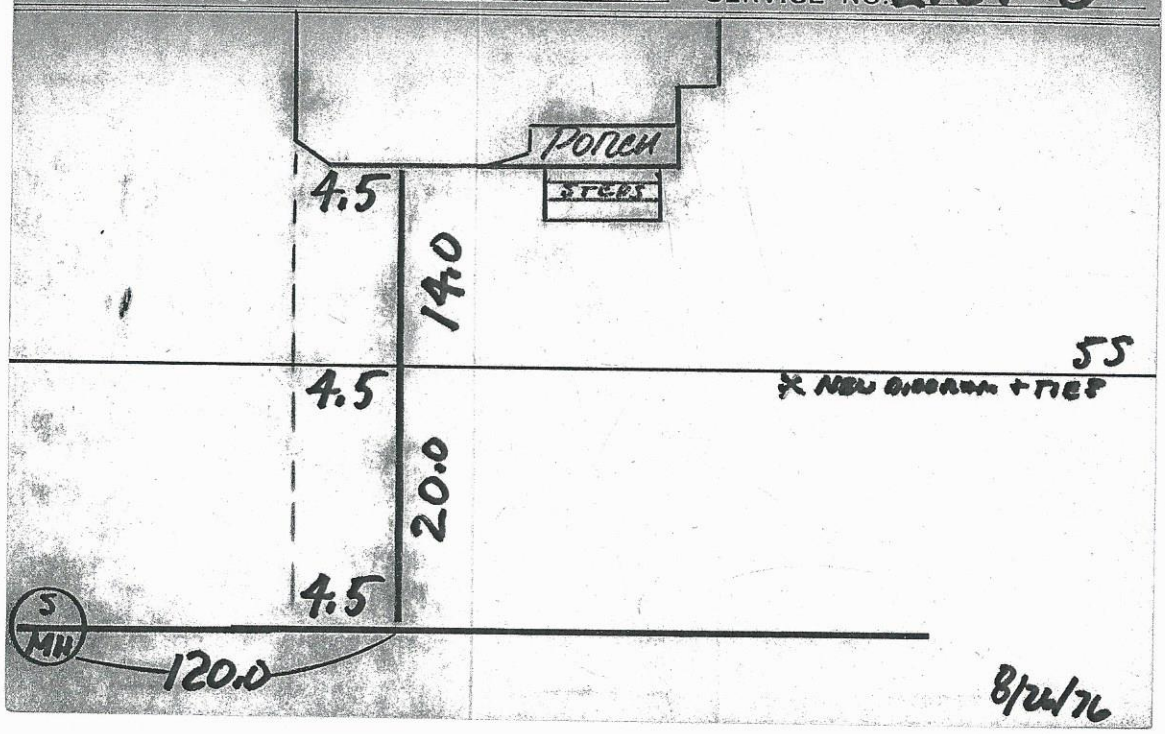
5/20/76

NO. 159 LONELL ST SERVICE NO. 2271-W



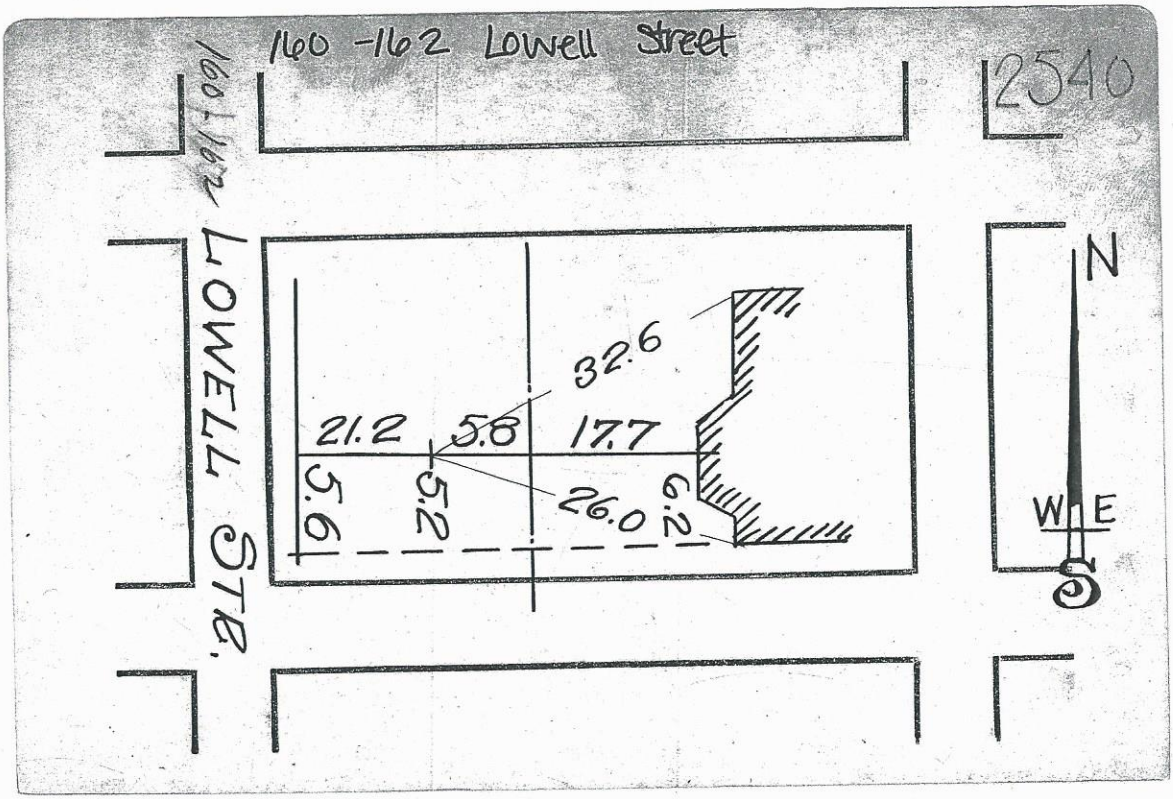
8/26/76

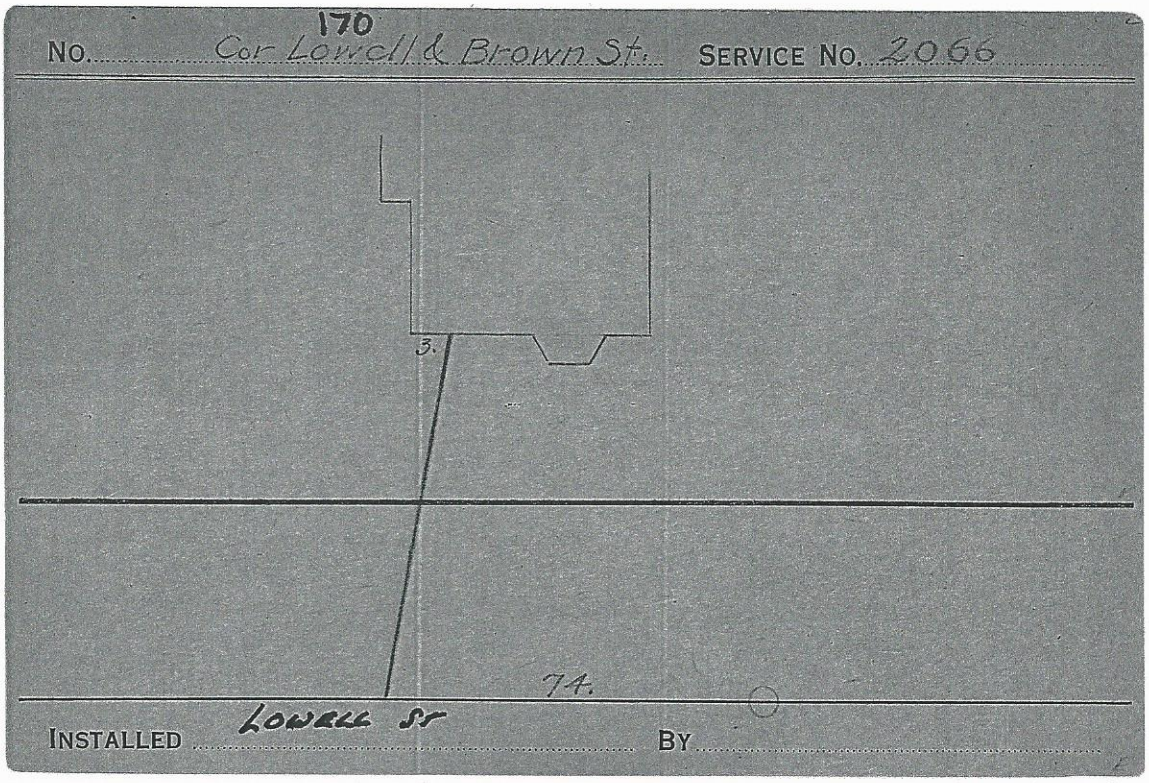
NO 159 LOWELL ST SERVICE NO. 2167-S

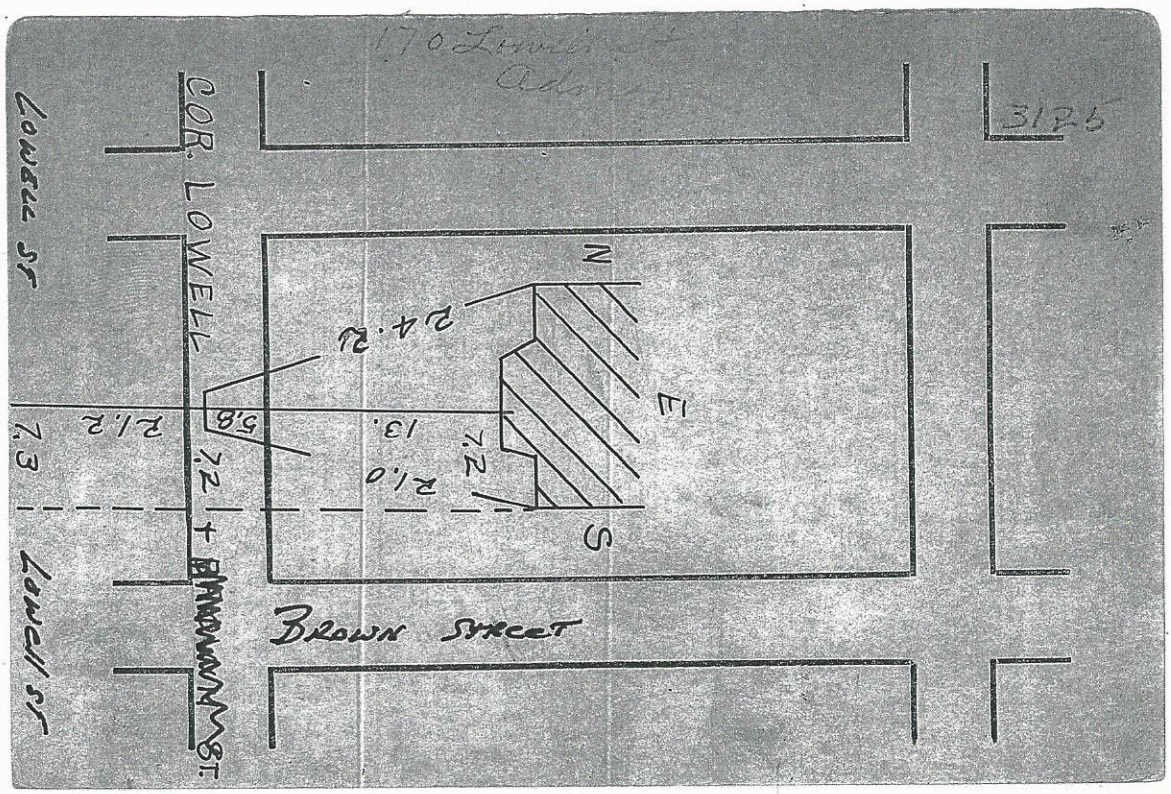


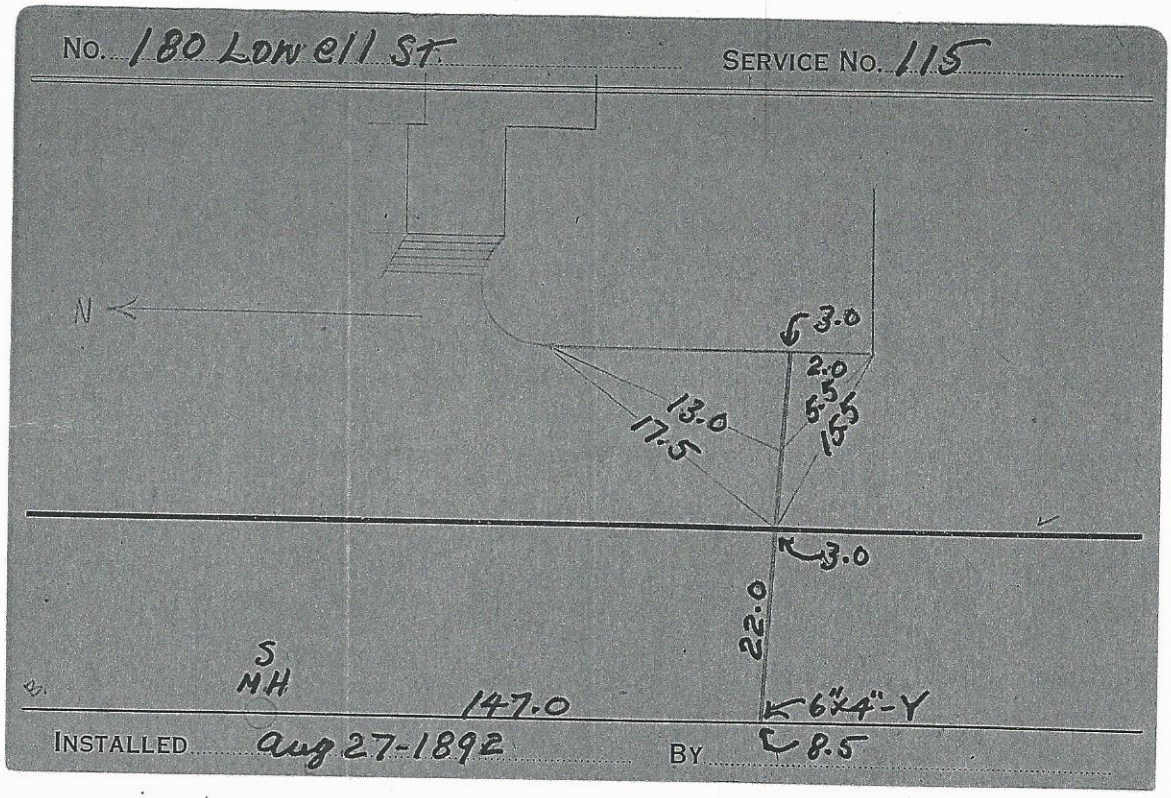
X NEW DRAIN + TIE

8/24/76

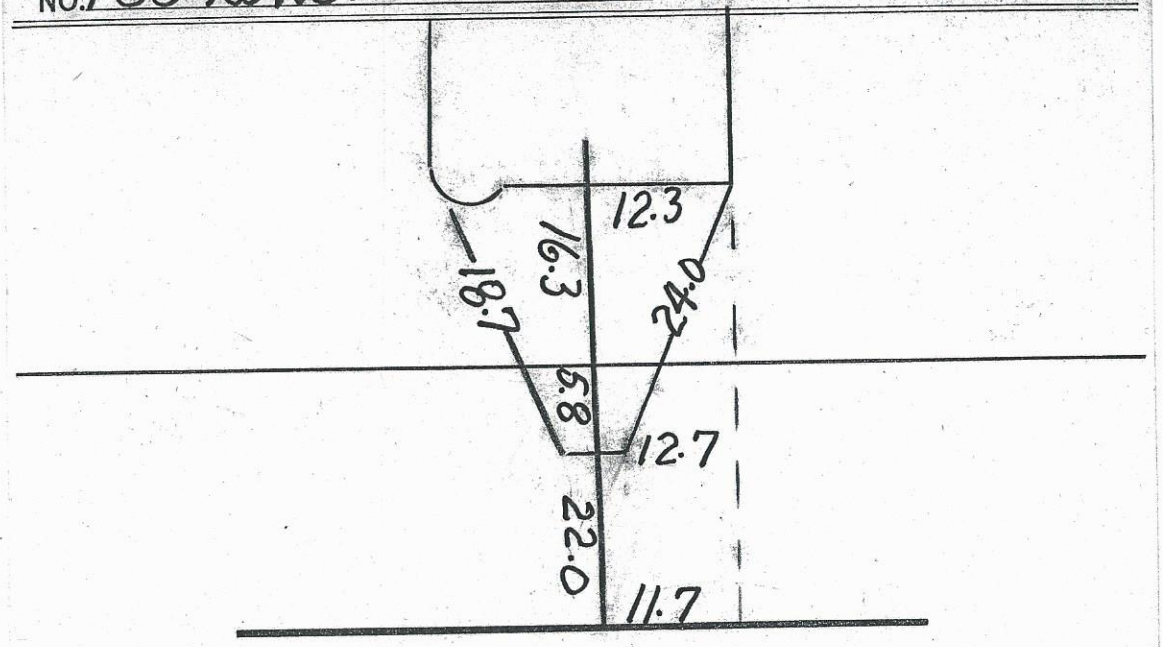

160 -162 Lowell Street
2540
160-162 LOWELL STR.
32.6
21.2
5.6
17.7
5.6
5.2
26.0
6.2
N
W
E
S


NO. 170 Cor Lowell & Brown St.
SERVICE NO. 2066
3.
74.
INSTALLED Lowell St
BY


180 Lowell St
Addition
3126
LOWELL ST
COR. LOWELL ST.
BROWN STREET
LOWELL ST
N
S
E
24.2
13.
7.2
2.0
2.2
7.3
5.8
7.2


No. 180 LOWELL ST.
SERVICE No. 115
N
3.0
2.0
13.0
17.5
5.5
15.5
3.0
22.0
S
M H
147.0
6"x4"-Y
8.5
INSTALLED aug 27-1892
BY

NO. 180 LOWELL ST SERVICE NO. 2739-W



DEC. 18-1891

ATTACHMENTS

CITY OF WALTHAM
STORM DRAIN IMPROVEMENTS

LOWELL STREET AND ASH STREET
WALTHAM, MASSACHUSETTS

ATTACHMENT A

JANUARY 2020

INDEX OF DRAWINGS		
SHEET	SHEET TITLE	DRAWING
1	G-001	TITLE SHEET AND INDEX OF DRAWINGS
2	G-002	LEGEND AND GENERAL NOTES
3	C-100	EXISTING CONDITIONS PLAN
4	C-101	PLAN AND PROFILE
5	C-102	PLAN
6	C-501	DETAILS
7	T-101	TRAFFIC DETOUR ROUTES
8	T-102	TRAFFIC DETAILS I
9	T-103	TRAFFIC DETAILS II

PROJECT LOCUS

Not To Scale

CITY ENGINEER
STEPHEN A. CASAZZA, P.E.

1/10/2020

SSV ENGINEERING INC.
609 WINTER STREET
FRAMINGHAM, MA

G-001

GENERAL NOTES

1. THE LOCATION AND DEPTH OF EXISTING UTILITIES HAVE BEEN PLOTTED FROM THE BEST AVAILABLE RECORD DATA SUPPLEMENTED WITH ON-LINE FIELD SURVEY. THE CONTRACTOR SHALL CHECK AND VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES AND NOTIFY THE STATE (DIF SAFE) MASSACHUSETTS UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM AT 1-888-344-7233, AS REQUIRED BY LAW.
2. UTILITY DATA HAS BEEN PLOTTED FROM A COMBINATION OF FIELD DATA AND MUNICIPAL LOCATION PLANS. THE LOCATION OF UTILITIES IS NOT WARRANTED TO BE CORRECT. THE CONTRACTOR IS HELD RESPONSIBLE FOR DETERMINING THE ACCURATE LOCATION OF UTILITIES IN THE FIELD.
3. EXISTING UTILITIES INTERFERING WITH WORK SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER IN THE FIELD, UNLESS OTHERWISE INDICATED OR SPECIFIED.
4. DAMAGE TO ANY UTILITY WILL BE REPAIRED BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, IN A TIMELY MANNER SO THAT DISRUPTION OF SERVICE TO ANY UTILITY WILL NOT BE LONGER THAT PRACTICALLY NECESSARY TO REPAIR DAMAGE. THE CONTRACTOR SHALL COORDINATE REPAIR WITH THE APPROPRIATE UTILITY COMPANY / OWNER.
5. THE ACTUAL NUMBER AND LOCATIONS OF TEST PITS TO BE EXCAVATED BY THE CONTRACTOR SHALL BE DETERMINED IN THE FILED BY THE ENGINEER, UNLESS OTHERWISE INDICATED OR SPECIFIED.
6. THE CONTRACTOR SHOULD BE AWARE THAT TEST PITS MAY UNCOVER CONFLICTS BETWEEN THE PROPOSED WORK AND EXISTING UTILITIES. REALIGNMENT OF PROPOSED WORK MAY BE NECESSARY, AS A RESULT, PARTICULARLY IN THOSE AREAS WHERE TEST PITS ARE INDICATED ON THE DRAWINGS. TEST PITS AND UTILITY COORDINATION SHALL BE PERFORMED AT LEAST TWO WEEKS IN ADVANCE OF CONSTRUCTION.
7. IN ADDITION TO COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS, THE CONTRACTOR SHALL TAKE ALL NECESSARY AND PROPER MEASURES AND SHALL PROVIDE ALL NECESSARY CONTINUOUS BARRIERS OF SUFFICIENT TYPE, SIZE AND STRENGTH TO PREVENT ACCESS TO ALL OPEN EXCAVATIONS AT THE COMPLETION OF EACH DAYS WORK. BARRIERS AND EQUIPMENTS SHALL BE PROVIDED WITH ALL LIGHTING NECESSARY TO PROTECT THE PUBLIC DURING WORKING AND NON-WORKING HOURS.
8. THE CONTRACTOR SHALL CONDUCT HIS CONSTRUCTION OPERATIONS SUCH THAT A MINIMUM OF ONE LANE OF TRAFFIC REMAINS OPEN AT ALL TIMES ON TRAVELLED WAYS. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION, TRAFFIC CONTROL , AND DETOURS WITH THE POLICE DEPARTMENT TO MINIMIZE OBSTRCUTION OF TRAFFIC.
9. WALLS, SIGNS, LIGHT POSTS AND GUARDRAILS AND ANY OTHER PUBLIC OR PRIVATE OBJECT DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION IN A TIMELY MANNER.
10. SEWER MANHOLE COVERS SHALL HAVE THE WORD "SEWER"CAST IN PROMINENT 3 INCH LETTERS RAISED ON THE EXTERIOR SURFACE. DRAIN MANHOLE COVERS SHALL HAVE THE WORD "DRAIN" CAST IN PROMINENT 3 INCH LETTERS RAISED ON THE EXTERIOR SURFACE.
11. MANHOLE INVERTS SHALL BE FORMED AND FILLETED AS REQUIRED TO DIRECT THE FLOW AS INDICATED, AND TO PREVENT DEPOSITION OF SOLIDS.
12. ALL EXTERIOR SURFACES OF MANHOLES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATERPROOFING BY THE CONTRACTOR.
13. OPENINGS AND KNOCKOUTS FOR PIPE IN PRECAST MANHOLE BASES SHALL BE CAST IN THE REQUIRED LOCATION DURING MANUFACTURE. FIELD CUT OPENINGS WILL NOT BE PERMITTED, UNLESS DIRECTED BY THE ENGINEER.
14. ALL EXTERIOR SURFACES OF MANHOLES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATERPROOFING BY THE CONTRACTOR.
15. "FILL CONCRETE IS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C=2000 PSI. ALL OTHER CONCRETE IS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C=3000 PSI.
16. SEWER TRENCHES EXCAVATED WIDER THAN THE TRENCH WIDTH Ws/Wu ABOVE THE "LINE OF NARROW TRENCH LIMIT" SHALL BE DONE AT THE CONTRACTOR'S OWN EXPENSE AND SHALL NOT BE MEASURED FOR PAYMENT.
17. BELOW THE "LINE OF NARROW TRENCH LIMIT" THE TRENCH SHALL NOT BE EXCAVATED BEYOND THE TRENCH WIDTH Ws/Wu.
18. IF EXCAVATION AND BACKFILL BELOW NORMAL DEPTH IS REQUIRED , SHEETING MAY BE ORDERED BY THE ENGINEER AND WILL BE PAID FOR UNDER THE BID ITEM FOR SHEETING DIRECTED TO BE LEFT IN PLACE.
19. SHEETING LEFT IN PLACE MAY BE USED WHERE DIRECTED BY THE ENGINEER. IN ALL CASES, SHEETING LEFT IN PLACE SHALL BE CUT OFF A MINIMUM OF 4'-0" BELOW TOP OF TRENCH, BUT IN NO CASE LESS THAN 1 FEET ABOVE THE CROWN OF THE PIPE, AND LEFT IN PLACE.
20. SERVICE CONNECTIONS HAVE NOT BEEN SHOWN FOR ALL UTILITIES AND THOSE SHOWN ON PLAN ARE APPROXIMATE ONLY. THE CONTRACTOR MUST COORDINATE THE LOCATION OF ALL SERVICE CONNECTIONS WITH THE WALTHAM WATER/SEWER DIVISION PRIOR TO EXCAVATION.
21. EXISTING SEWER AND MANHOLES TO BE ABANDONED AS DESCRIBED IN SECTION 01025 MEASUREMENT AND PAYMENT.
22. HEIGHT OF CHIMNEY SEWER SERVICES TO BE ADJUSTED IN THE FIELD BY THE CONTRACTOR.
23. IN LOCATION WHERE THE NEW SURFACE COURSE PAVEMENT DOES NOT JOIN INTO THE EXISTING PAVING OR CURBING, THE EXISTING GROUND SURFACE SHALL BE GRADED, LOAMED AND SEEDED TO ENSURE A GRADUAL SLOPE FROM THE TOP OF THE NEW PAVEMENT OVERLAY TO THE EXISTING GROUND SURFACE.
24. EXCAVATED MATERIALS SHALL NOT BE PLACED OR STORED WITH IN 100 FEET OF A WETLAND.
25. GROUNDWATER REMOVED FROM TRENCHES DURING CONSTRUCTION SHALL BE TREATED TO REMOVE FINES PRIOR TO DISCHARGE AS SPECIFIED OR AS DIRECTED BY THE ENGINEER.

UTILITY CONTACTS:

THE CITY OF WALTHAM - WATER/SEWER/DRAIN
WATER & SEWER FOREMAN (7AM-3PM): 781-314-3826
DAYTIME OFFICE: 781-314-3820
AFTER HOURS EMERGENCY: 781-893-3700
THE CITY OF WALTHAM - WIRES DEPARTMENT
TIM KELLY, INSPECTOR OF WIRES: 781-389-6044
VERIZON - TELEPHONE
FREDERICK WAGNER, AREA PROJECT COORDINATOR: 781-376-5067
COMCAST - CABLE
MANUEL FURTADO, AREA PROJECT COORDINATOR: 774-644-9104
NATIONAL GRID - GAS
KEITH WALTERS, AREA PROJECT COORDINATOR: 516-924-4602
EVERSOURCE - ELECTRIC
N.E. SERVICE NUMBER: 800-592-2000

SYMBOLS

EXISTING	PROPOSED	
□ ..... CATCH BASIN	□ CB	CATCH BASIN (GUTTER INLET)
	CBCI	CATCH BASIN WITH CURB INLET
(S) ..... SEWER MANHOLE		CURB (OR BERM)-TYPE NOTED
(D) ..... DRAIN MANHOLE		EDGE OF ROAD
(E) ..... ELECTRIC MANHOLE	●EHH	ELECTRIC HANDHOLE
MB ..... MAIL BOX	●EMH	ELECTRIC MANHOLE
..... GAS VALVE	●TMH	TELEPHONE MANHOLE
..... WATER VALVE	●WMH	WATER MANHOLE
VGC ..... VERTICAL GRANITE CURB	●SMH	SEWER MANHOLE
▭ ..... HAND HOLE	◉ DMH	DRAINAGE MANHOLE
15.00TC ..... TOP OF CURB	●GG	GAS GATE
14.00BC ..... BOTTOM OF CURB	◉WG	WATER GATE AND GATE BOX
14.50CL ..... CENTERLINE	●CS	CURB STOP
TT ..... TOP OF TRAP		HYDRANT
..... WROUGHT IRON FENCE		STREET LIGHT
..... UTILITY POLE		UTILITY POLE
		GUY POLE
		DRAIN PIPE
	S	SEWER MAIN
	UE	ELECTRIC DUCT
	G	GAS MAIN
	W	WATER MAIN

COMMONWEALTH OF MASSACHUSETTS
SAMUEL S. VARTIAN
REGISTERED PROFESSIONAL ENGINEER
1/10/2020

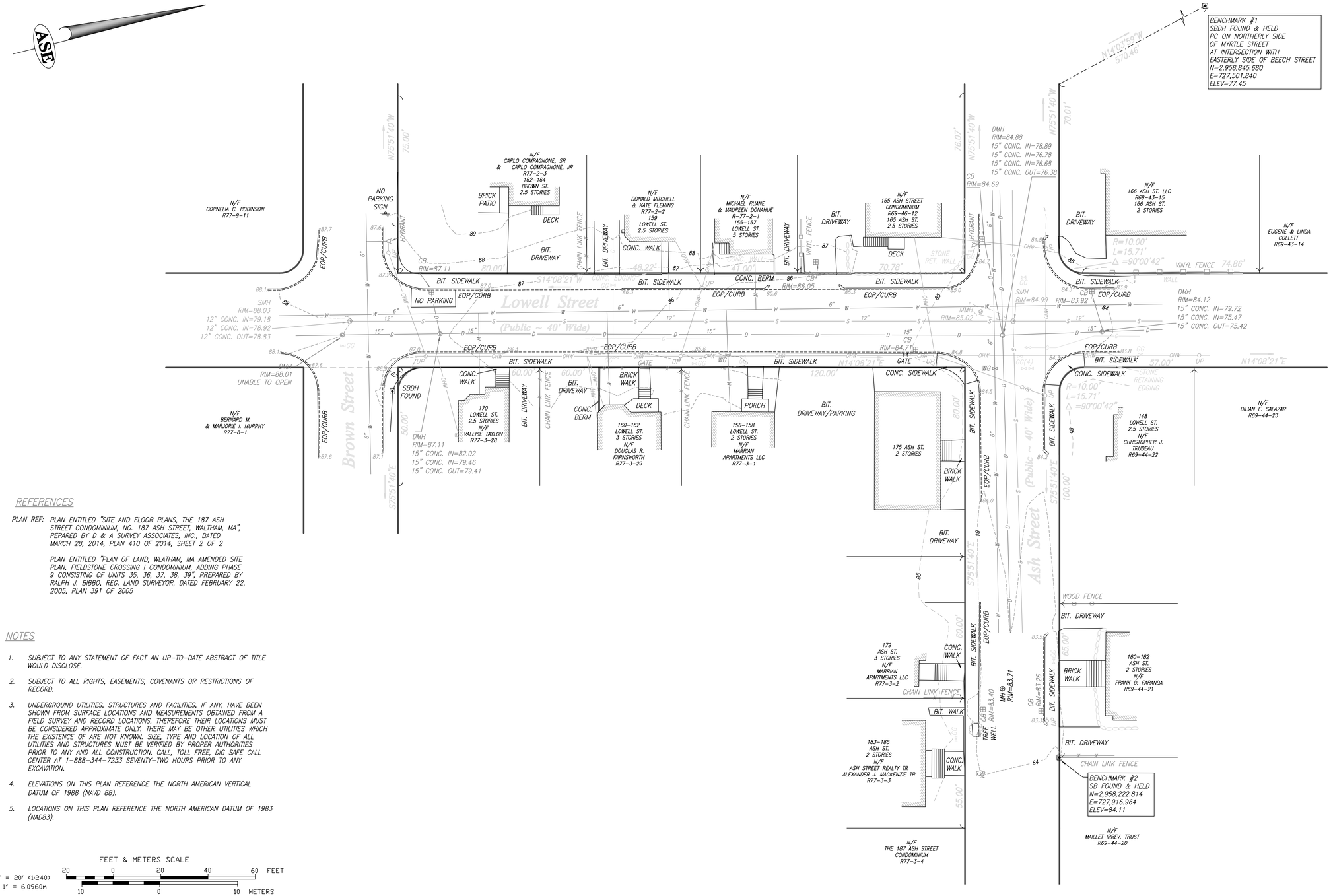
SSV ENGINEERING INC.
SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

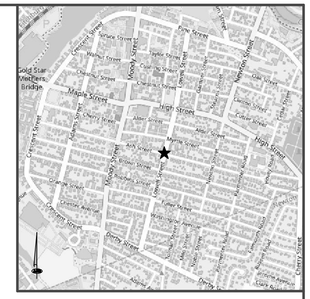
No.	Revision/Issue	Date
1	Review Comments	12/4/19

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS
LOWELL STREET & ASH STREET
WALTHAM, MA
GENERAL NOTES & LEGENDS

Project	Sheet
Date: NOV 2019	G-002
Scale	





LOCUS MAP
SCALE: 1" = 1,200'

LEGEND

SB	STONE BOUND
SBDH	STONE BOUND DRILL HOLE
EOP	EDGE OF PAVEMENT
84.3x	SPOT ELEVATION
CB	CATCH BASIN
DMH	DRAIN MANHOLE
—D—D—	DRAIN LINE
UP	UTILITY POLE
—OHW—	OVERHEAD WIRES
E	ELECTRIC METER
MH	MANHOLE
MMH	MEDIA MANHOLE
GG	GAS GATE
—G—G—	GAS PAINT
WG	WATER GATE
—W—W—	WATER LINE
SMH	SEWER MANHOLE
—S—S—	SEWER LINE
PC	POINT OF CURVATURE
R77-3-1	CITY OF WALTHAM MAP-BLOCK-LOT

REFERENCES

PLAN REF: PLAN ENTITLED "SITE AND FLOOR PLANS, THE 187 ASH STREET CONDOMINIUM, NO. 187 ASH STREET, WALTHAM, MA", PEPARED BY D & A SURVEY ASSOCIATES, INC., DATED MARCH 28, 2014, PLAN 410 OF 2014, SHEET 2 OF 2

PLAN ENTITLED "PLAN OF LAND, WLATHAM, MA AMENDED SITE PLAN, FIELDSTONE CROSSING I CONDOMINIUM, ADDING PHASE 9 CONSISTING OF UNITS 35, 36, 37, 38, 39", PREPARED BY RALPH J. BIBBO, REG. LAND SURVEYOR, DATED FEBRUARY 22, 2005, PLAN 391 OF 2005

NOTES

1. SUBJECT TO ANY STATEMENT OF FACT AN UP-TO-DATE ABSTRACT OF TITLE WOULD DISCLOSE.
2. SUBJECT TO ALL RIGHTS, EASEMENTS, COVENANTS OR RESTRICTIONS OF RECORD.
3. UNDERGROUND UTILITIES, STRUCTURES AND FACILITIES, IF ANY, HAVE BEEN SHOWN FROM SURFACE LOCATIONS AND MEASUREMENTS OBTAINED FROM A FIELD SURVEY AND RECORD LOCATIONS, THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHER UTILITIES WHICH THE EXISTENCE OF ARE NOT KNOWN. SIZE, TYPE AND LOCATION OF ALL UTILITIES AND STRUCTURES MUST BE VERIFIED BY PROPER AUTHORITIES PRIOR TO ANY AND ALL CONSTRUCTION. CALL, TOLL FREE, DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO ANY EXCAVATION.
4. ELEVATIONS ON THIS PLAN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. LOCATIONS ON THIS PLAN REFERENCE THE NORTH AMERICAN DATUM OF 1983 (NAD83).

FEET & METERS SCALE
1" = 20' (1:240)
1" = 6.0960m
20 0 20 40 60 FEET
10 0 10 METERS

C-100

ZONING DESIGNATION:
CITY OF WALTHAM ZONING DISTRICT
RESIDENCE B

I CERTIFY THAT THIS PLAN IS BASED ON A FIELD SURVEY PERFORMED ON THE GROUND ON SEPTEMBER 5, 2019, AND THE LATEST PLANS AND DEEDS OF RECORD.

I CERTIFY THAT THE PORTION OF ROADWAYS SHOWN HEREON LIES IN A ZONE "X", SHOWN ON MAP NUMBER 25017C0551E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

REVISIONS

DATE	DESCRIPTION

FIELD: MRI/BMD
CALCS: EJP/SMI
DRAWN BY: SMI
FIELD EDIT: N/A
CHECKED: EJP
APPROVED:
JOB #: 191743

PROFESSIONAL LAND SURVEYOR DATE

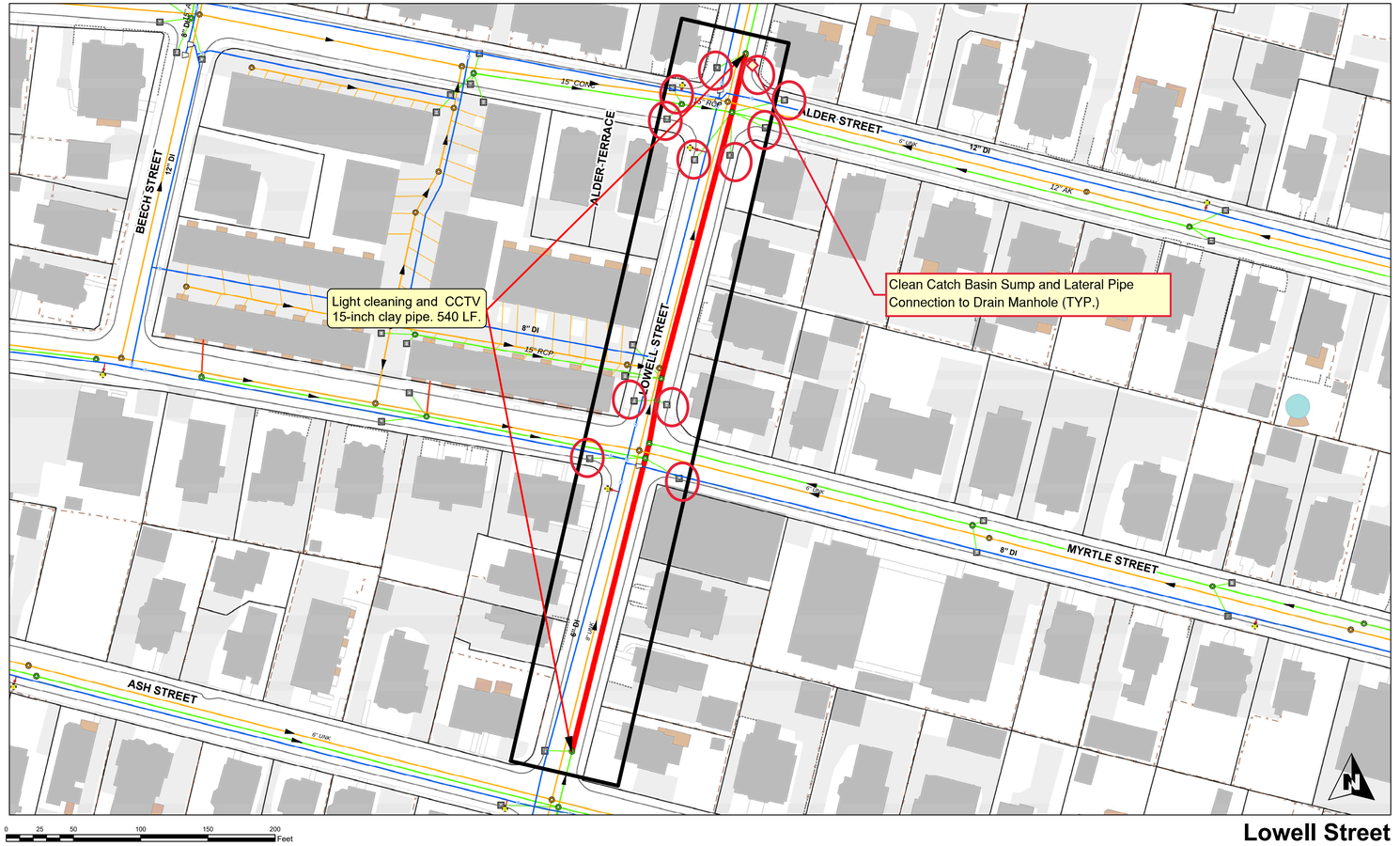
A.S. Elliott & Associates
Professional Land Surveyors
P.O. BOX 85 ~ HOPEDALE, MA 01747
(508) 634-0256
www.aselliott.com

Existing Conditions Plan of Land

LOWELL STREET, ASH STREET
WALTHAM, MASSACHUSETTS
PREPARED FOR: SAM BADE
SCALE: 1" = 20' DATE: SEPTEMBER 5, 2019

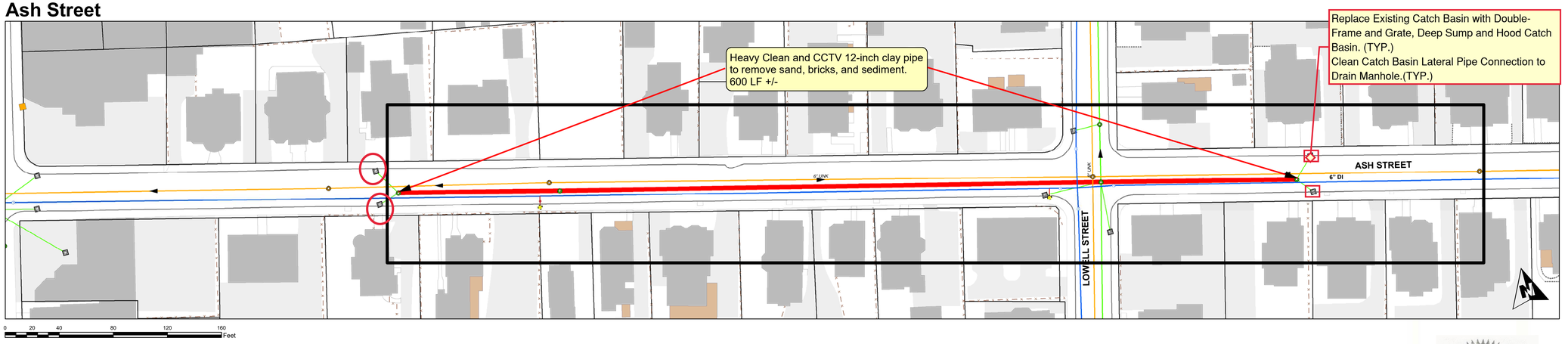
Legend

Hydrants	Fence	Parcel Lines
Gate Valve	Retaining Wall	Walkway/Sidewalk
Hydrant Gate	Edge of Pavement	Building Footprint
Hydrant Lateral	Catch Basins	Deck
Water Main	Drain Manholes	Paved Area
Grease Trap	Pipes to be cleaned	
Sewer Manhole	Catch Basin Lateral	
Sewer Main	Gravity	



Lowell Street

Ash Street



SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.	Revision/Issue	Date

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

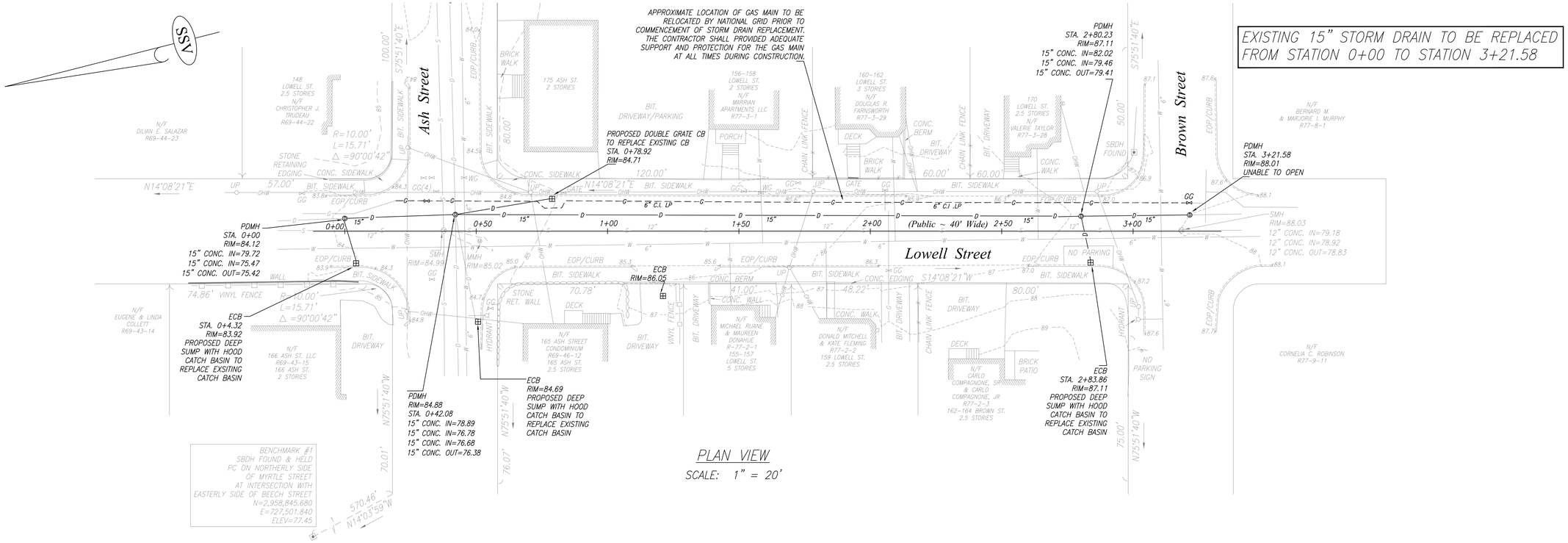
STORM DRAIN IMPROVEMENTS
LOWELL STREET & ASH STREET
WALTHAM, MA
PLAN

Project	Sheet
Date: NOV 2019	C-102
Scale	

COMMONWEALTH OF MASSACHUSETTS
JAMES P. SMITH
REGISTERED PROFESSIONAL ENGINEER
11/10/2020

Document Path: G:\Maps\Ash Street @ Lowell Street - Drainage Improvements - Panels.mxd

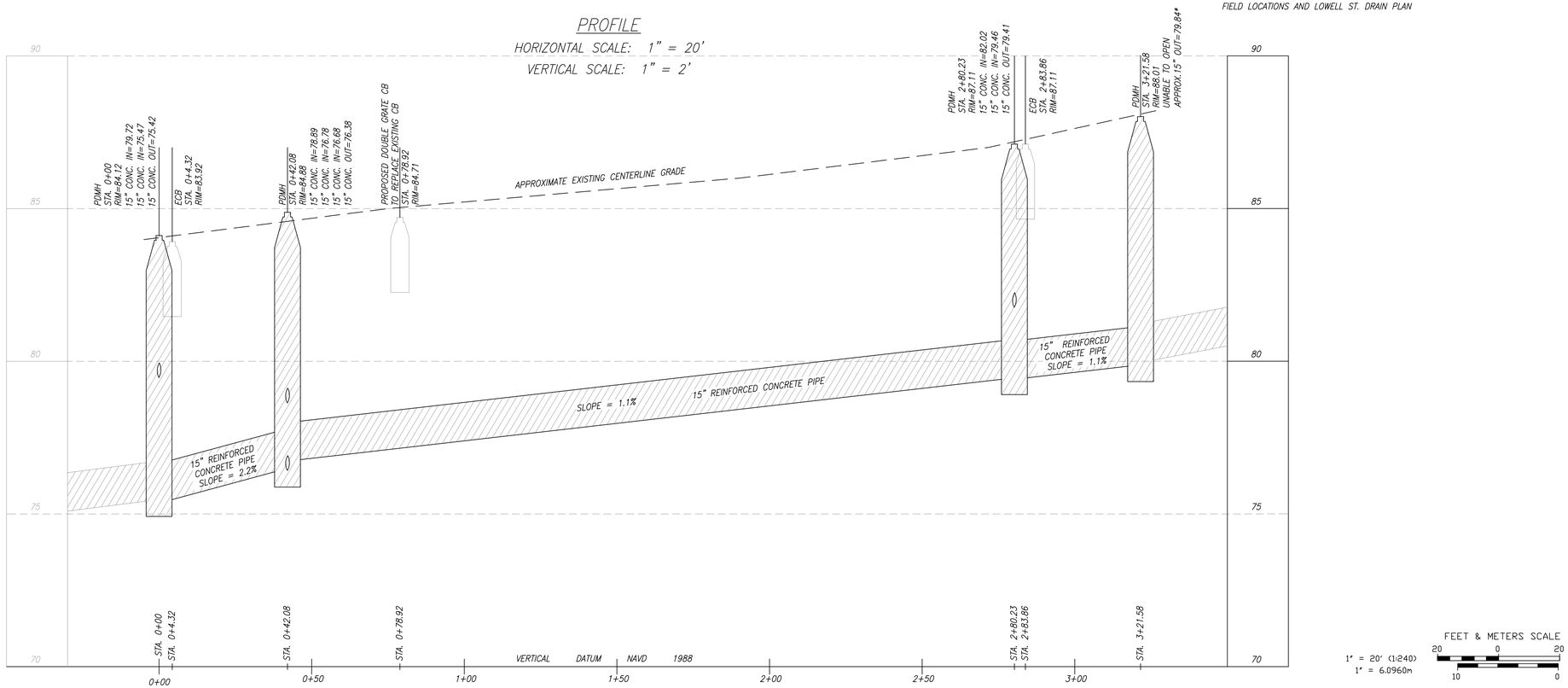
EXISTING 15" STORM DRAIN TO BE REPLACED FROM STATION 0+00 TO STATION 3+21.58



PLAN VIEW
SCALE: 1" = 20'

* APPROXIMATE INVERT DATA CALCULATED FROM FIELD LOCATIONS AND LOWELL ST. DRAIN PLAN

PROFILE
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 2'



FEET & METERS SCALE
1" = 20' (1:240)
1" = 6.0960m
20 0 20
10 0

SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.	Revision/Issue	Date
1	ADD NOTES	12/11/19

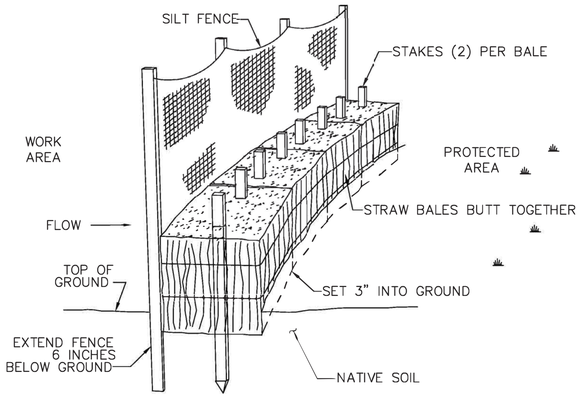
ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS

WALTHAM, MASSACHUSETTS

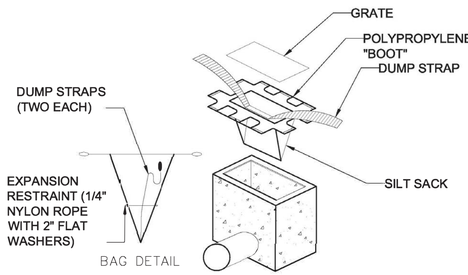
PLAN AND PROFILE

Project	Sheet
Date	
Scale 1" = 20'	



SEDIMENTATION CONTROL BARRIER

NOT TO SCALE



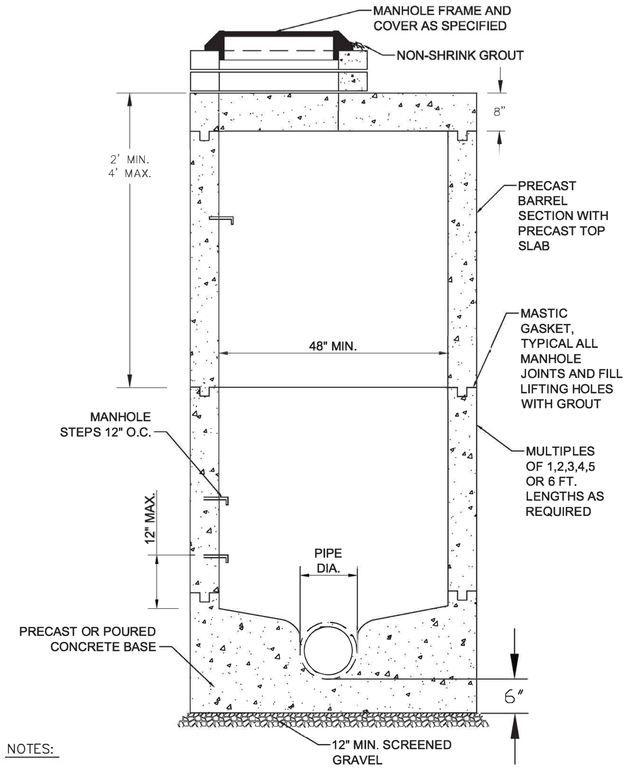
INSTALLATION DETAIL

NOTES:

1. TEMPORARY INLET SEDIMENT FILTER TO BE INSTALLED ON ALL CATCH BASINS OR STORM INLETS WITHIN THE PROJECT LIMITS.
2. INLET FILTER TO BE SIMILAR TO "STREAMGUARD" AS MANUFACTURED BY STORMWATER SERVICES CORPORATION (206–767–0441), "SILTSACK" AS MANUFACTURED BY GEO–SYNTHETICS, LLC (800–444–5523), OR "SILTSACK" AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS, INC. (800–448–3636).
3. INSPECT FILTER REGULARLY AND CLEAN AS NEEDED.

INLET PROTECTION DETAIL

NOT TO SCALE

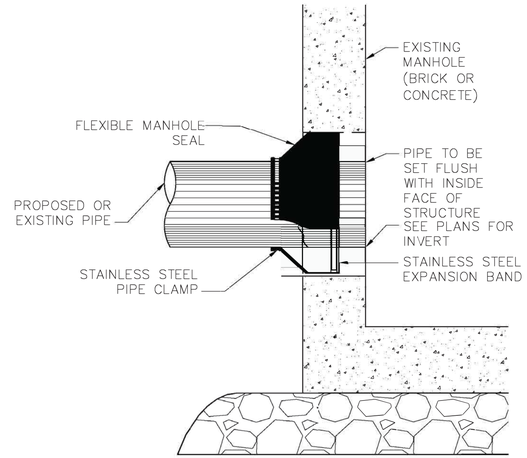


NOTES:

1. FLAT TOP MANHOLE IS REQUIRED WHEN THE CONNECTING PIPE HAS LESS THAN 3 FEET OF COVER.
2. FOR MANHOLES WITH DIAMETERS GREATER THAN 4' THE WALL AND BASE THICKNESS SHALL BE PER PRECAST MANUFACTURER'S STANDARD STRUCTURE FOR THE INDICATED DIAMETER. IN ADDITION THE MANUFACTURER'S STANDARD REDUCER SECTION FOR EACH DIAMETER SHALL BE USED WHERE REQUIRED TO MEET 4' DIAMETER ECCENTRIC CONE.
3. PROVIDE RESILIENT CONNECTOR WHERE PIPE ENTERS MANHOLE.
4. DESIGN LIVE LOAD HS20–44.

DRAIN MANHOLE - FLAT TOP

NOT TO SCALE



NOTES:

1. ALL METAL FIXTURES SHALL BE STAINLESS STEEL.
2. SERVICE LINE SHALL BE FLUSH WITH THE INSIDE OF THE MANHOLE.
3. FOR MANHOLE INSTALLATION AT EXISTING PIPE, CONTRACTOR SHALL EXTEND PIPE INTO NEW MANHOLE USING A SPOOL PIECE (OF SAME PIPE MATERIAL) WITH FERNCO COUPLES.

CONNECTION TO MANHOLE

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
JOHN H. SMITH
REGISTERED PROFESSIONAL ENGINEER
1/10/2020

SSV ENGINEERING INC.

SSV ENGINEERING
609 WINTER STREET,
FRAMINGHAM, MA

No.		Date

INCORPORATED A TOWN 1738 · WALTHAM · INCORPORATED A CITY 1884

ENGINEERING DEPARTMENT
CITY OF WALTHAM
MASSACHUSETTS

STORM DRAIN IMPROVEMENTS

LOWELL STREET & ASH STREET
WALTHAM MA
DETAILS

Project	Sheet
Date: OCT 2019	C-501
Scale	

PHASE 1 DETOUR ROUTE

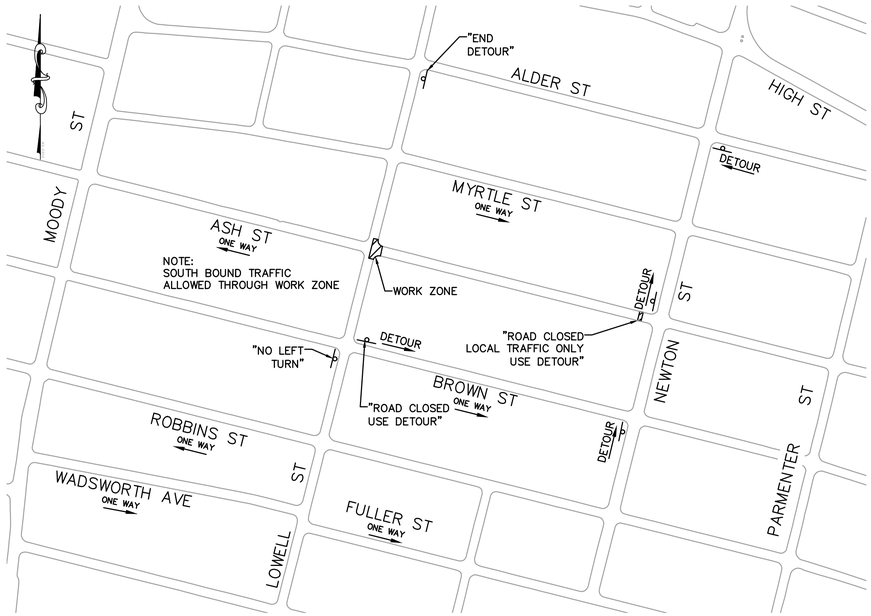
N.T.S.

PHASE 2 DETOUR ROUTE

N.T.S.

GENERAL TRAFFIC DETOUR NOTES:

1. WORK HOURS SHALL BE LIMITED BETWEEN 7:30AM AND 4:30PM OVER THE ENTIRE PROJECT AREA UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE CITY.
2. ALL TRENCHES AND OPEN CUTS SHALL BE MADE PASSABLE BY THE END OF EACH WORKDAY.
3. DETOUR ROUTES SHOWN WITHIN THESE PLANS ARE FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO SUBMIT A TRAFFIC MANAGEMENT PLAN (TMP) FOR APPROVAL AT THE PRE-CONSTRUCTION MEETING.
4. CONTRACTOR TO INSTALL TEMPORARY CONSTRUCTION SIGNS PRIOR TO THE IMPLEMENTATION OF ANY ALTERATIONS IN NORMAL TRAFFIC PATTERNS.
5. SIGNS SHALL BE COVERED OR BAGGED AT THE END OF EACH WORKDAY WHEN NOT IN USE. ALL SIGNS SHALL BE REMOVED ONCE NO LONGER APPLICABLE.
6. SIGNS SHALL BE INSTALLED IN SUCH A MANNER AS TO NOT BLOCK OR IMPEDE PEDESTRIAN TRAFFIC ALONG SIDEWALKS OR OTHER WALKWAYS.
7. CONTRACTOR SHALL SEQUENCE ALL WORK AS TO MAINTAIN SIMILAR TRAFFIC PATTERN ALTERATIONS FROM DAY TO DAY. WORK SHALL BE DONE IN SEGMENTS TO MINIMIZE THE CHANGES IN TRAFFIC PATTERN ALTERATIONS. CONTRACTOR IS TO SUBMIT PROPOSED SEQUENCE OF WORK AT THE PRE-CONSTRUCTION MEETING FOR APPROVAL.
8. ALL CONSTRUCTION SIGNS ARE TO BE MADE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, MUTCD. HAND PAINTED OR MARKED SIGNS WILL BE REJECTED.
9. DETOUR ARROWS DEPICTED ON THESE DRAWINGS INDICATE THE DIRECTION OF TRAFFIC FLOW. DETOUR SIGNS FURNISHED AND INSTALLED SHALL DIRECT TRAFFIC IN THE PROPER DIRECTION.
10. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING PROPER DETOUR SIGNS FOR USE IN DIRECTING TRAFFIC IN THE INTENDED DIRECTION. SIGNS SHALL NOT BE FLIPPED OR ROTATED TO CHANGE THE SIGNS DIRECTION. THE "DETOUR" TEXT SHALL BE ORIENTED IN A READABLE FASHION WHILE THE ARROW IS IN THE PROPER DIRECTION.
11. SIGNS SHALL BE AFFIXED TO A PERMANENT OR SEMI-PERMANENT BASE THAT IS RESISTANT TO TIPPING AND / OR MOVEMENT IN GENERAL. THE USE OF TRAFFIC CONES TO SUPPORT SIGNS WILL NOT BE PERMITTED.
12. SIGNS THAT ARE, IN THE OPINION OF THE ENGINEER, IN POOR CONDITION SHALL BE PROMPTLY REMOVED FROM THE JOB SITE AND REPLACED WITH A SIGN IN GOOD CONDITION BY THE CONTRACTOR.



PHASE 3 DETOUR ROUTE

N.T.S.

SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:			
DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV

DATE: 12/31/2019
SCALE: N.T.S.
FILE: ASH&LOWELL

T-101 DETOUR ROUTES

TRAFFIC MANAGEMENT NOTES:

GENERAL:

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE MHD STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TRAFFIC MANAGEMENT PLANS.
2. THE TRAFFIC MANAGEMENT PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D. AND AS APPROVED OR REQUIRED BY THE CITY. THE CONTRACTOR SHALL SUBMIT ALTERNATE TRAFFIC CONTROL PLANS FOR APPROVAL WHEN NECESSARY.
3. WORK WITHIN THE TRAVELED WAY SHALL BE DETERMINED DURING THE PRE-CONSTRUCTION MEETING.
4. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
5. TEMPORARY CONSTRUCTION SIGNING, BARRICADES AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
6. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
7. CONTRACTOR SHALL MAINTAIN ABUTTER ACCESS AT ALL TIMES EXCEPT FOR VERY SHORT PERIODS APPROVED BY THE TOWN. CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
8. THE FIRST THREE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
9. THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE AS SHOWN ON THESE PLANS OR AS DETERMINED BY THE ENGINEER.
10. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
11. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
12. MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER. ONE (1) THROUGH TRAVEL LANE HAVING A MINIMUM WIDTH OF 11 FEET MAY BE PROVIDED FOR BOTH DIRECTIONS(LANE TO BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE IN SOME SITUATIONS UNDER POLICE CONTROL) EXCEPT WHERE ROAD CLOSURE IS SHOWN ON THE DRAWINGS OR OTHERWISE PERMITTED BY ENGINEER.
13. LANE RESTRICTIONS MAY NOT REMAIN DURING NON-WORKING HOURS. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS.
14. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
15. IF APPROVED BY OWNER & AGENCY WITH JURISDICTION, NIGHT WORK OPERATIONS SHALL INCLUDE PROPERLY LIT & PLACED LUMINAIRES MEETING THE REQUIREMENTS OF THE MUTCD AND MASSDOT.
16. ALL TRAFFIC MANAGEMENT SETUPS SHOULD ACCOMMODATE LARGE VEHICLES (WB-50) UNLESS A TRUCK EXCLUSION IS PRESENT.
17. ALL WORK ZONE AREAS SHOULD BE PROTECTED APPROPRIATELY. ALL EXPOSED WORK ZONES SHOULD BE STEEL PLATED OR BACK FILLED WHEN NO WORK IS UNDERWAY/PERFORMED AND APPROPRIATELY SIGNED.

GRADE DIFFERENCES:

1. WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN THE EXISTING PAVEMENT AND COLD PLANED OR NEW PAVEMENT, THE CONTRACTOR SHALL PATCH A TEMPORARY HOT MIX ASPHALT WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.
2. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.
3. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.
4. A MINIMUM SLOPE OF 4:1 MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, NEXT SHEET). A MINIMUM SLOPE OF 8:1 MUST BE MAINTAINED ON ALL ABUTTED ACCESS DRIVES AND A MINIMUM SLOPE OF 12:1 MUST BE MAINTAINED ON ALL SIDEWALKS.

CONSTRUCTION SIGNING:

1. THE FIRST CONSTRUCTION SIGN IN A SERIES ON EACH APPROACH TO THE PROJECT SHALL BE FLUORESCENT ORANGE, HIGH PERFORMANCE (OR HIGH DENSITY) SHEETING.
2. ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED AND SHALL CONFORM TO THE MUTCD.
3. EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS REQUIRED BY THE TOWN.
4. ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.
5. IF USED, W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY LANE RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT IN ACCORDANCE WITH NOTE ABOVE.
6. USE W20-8 SIGNS ONLY WHILE POLICE ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH WORK DAY.
7. SIGNS MUST BE PROFESSIONALLY LETTERED. NO HANDWRITTEN/PAINTED SIGNS SHALL BE ALLOWED.
8. WHERE LANE SHIFTS, WORK ZONES, OR OTHER CONSTRUCTION ACTIVITIES INFRINGE UPON ON-STREET PARKING AREAS, THE CONTRACTOR SHALL INSTALL TEMPORARY 'NO PARKING/TOW AWAY ZONE' SIGNS (R8-3/R7-201) AS APPROPRIATE AT LEAST 24 HOURS IN ADVANCE. THE R8-3/R7-201 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY UNLESS PARKING RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT AS REQUIRED BY THE TOWN.

PAVEMENT MARKINGS:

1. PAVEMENT MARKINGS WHICH ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TRAFFIC MANAGEMENT PLANS AND AS REQUIRED BY THE TOWN.
2. ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT TAPE, AS REQUIRED BY THE TOWN. FOR THE FULL DURATION OF THE PHASE IN PROGRESS. TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

FORMULAS FOR DETERMINING TAPER LENGTHS

Speed Limit (S)	Taper Length (L) Feet
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR MORE	$L = WS$

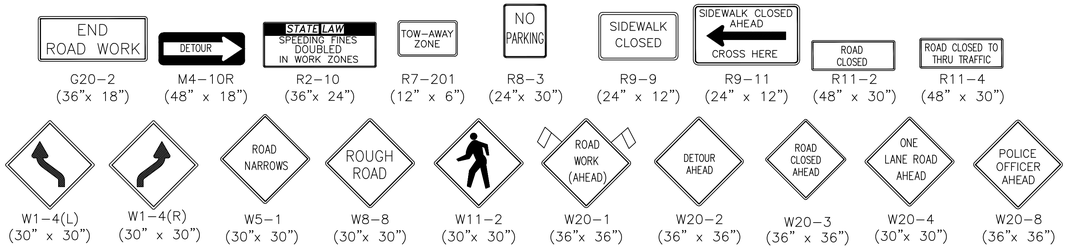
WHERE: L = TAPER LENGTH IN FEET (METERS)

W = WIDTH OF OFFSET IN FEET (METERS)

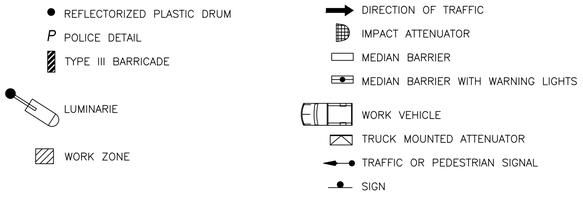
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 2003 MUTCD

SIGN LEGEND:



LEGEND:



TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

Type of Taper	Taper Length (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	100 FT MAXIMUM
DOWNSTREAM TAPER	100 FT PER LANE

Source: Table 6C-3 2003 MUTCD

SUGGESTED WORK ZONE WARNING SIGN SPACING

Road Type	Distance Between Signs**		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350	350	350
MOST OTHER ROADWAYS*	500	500	500
FREEWAYS AND EXPRESSWAYS*	1,000	1,500	2,640

* SPEED CATEGORY TO BE DETERMINED BY MASSDOT.

** DISTANCES ARE SHOWN IN FEET. THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/ TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS REFERRED TO AS THE INITIAL ADVANCE WARNING SIGN ON THE TMP SETUPS. IT IS THE ONE WHICH MAY OFTEN HAVE THE "STANDARD RED OR RED-ORANGE FLAGS (16 in. X 16 in.)" MOUNTED ON IT. THESE INITIAL ADVANCE WARNING SIGNS ARE LOCATED AT THE PROJECT LIMITS ON ALL APPROACHES (i.e. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10 SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS.

R2-10, W20-1 AND G20-2 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

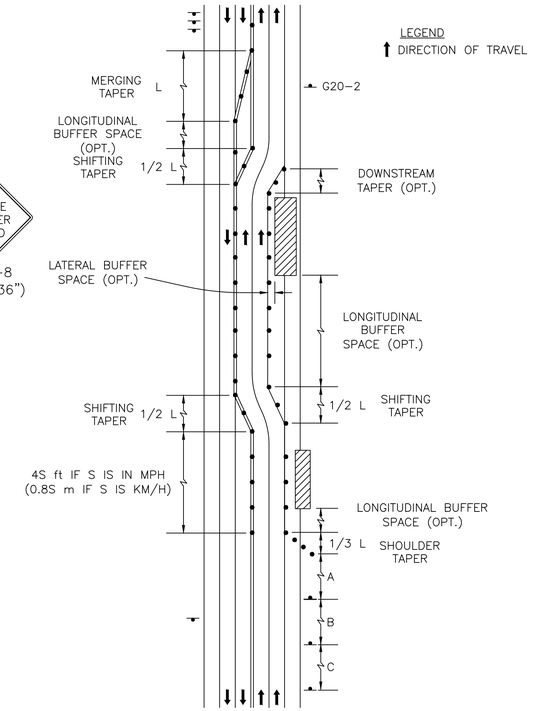
SPEED* (mph)	DISTANCE (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

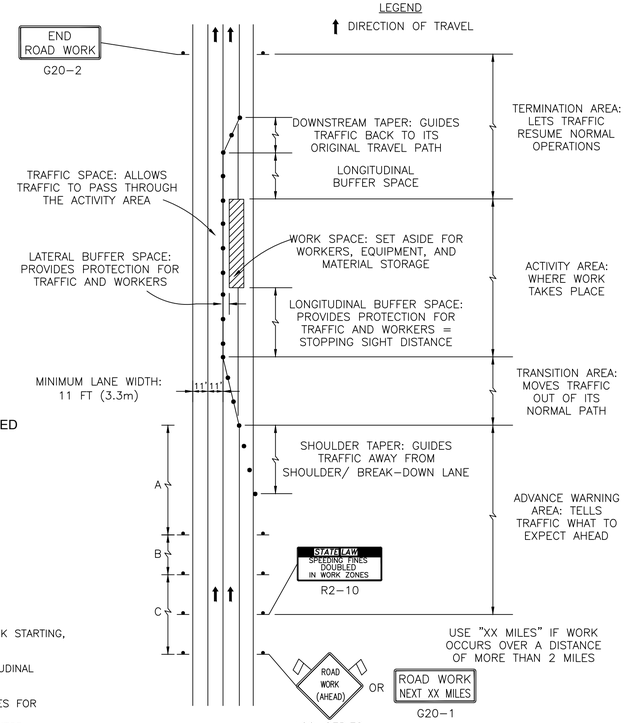
THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 2003 MUTCD



TYPES OF TAPERS AND BUFFER SPACES

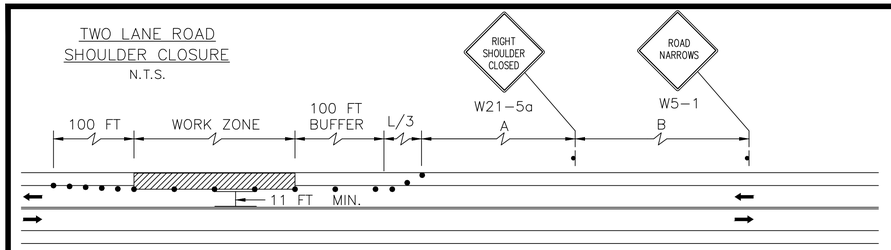


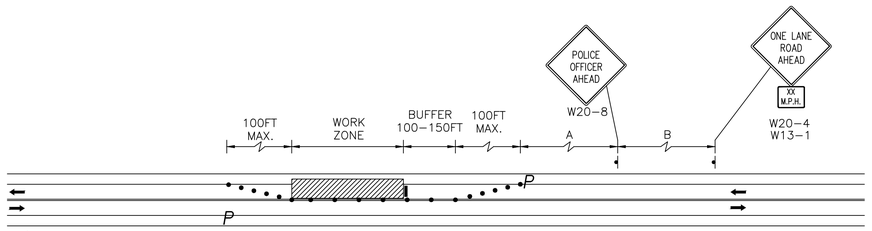
COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL ZONE

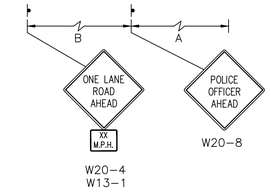
SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:	DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV
	DATE: 12/31/2019	SCALE: N.T.S.	FILE: ASH&LOWELL	**T-102 TRAFFIC DETAILS I**

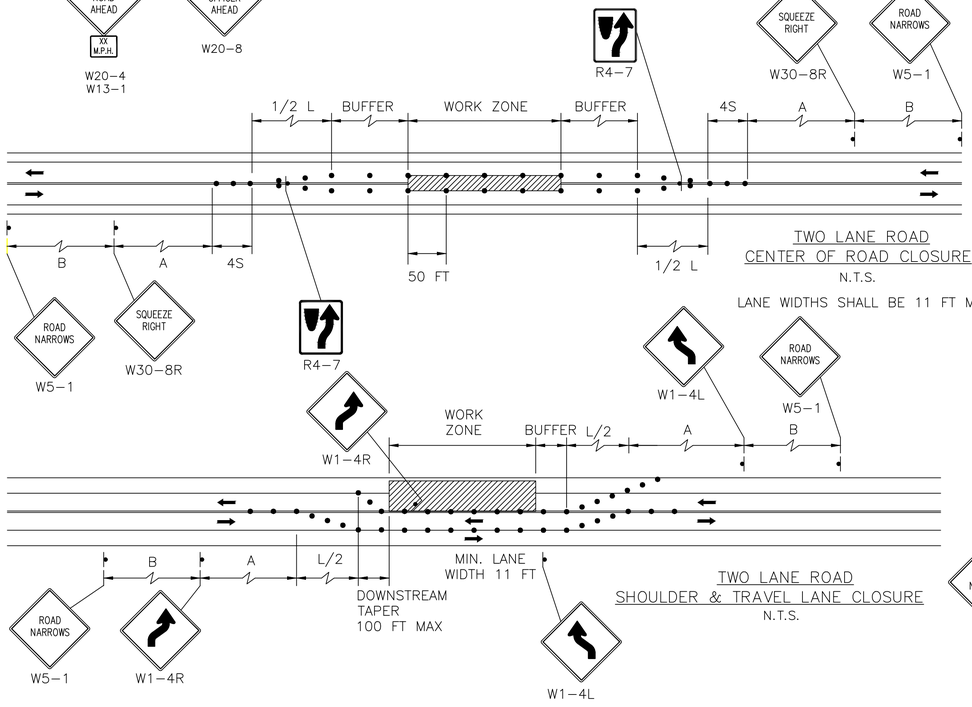
TWO LANE ROAD SHOULDER CLOSURE
N.T.S.







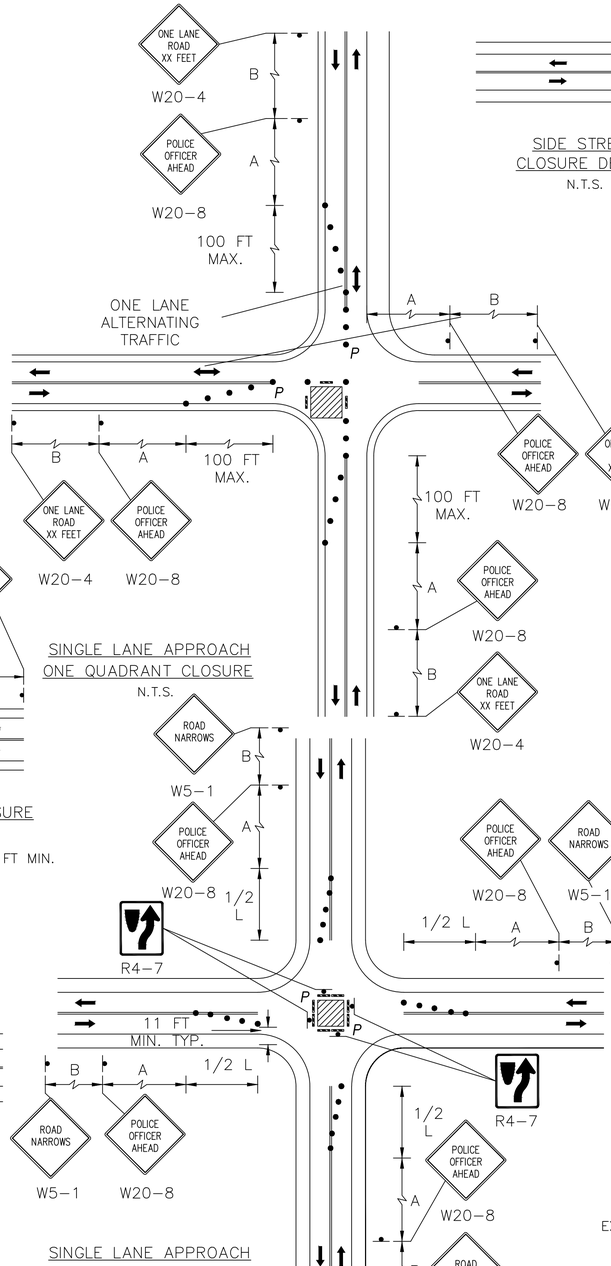
TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC WITH POLICE DETAIL
N.T.S.



TWO LANE ROAD SHOULDER & TRAVEL LANE CLOSURE
N.T.S.

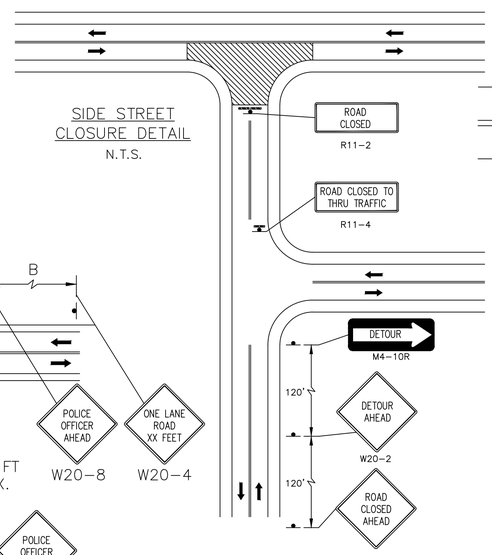
TWO LANE ROAD CENTER OF ROAD CLOSURE
N.T.S.

LANE WIDTHS SHALL BE 11 FT MIN.

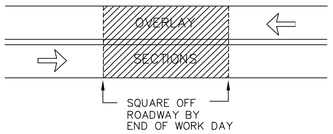


SINGLE LANE APPROACH ONE QUADRANT CLOSURE
N.T.S.

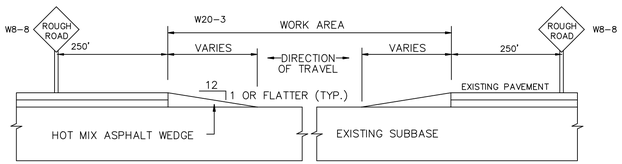
SINGLE LANE APPROACH CENTER CLOSURE
N.T.S.



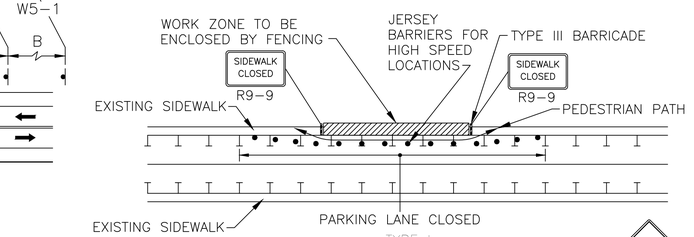
SIDE STREET CLOSURE DETAIL
N.T.S.



AFTER WORK HOURS TREATMENT FOR AREAS RECEIVING OVERLAY
N.T.S.



TEMPORARY RAMP
N.T.S.



PEDESTRIAN BYPASS
N.T.S.

NOTES

1. ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
2. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE TOWN.
5. BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE TOWN.

GUIDELINE FOR CHANNELIZATION

TAPER LENGTH (ft.)	MINIMUM NUMBER OF CHANNELIZING DEVICES NEEDED								
	20 MPH			35 MPH			45 MPH		
	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA
100	5	3		5	3		5	3	
150	8	4		6	3		6	3	
200	10	5	ONE	7	4	ONE	6	4	ONE
250	12	6		9	5		7	4	
300	15	7	DRUM	10	5	DRUM	8	4	DRUM
350	18	9		11	6		9	5	
400	20	10	EVERY	13	7	EVERY	10	6	EVERY
450	22	11	20'	14	7	35'	11	6	45'
500	25	12		16	8		13	7	
550	27	13	(MAX.)	17	8	(MAX.)	14	7	(MAX.)
600	30	15		19	10		15	9	
650	32	16		20	10		16	9	

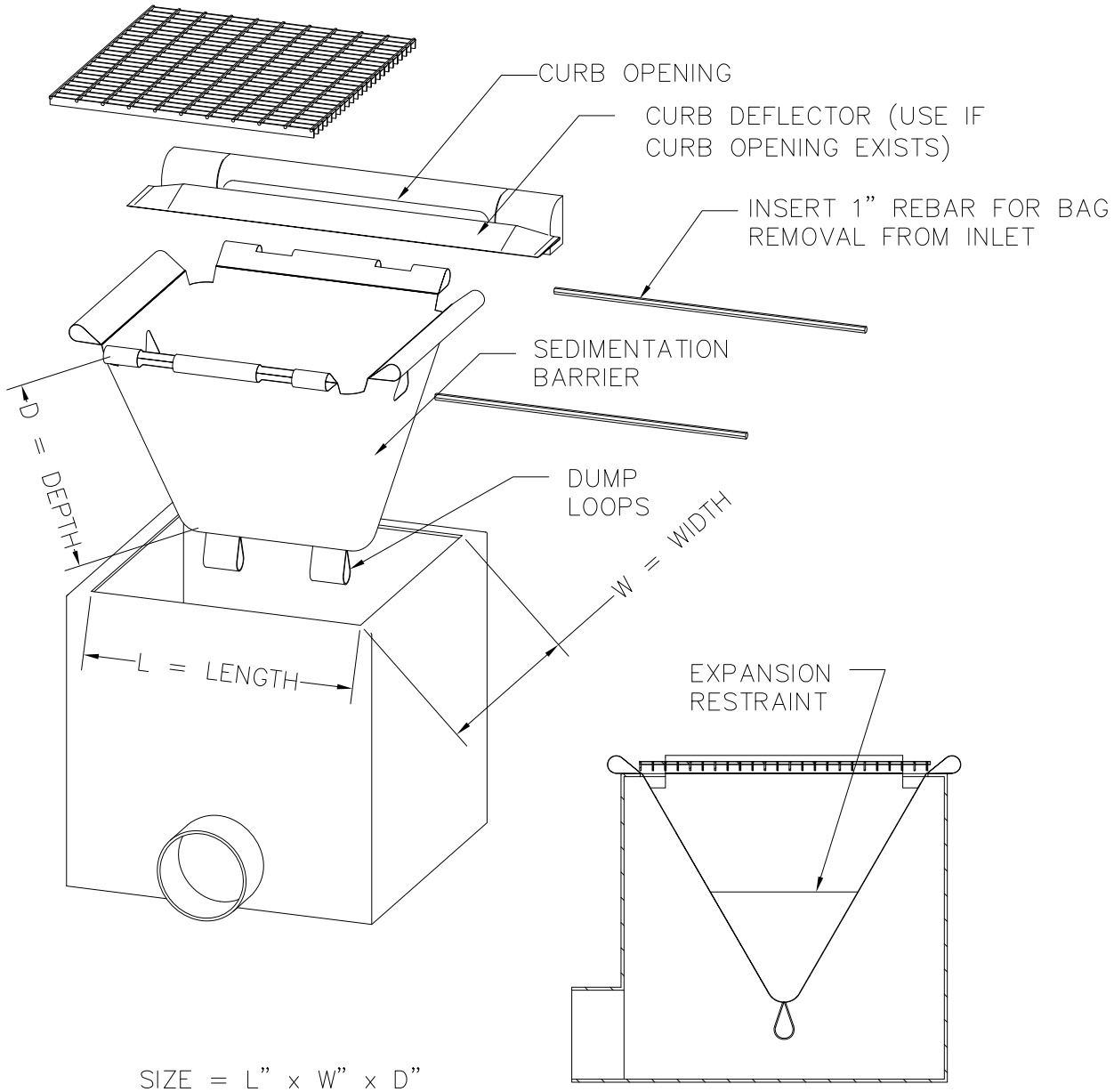
NOTE: MINIMUM SPACING OF DRUMS MAY VARY AND SHALL BE DETERMINED IN THE FIELD.

SSV ENGINEERING, INC.
STORM DRAIN IMPROVEMENTS
ASH AND LOWELL STREETS
CITY OF WALTHAM - MASSACHUSETTS

REV:			
DRAWN BY: SSV	DESIGNED BY: SSV	REVIEWED BY: SSV	APPROVED BY: SSV
DATE: 12/31/2019	SCALE: N.T.S.	FILE: ASH&LOWELL	**T-103 TRAFFIC DETAILS II**

ATTACHMENT B

Construction Standard Details



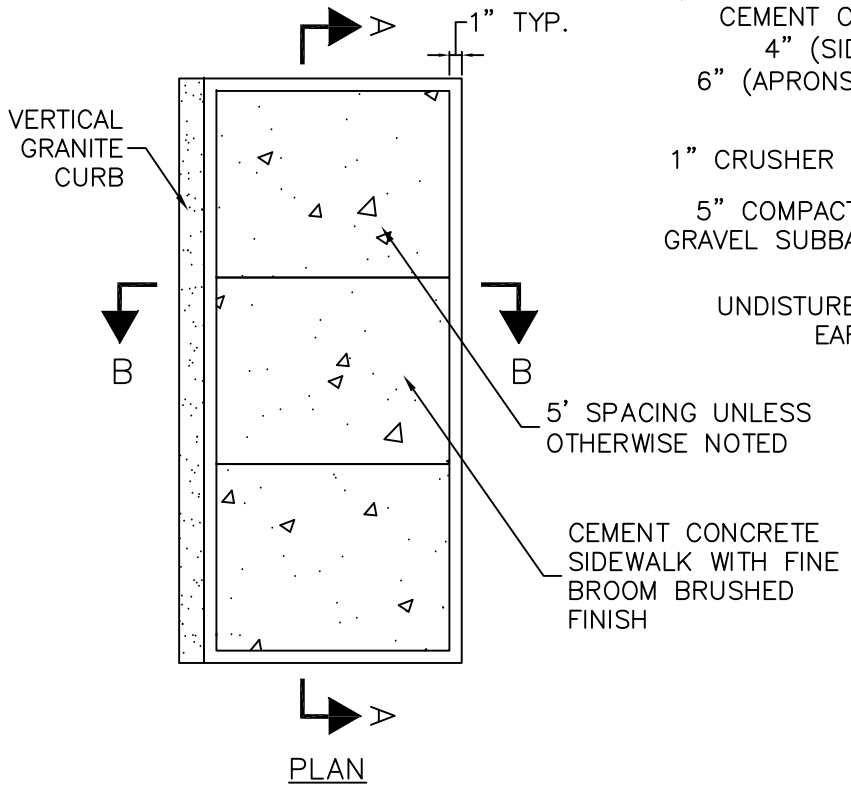
SIZE = L" x W" x D"

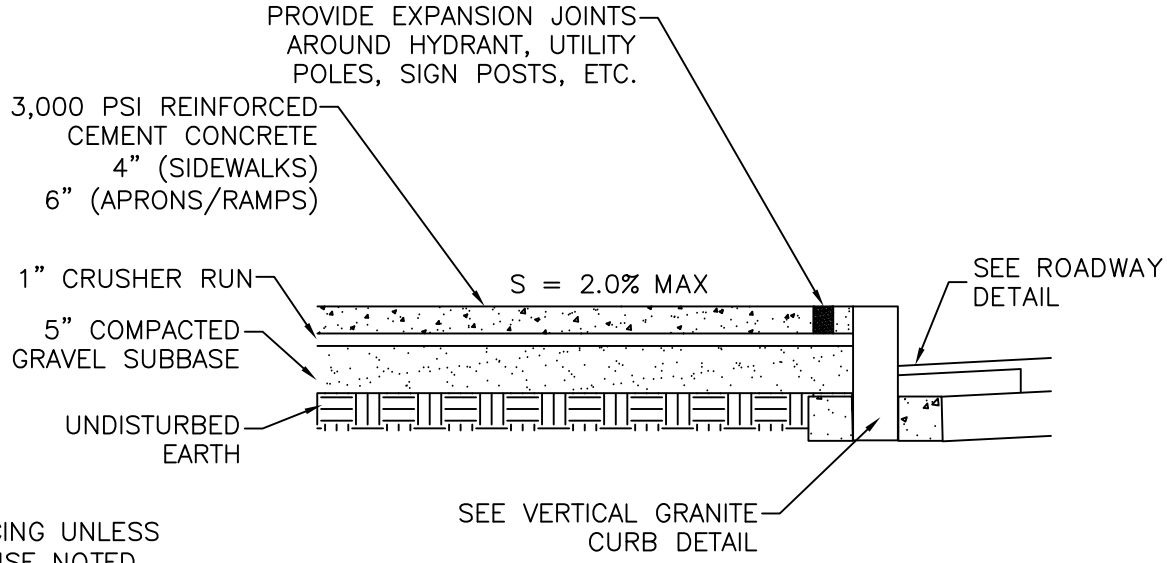
SEDIMENTATION BARRIER SHALL BE MANUFACTURED TO FIT THE OPENING OF THE CATCH BASIN OR DROP INLET. SEDIMENTATION BARRIER SHALL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE GEOTEXTILE WITH AN ALLOWABLE FLOW RATE OF 50 GPM/SF

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

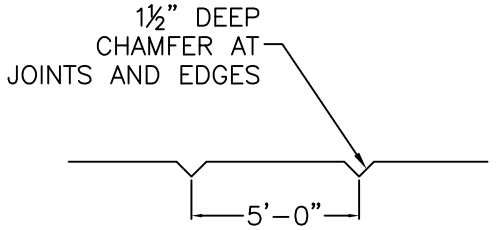
STANDARD DETAILS	Sheet No. 110.001
SEDIMENTATION BARRIER	Scale NTS
110.000	

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg





SECTION B–B

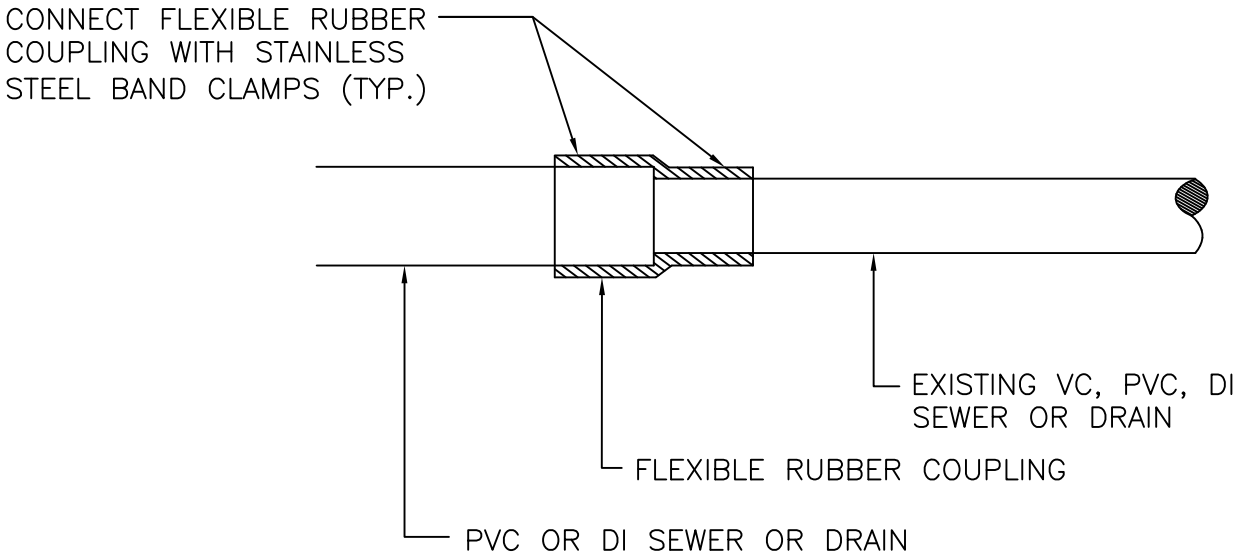


SECTION A–A

SIDEWALK NOTES:
1. NEW SIDEWALKS SHALL MATCH WIDTH OF EXISTING SIDEWALK UNLESS OTHERWISE NOTED.
2. SIDEWALK MATERIAL TO MATCH EXISTING SIDEWALK. FOR EXISTING ASPHALT SIDEWALK, SUBSTITUTE 4" CONCRETE.
3. SIDEWALKS TO BE BUILT ACCORDING TO ADA AND MA AAB REGULATIONS, 2.0% MAX (0% TOLERANCE) CROSS SLOPE.
4. SEE CONSTRUCTION PLANS AND GRADING PLANS FOR SIDEWALK WIDTHS AND GRADES.

CONCRETE SIDEWALK DETAIL

	FIGURE NAME: 701.000 – 4"&6" CEMENT CONCRETE SIDEWALK	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



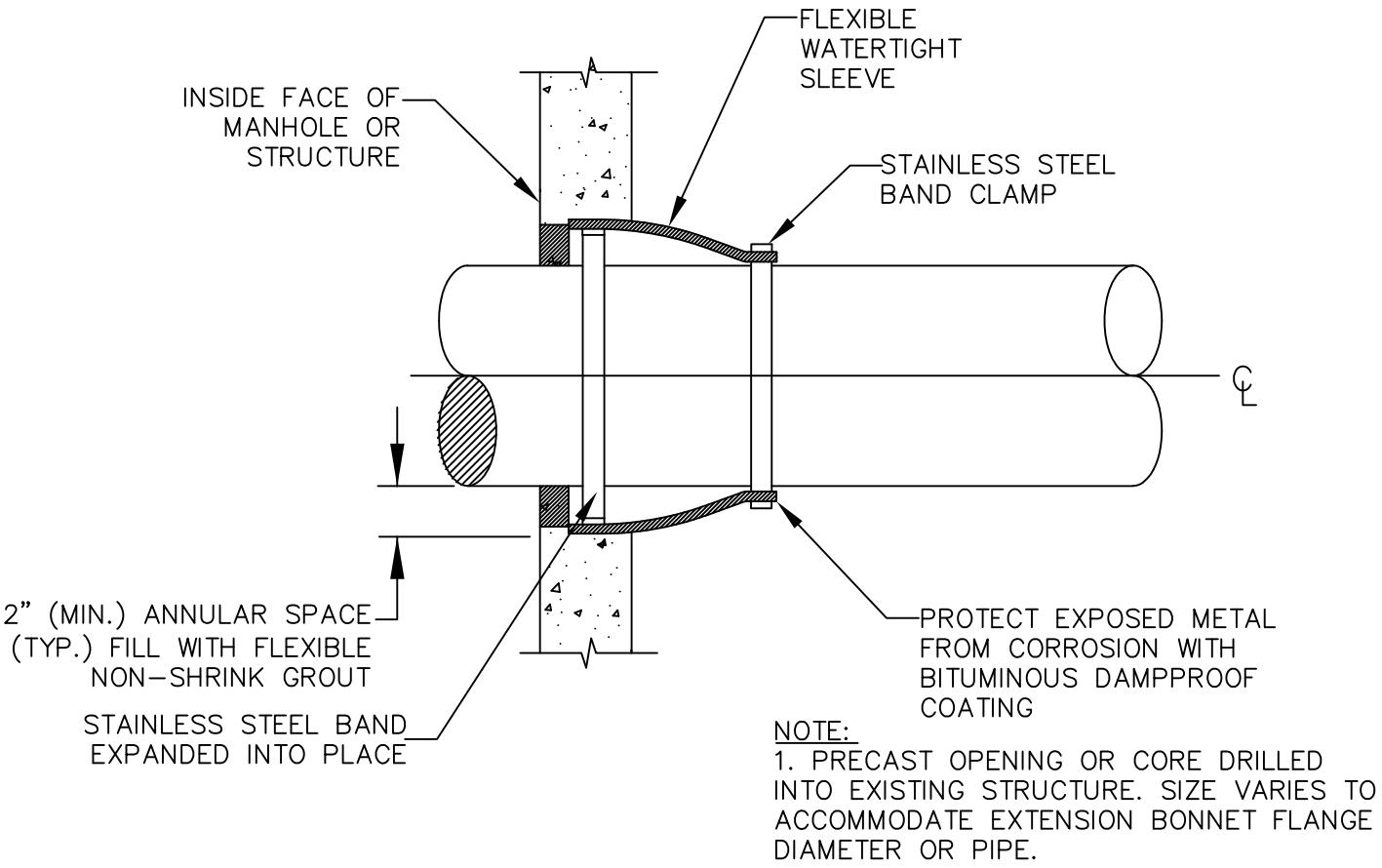
NOTES:

1. GRAVITY LATERAL PIPES (SEWERS OR DRAINS)
2. SEE SPECIFICATIONS FOR MATERIALS AND REQUIREMENTS.

PIPE FIELD CLOSURE (FLEXIBLE RUBBER COUPLING) DETAIL

FOR NON-PRESSURE PIPES OF DIFFERENT MATERIALS OR SIZES

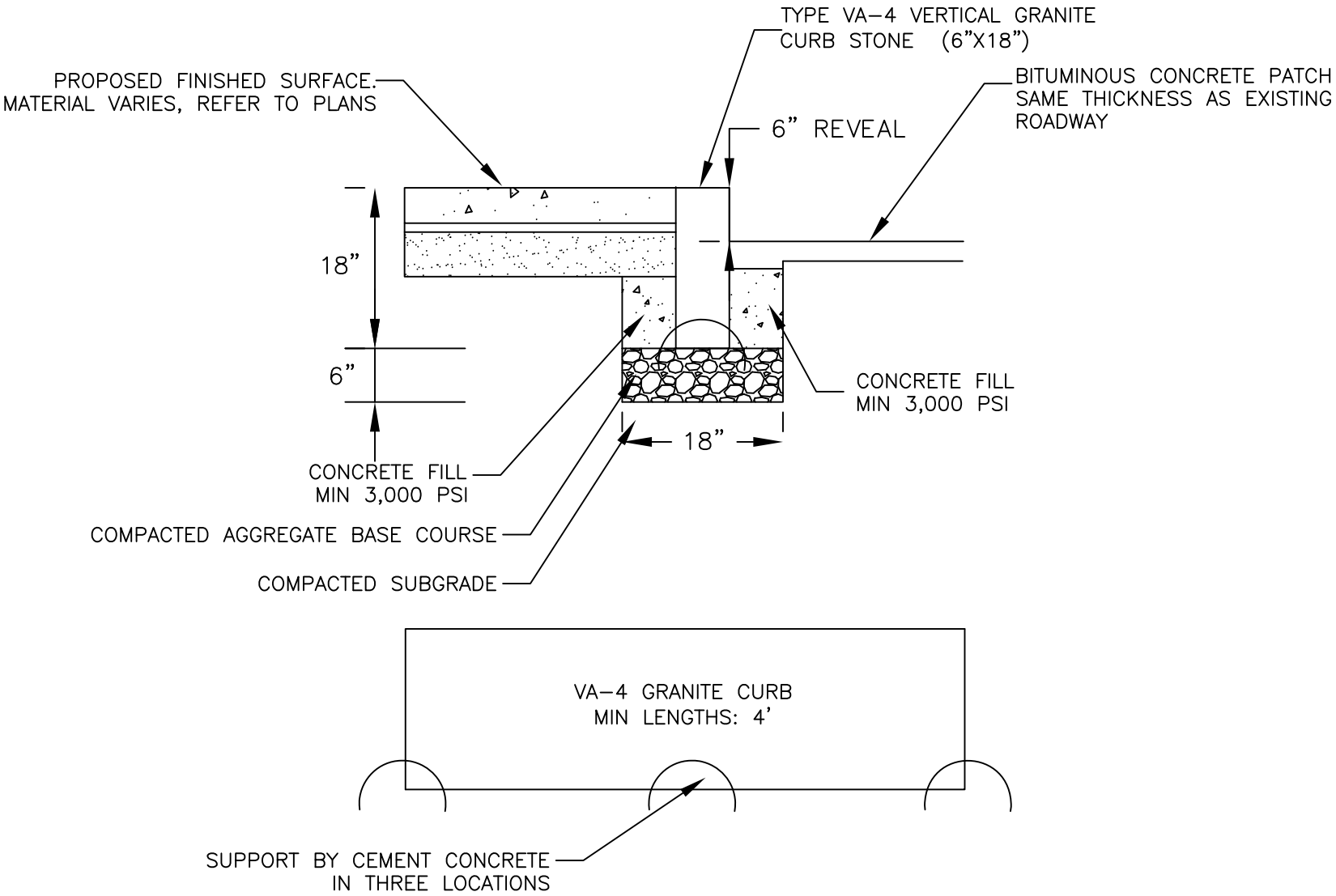
	FIGURE NAME: 999.100 – FERNCO CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



NOTE:
1. PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.

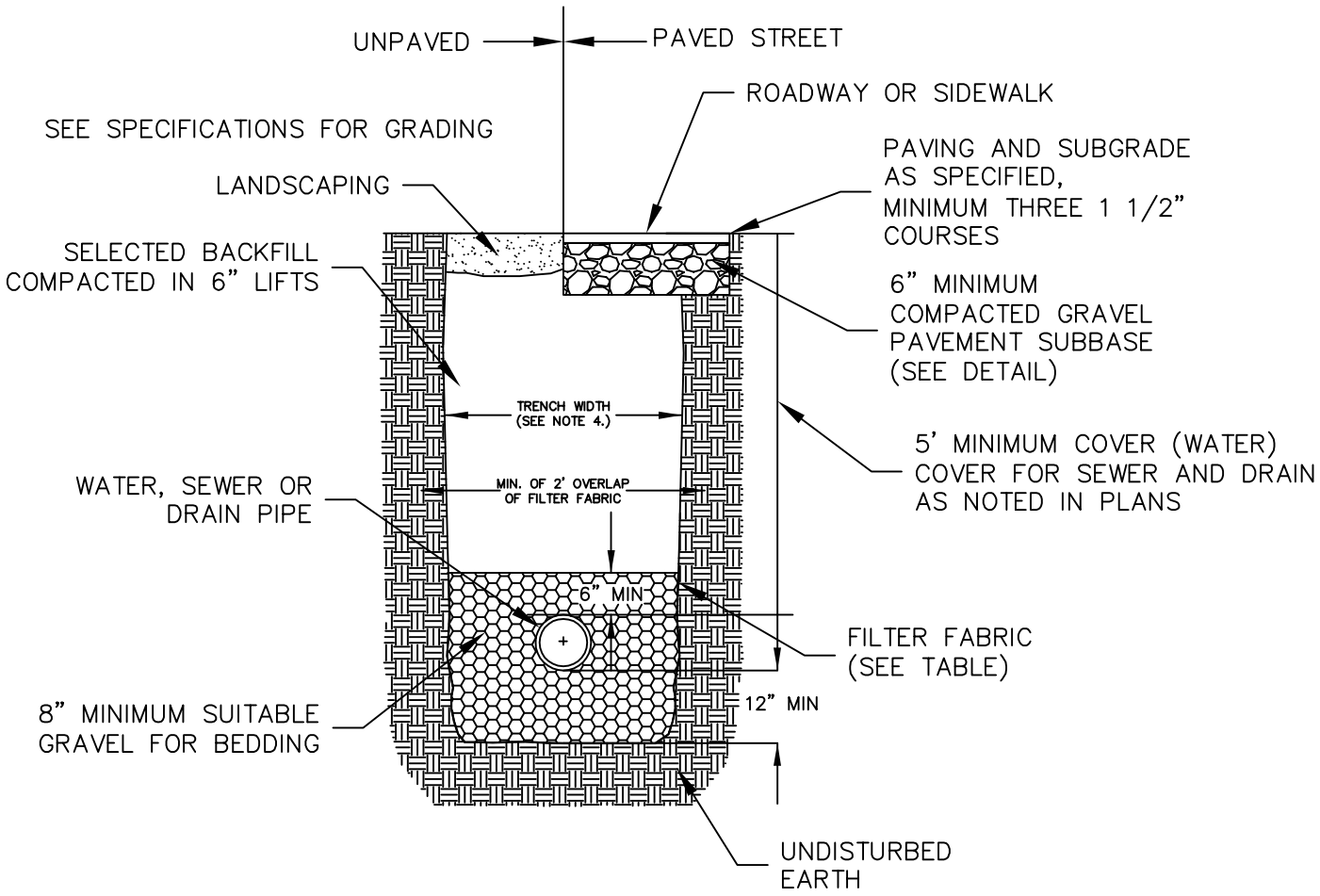
FLEXIBLE SLEEVE CONNECTION DETAIL

	FIGURE NAME: 202.000.A – FLEXIBLE SLEEVE CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TYPICAL VERTICAL GRANITE CURB DETAIL

	FIGURE NAME: 504.000 – TYPICAL VERTICAL GRANITE CURB DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:

   LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET

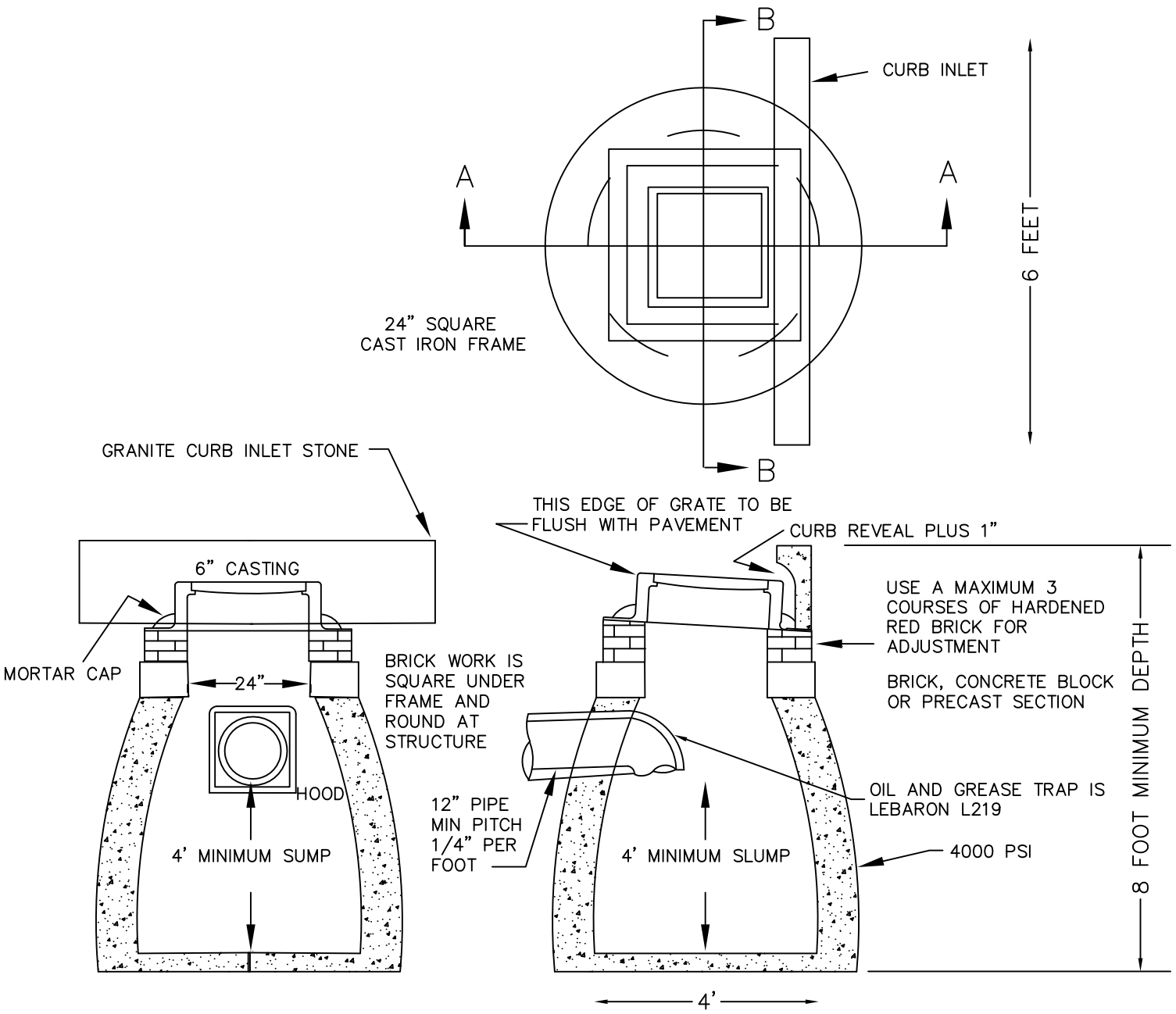
   EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL

	FIGURE NAME: 141.000.A – TRENCH DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



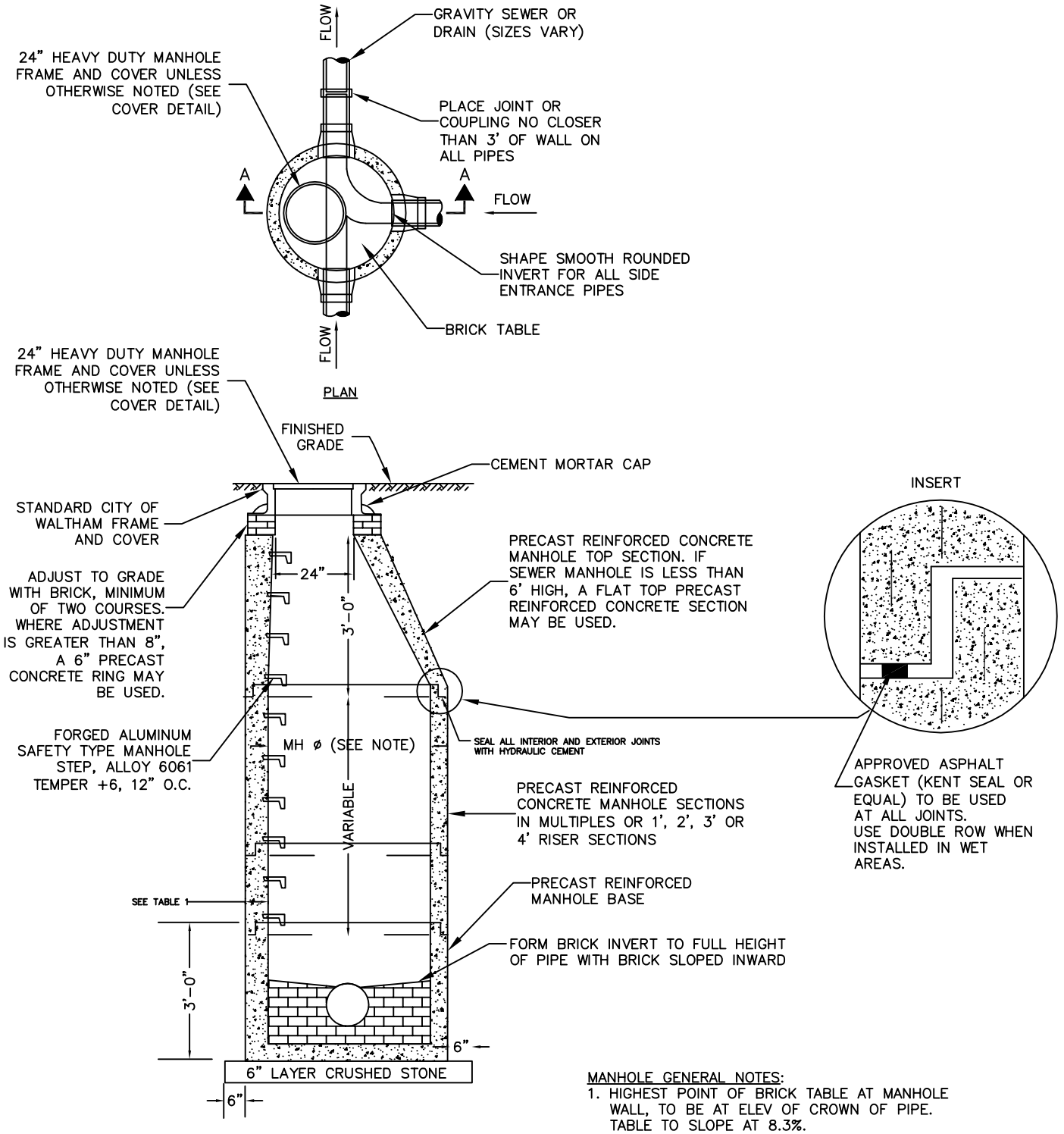
SECTION B–B

SECTION A–A

MAY BE CONSTRUCTED WITH 8" CONCRETE BLOCKS,
A COMPLETE 5" PRECAST STRUCTURE, OR A
COMBINATION OF 5" TO 8" PRECAST BASE SECTION
AND 8" CONCRETE BLOCKS LAID ABOVE.

STANDARD CATCH BASIN

	FIGURE NAME: 201.500.A – STANDARD CATCH BASIN DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



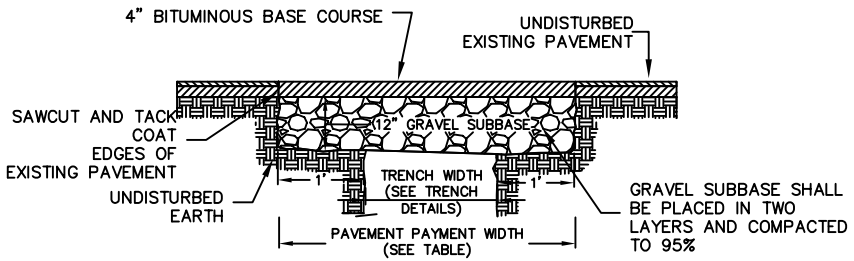
SECTION A–A

STANDARD MUNICIPAL MANHOLE

MANHOLE GENERAL NOTES:

1. HIGHEST POINT OF BRICK TABLE AT MANHOLE WALL, TO BE AT ELEV OF CROWN OF PIPE. TABLE TO SLOPE AT 8.3%.
2. SEWER OR DRAIN MANHOLE DIAMETER SHALL BE 4', 5', 6', 8' OR 10' AS SHOWN ON PLAN/PROFILE VIEWS.
3. DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS. UNLESS OTHERWISE NOTED
4. PRECAST MANHOLES SHALL BE PRE–ORDERED WITH PENETRATIONS AT ELEVATIONS INDICATED ON CONTRACT DRAWINGS.

	FIGURE NAME: 202.000.B – STANDARD MUNICIPAL MANHOLE DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TRENCH PAY LIMIT TABLE FOR TEMPORARY PAVEMENT

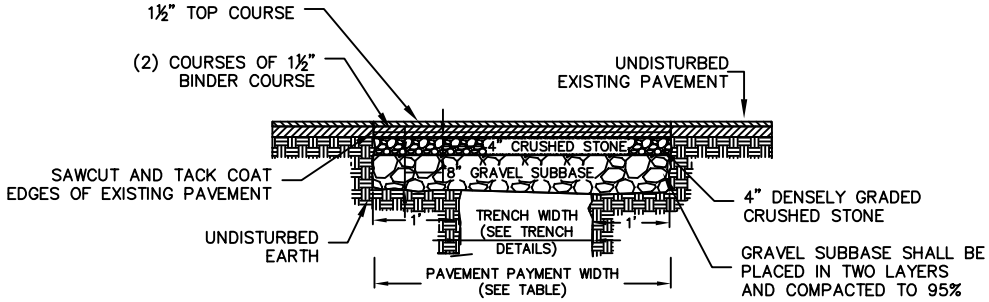
	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	6'–6"	9'–6"	12'–6"	15'–6"	PAY WIDTH
OVER 24"	O.D. + 4'–0"	O.D. + 7'–0"	O.D. + 10'–0"	O.D. + 13'–0"	

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

TEMPORARY PAVEMENT DEPTH SHALL BE 3–IN.

TEMPORARY TRENCH PAVEMENT DETAIL



TRENCH PAY LIMIT TABLE FOR PERMANENT PAVEMENT

	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	8'–6"	11'–6"	14'–6"	17'–6"	PAY WIDTH
OVER 24"	O.D. + 6'–0"	O.D. + 9'–0"	O.D. + 12'–0"	O.D. + 15'–0"	

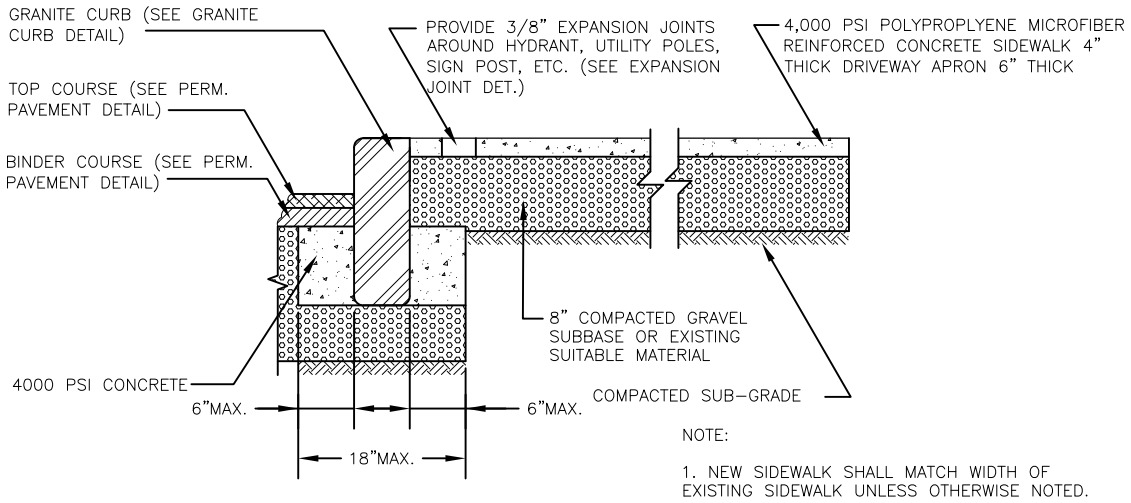
I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

PERMANENT TRENCH PAVEMENT DETAIL

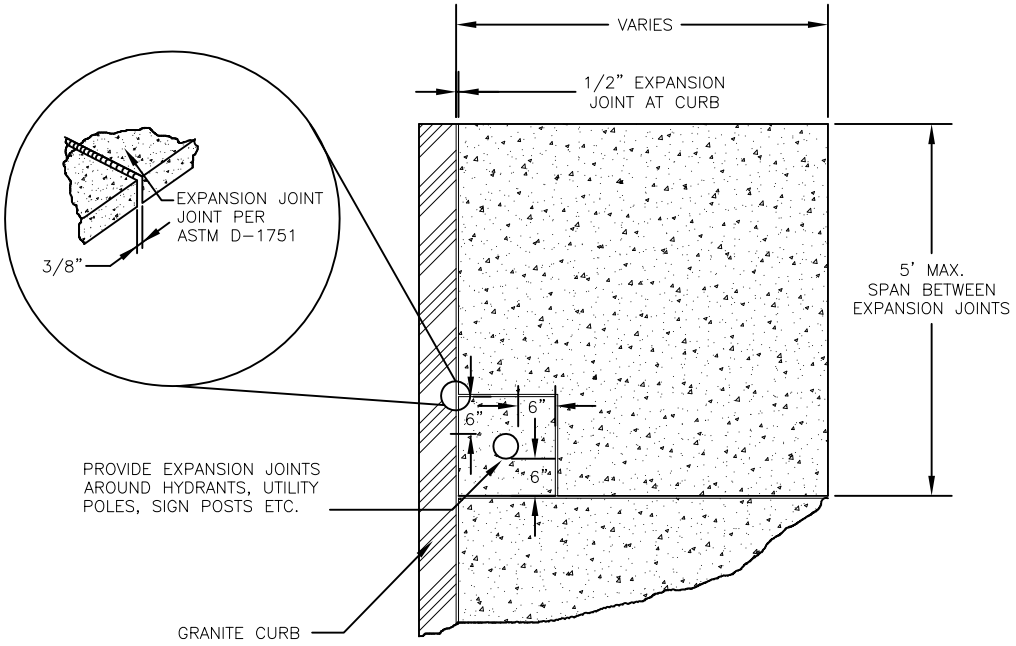
TEMPORARY AND PERMANENT TRENCH PAVEMENT NOTES:
1. PERMANENT TRENCH PAVEMENT PAYMENT WIDTH SHALL BE THE TRENCH PAY LIMIT PLUS 2 FEET
2. TEMPORARY TRENCH PAVEMENT PAYMENT WIDTH SHALL BE EQUAL TO THE TRENCH PAYMENT LIMIT
3. REMOVE AND DISPOSE ALL TEMPORARY PAVEMENT AS REQUIRED. RESTORE AND COMPACT SUBBASE AS REQUIRED PRIOR TO PERMANENT TRENCH PAVEMENT.
4. DEPTH OF PERMANENT TRENCH PAVEMENT SHALL BE THE SAME THICKNESS AS THE EXISTING PAVEMENT.

	FIGURE NAME: 141.000.B – TRENCH PAVEMENT DETAILS	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



CONCRETE SIDEWALK DETAIL

NOT TO SCALE



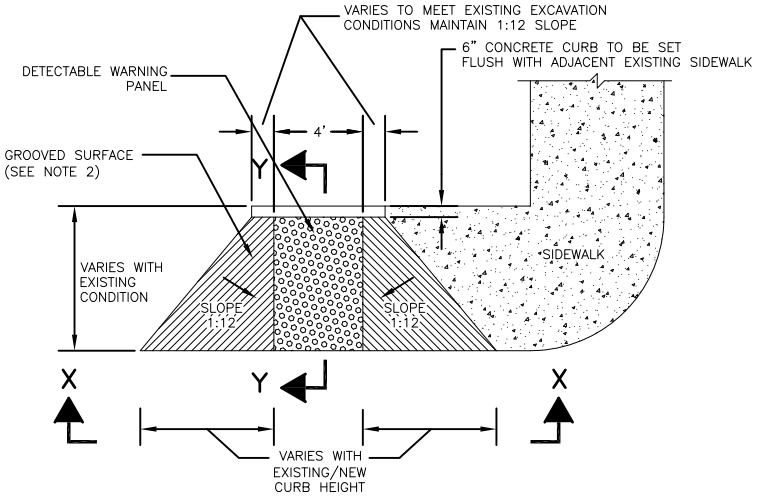
CONCRETE SIDEWALK EXPANSION JOINT DETAIL

NOT TO SCALE

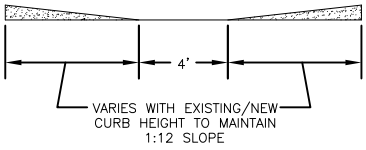
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS	Sheet No. 701.000.1
CONCRETE SIDEWALK	Scale NTS
701.000.1	

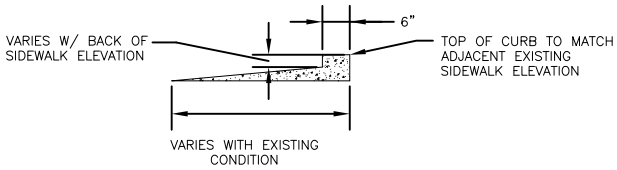
DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg



PLAN



SECTION X–X



SECTION Y–Y

HANDICAP RAMP DETAIL

NOT TO SCALE

GENERAL HANDICAP NOTES:
1. REINFORCEMENT FOR HANDICAP RAMP SHALL BE THE SAME AS MICROFIBER REINFORCED CONCRETE FOR SIDE WALK.

2. THE FINISHED SURFACE OF HANDICAP RAMP IS TO BE GROOVED LATERALLY WITH 1/4" WIDE BY 1/4" DEEP GROOVES. SPACED 2–1/4" AND ROUGHENED WITH NO LESS THAN A BROOM FINISH TO PREVENT SLIPPING AND TO DIFFERENTIATE ITS TEXTURE FROM THAT OF STANDARD SIDEWALK.

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

CONCRETE WHEELCHAIR RAMP

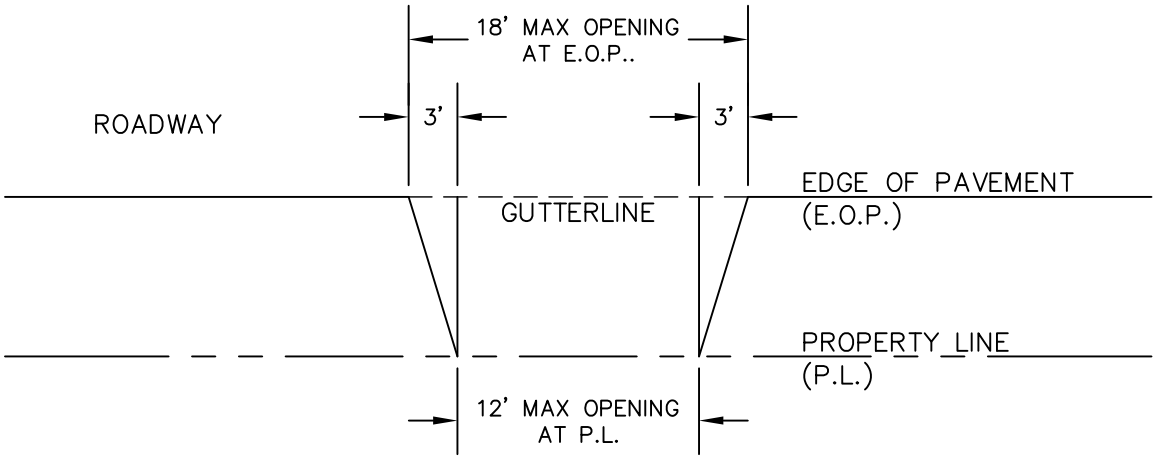
701.000 - 701.101

Sheet No.
701.000.2

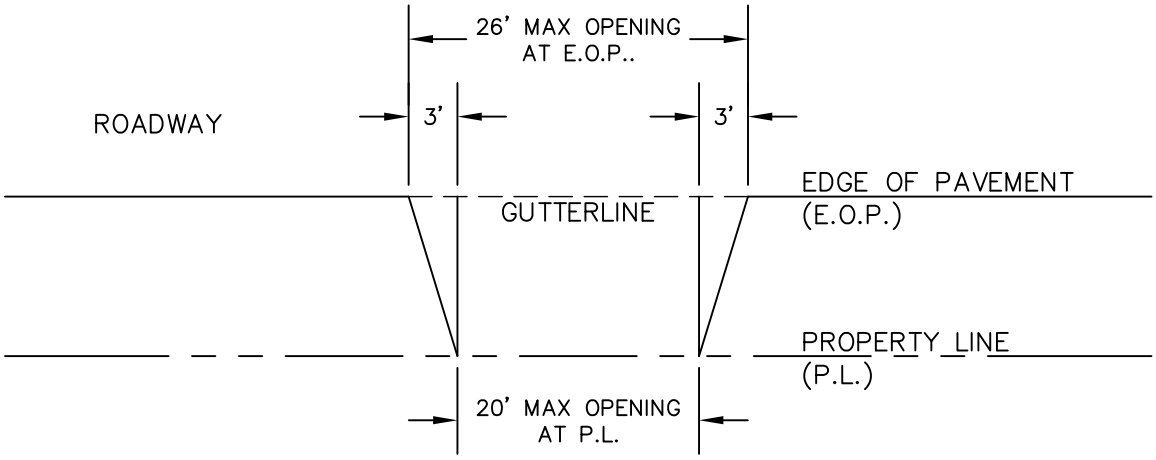
Scale
NTS

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

12' DRIVEWAY OPENING
WITHOUT CURBING



20' DRIVEWAY OPENING
WITHOUT CURBING



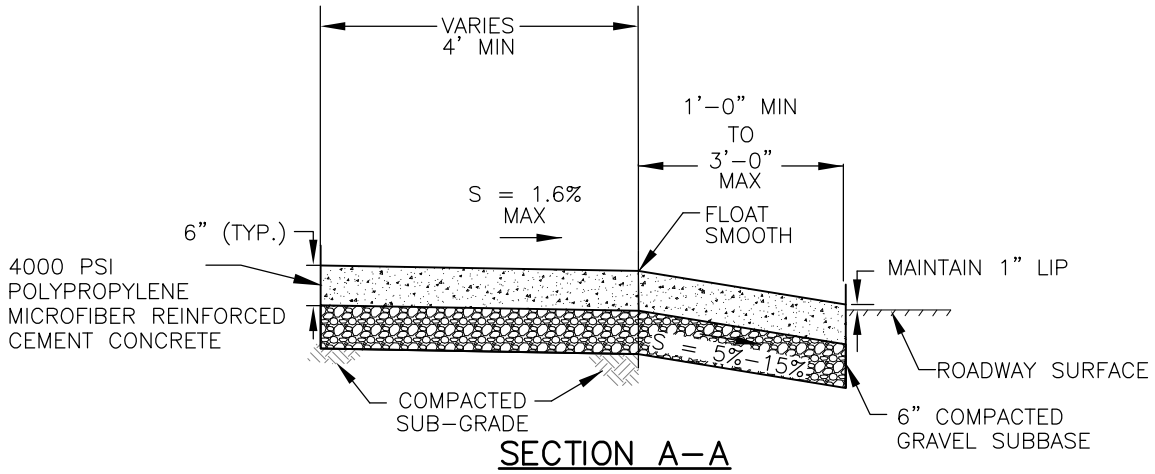
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

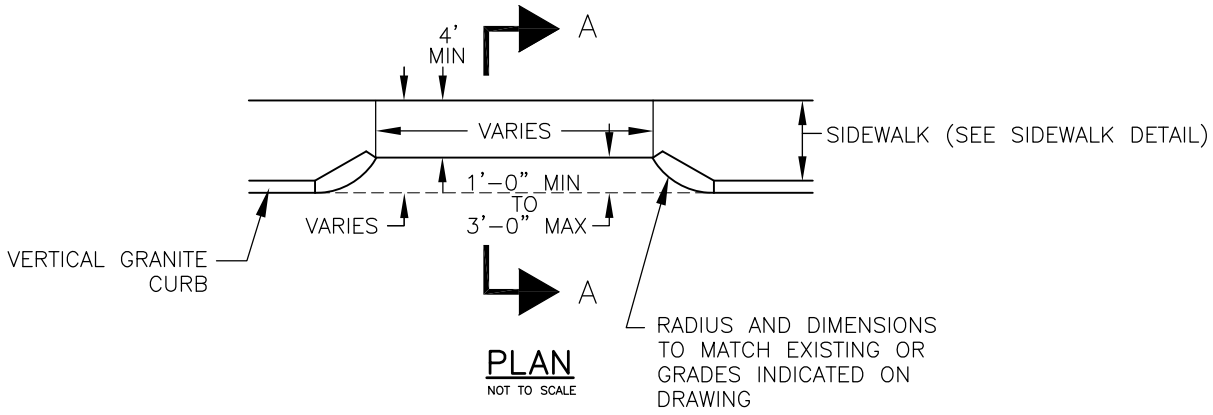
DRIVEWAY OPENINGS
WITHOUT CURBING

Sheet No.

Scale
NTS



SECTION A–A



PLAN
NOT TO SCALE

CEMENT CONCRETE DRIVEWAY APRON
NOT TO SCALE

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

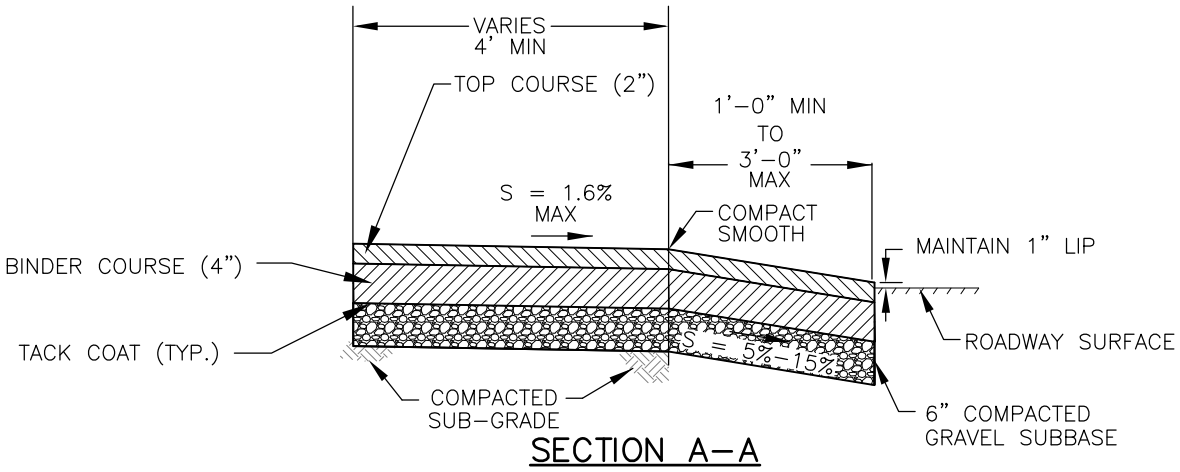
STANDARD DETAILS

CEMENT CONCRETE
DRIVEWAY APRON

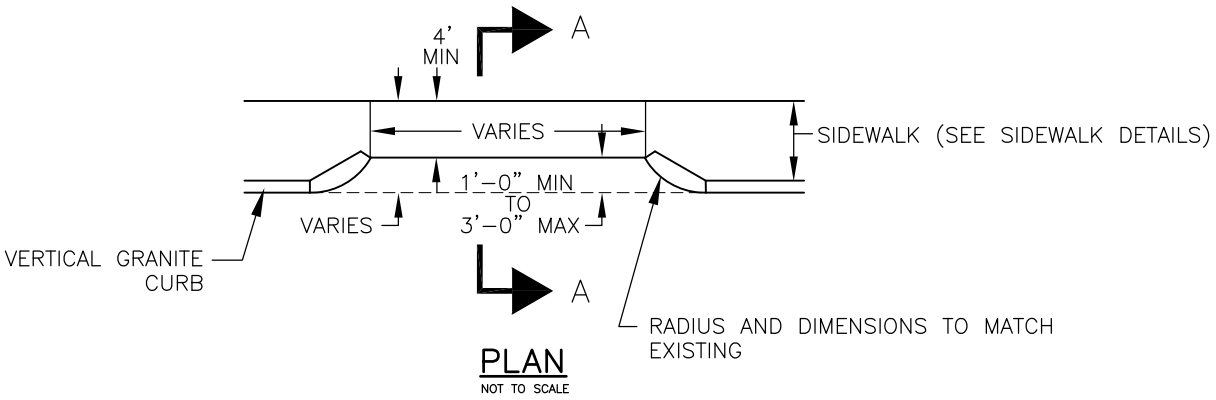
701.002

Sheet No.
701.002

Scale
NTS



SECTION A-A

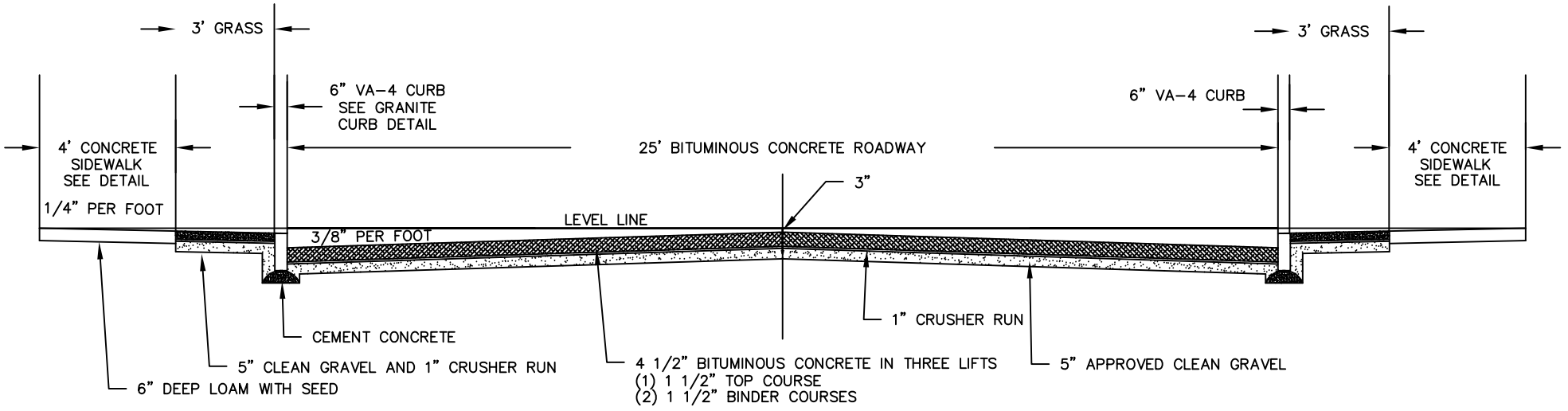


PLAN
NOT TO SCALE

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

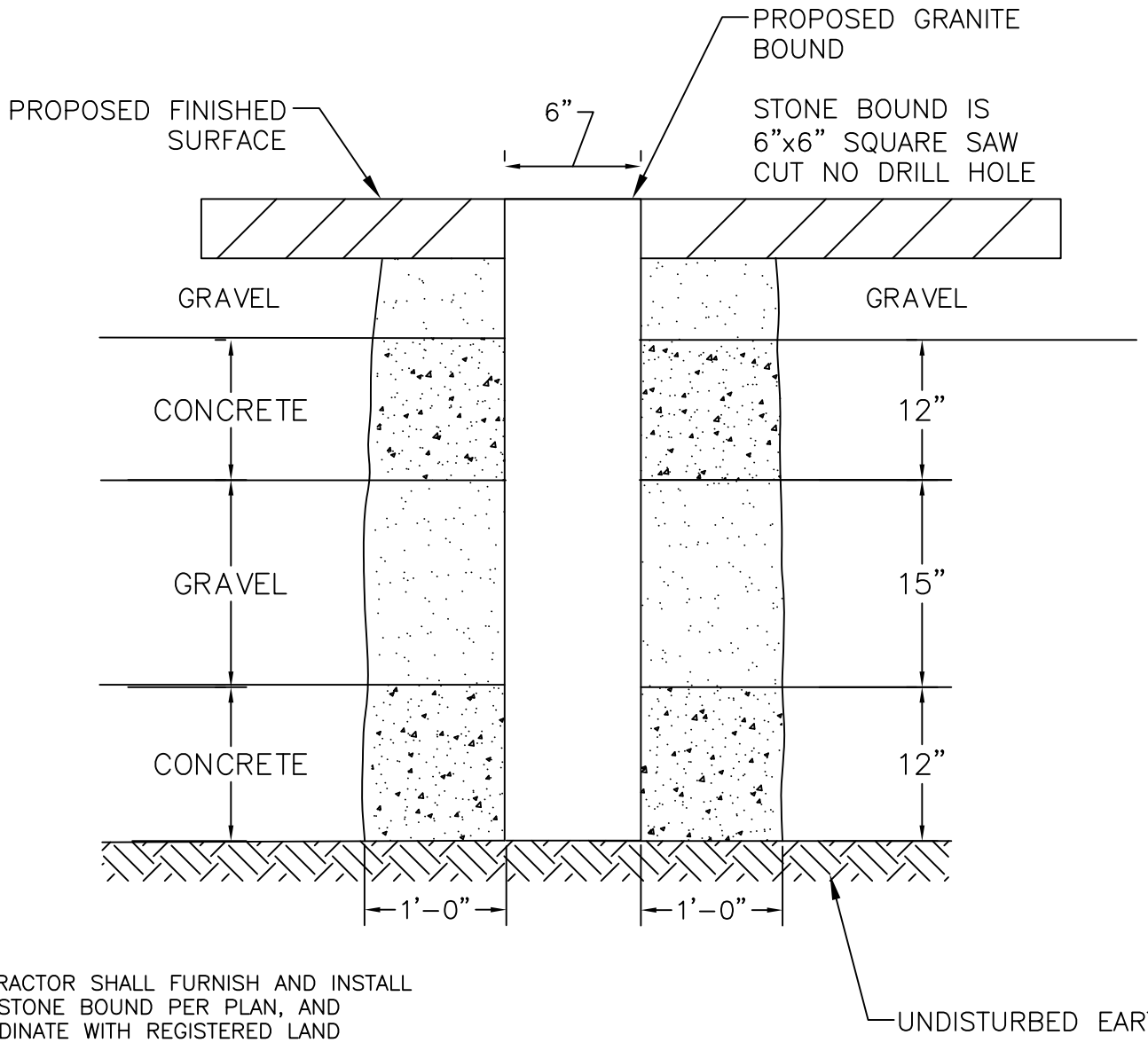
STANDARD DETAILS	Sheet No. 460.001.1
BITUMINOUS CONCRETE APRON	Scale NTS
460.001.1	



TYPICAL CROSS SECTION FOR 40 FOOT LAYOUT

N.T.S.

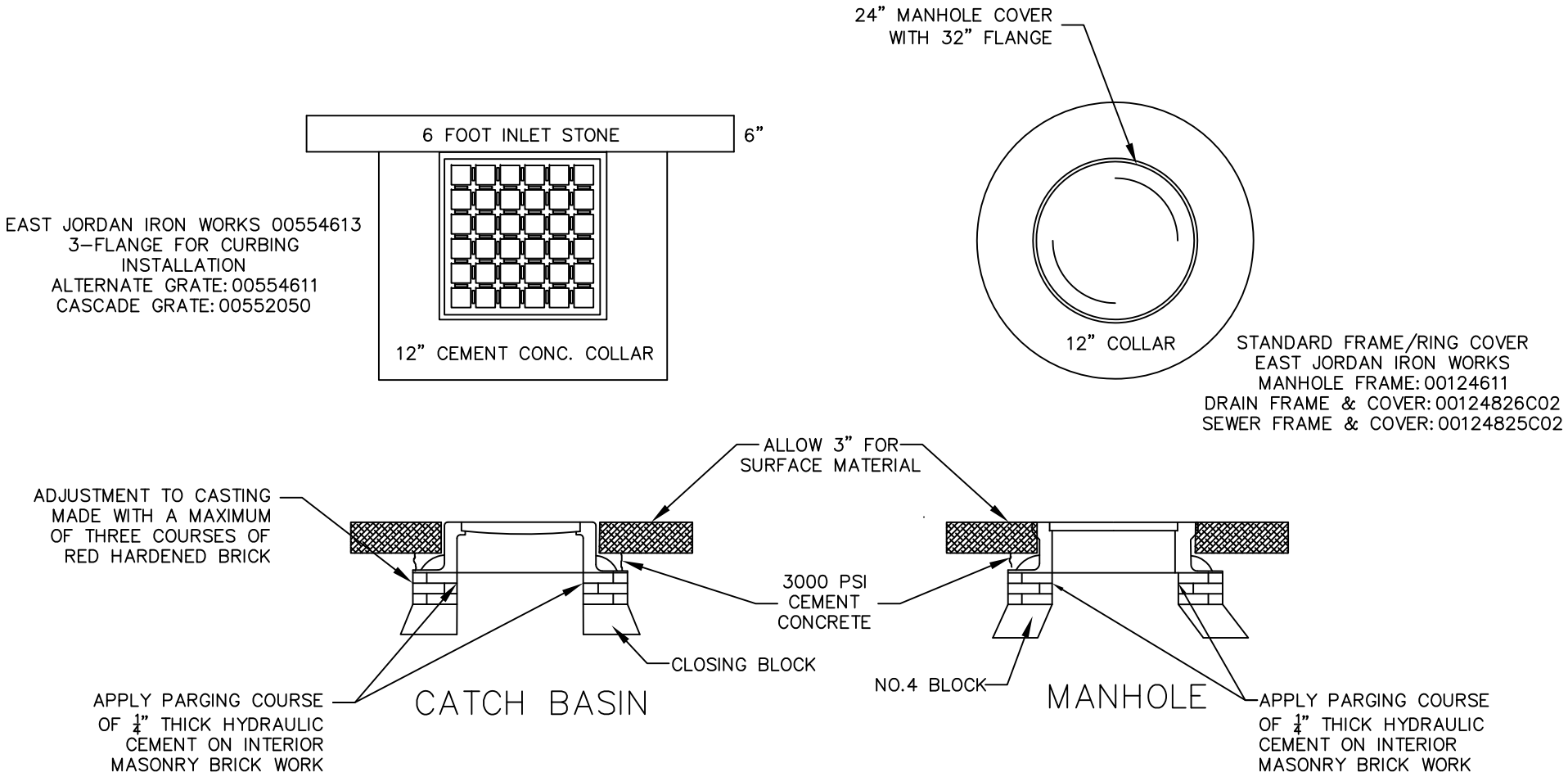
	FIGURE NAME: 460.000.A – TYPICAL 40–FOOT ROAD CROSS SECTION	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



NOTES:
1. CONTRACTOR SHALL FURNISH AND INSTALL NEW STONE BOUND PER PLAN, AND COORDINATE WITH REGISTERED LAND SURVEYOR FOR EACH LOCATION.
2. DRILL HOLES SHALL BE SET BY REGISTERED PROFESSIONAL LAND SURVEYOR.

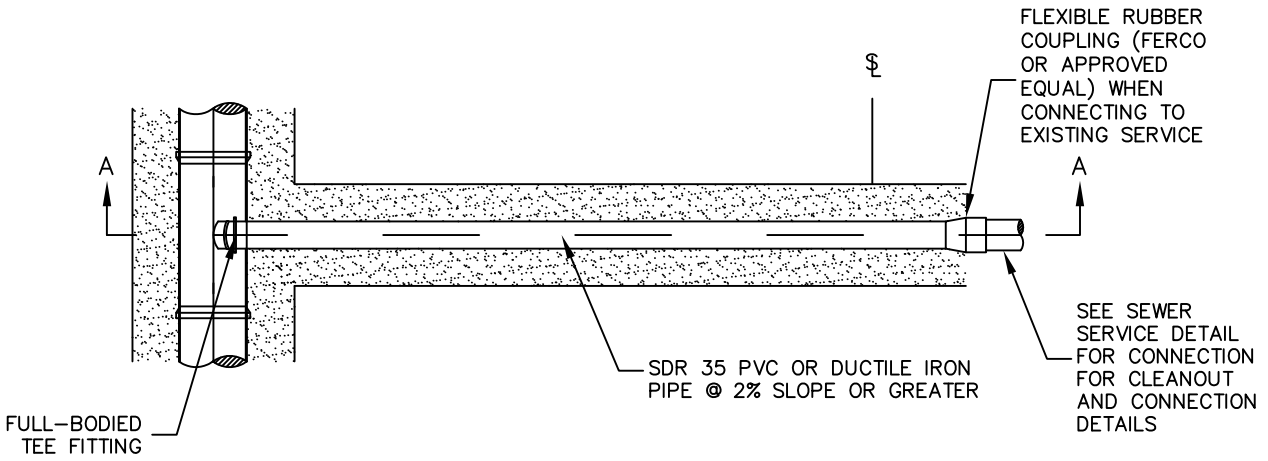
STONE BOUND DETAIL

	FIGURE NAME: 711.100 – STONE BOUND DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011

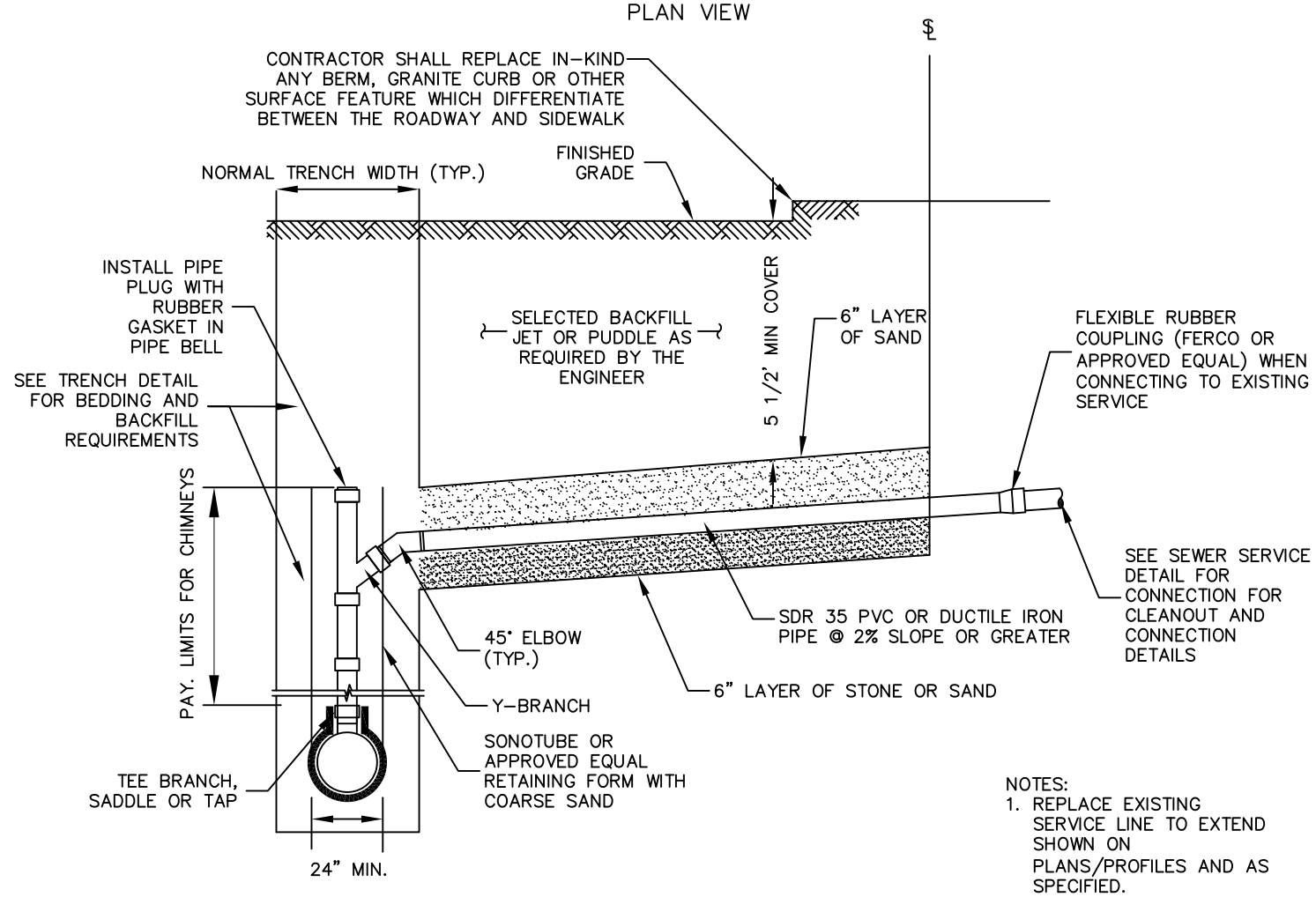


CEMENT CONCRETE COLLARS
FOR MANHOLES AND CATCH BASINS

	FIGURE NAME: 222.010 – FRAMES, GRATES & CONCRETE COLLARS DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



PLAN VIEW

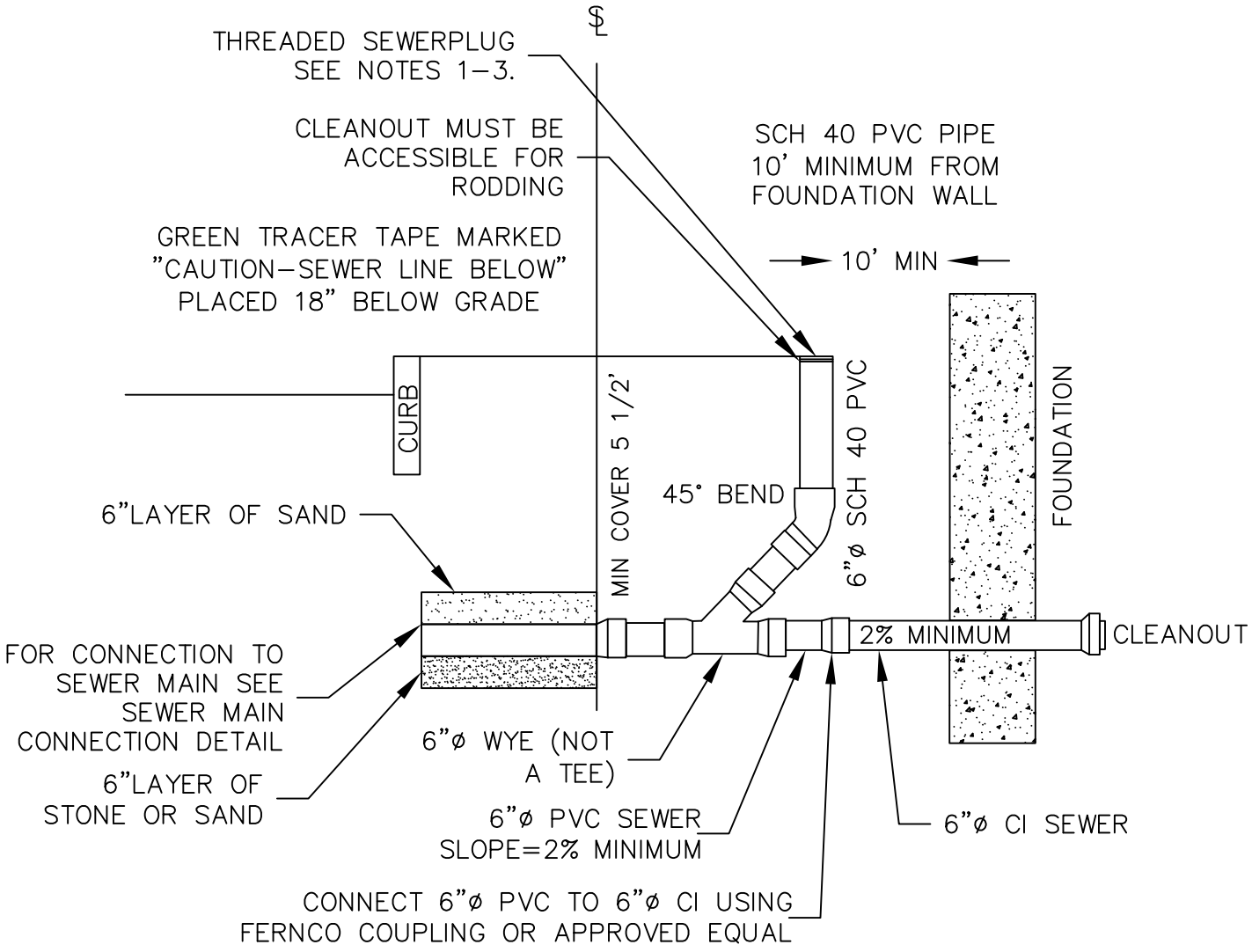


NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

SEWER OR DRAIN
CONNECTION DETAIL WITH CHIMNEY >12' DEEP

	FIGURE NAME: 269.000.B – SEWER OR DRAIN CONNECTION DETAIL CHIMNEY	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

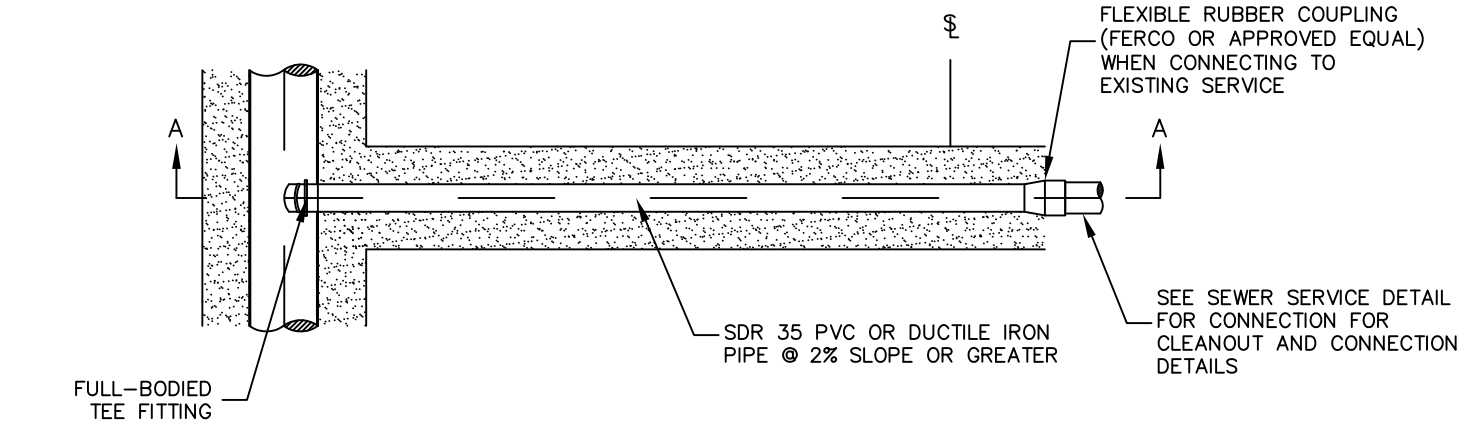


NOTES:

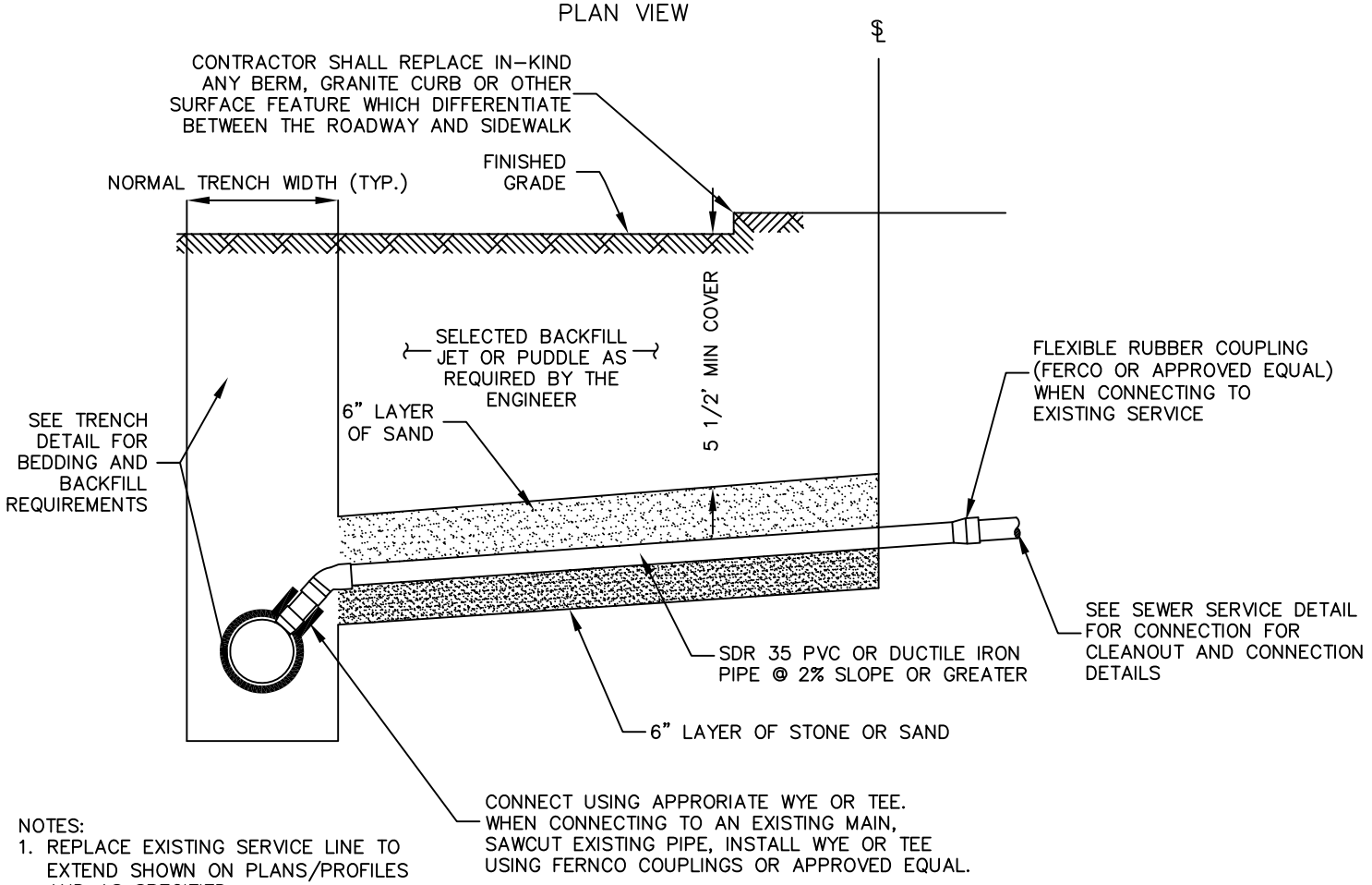
1. CLEANOUT SHALL BE HEAVY DUTY, H20 LOADING IF IN ROADWAY (EJ PRESCOTT PRODUCT NO.45005 600 OR APPROVED EQUAL).
2. CLEANOUTS LOCATED IN DRIVEWAYS SHALL BE (EJ PRESCOTT PRODUCT NO.65004 6S 600 OR APPROVED EQUAL.
3. ALL CLEANOUT SHALL BE LEVEL WITH FINAL GRADE

6"ø SEWER SERVICE CONNECTION WITH CLEANOUT

	FIGURE NAME: 269.000.C – SEWER CONNECTION CLEANOUT	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



PLAN VIEW



NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

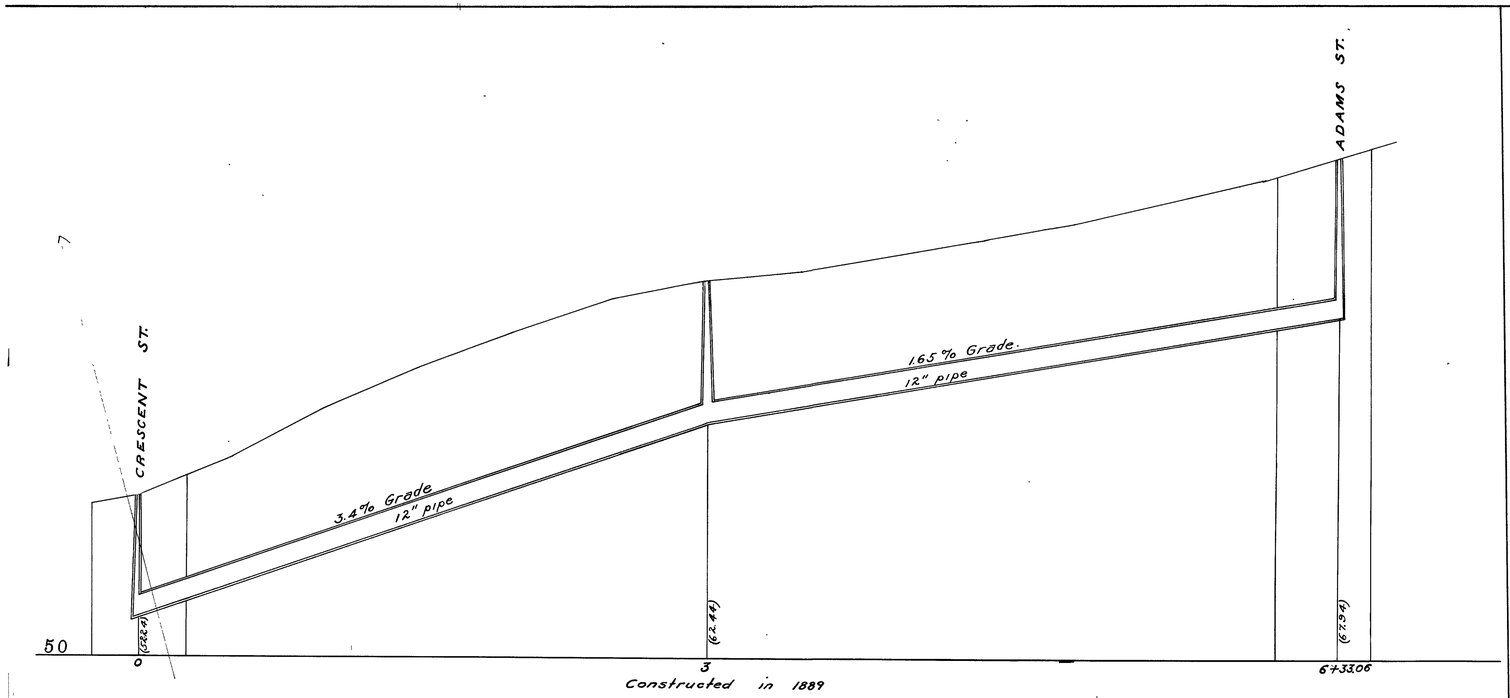
SEWER OR DRAIN
CONNECTION DETAIL <12' DEEP

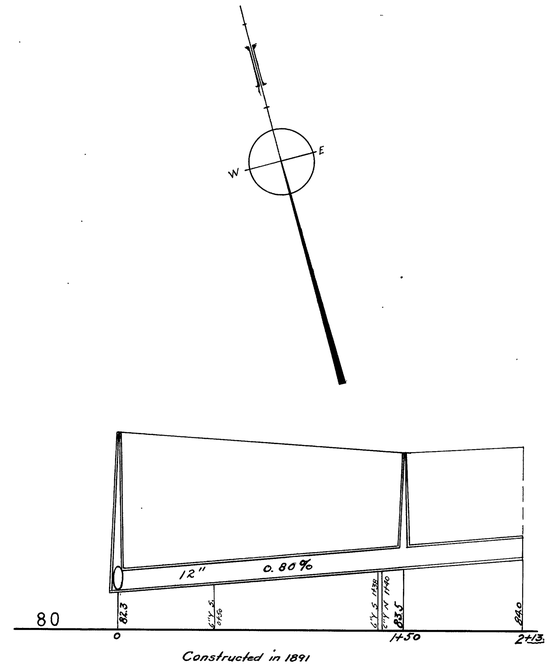
	FIGURE NAME: 269.000.A – SEWER OR DRAIN CONNECTION DETAIL <12' DEEP	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

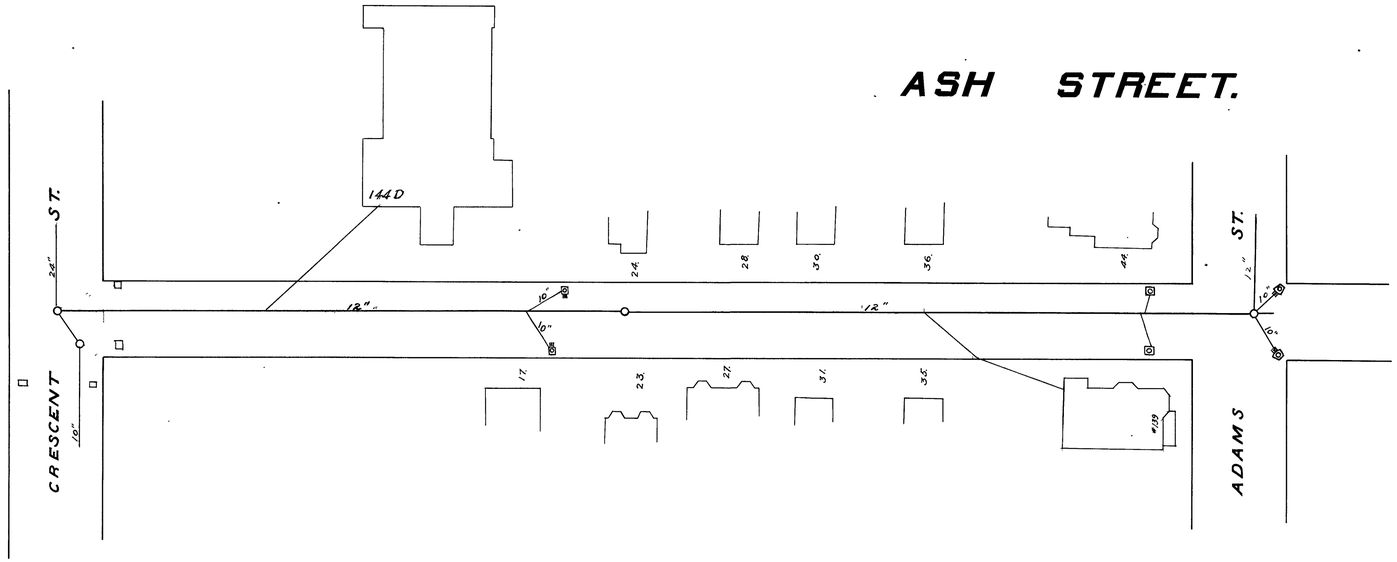
ATTACHMENT C

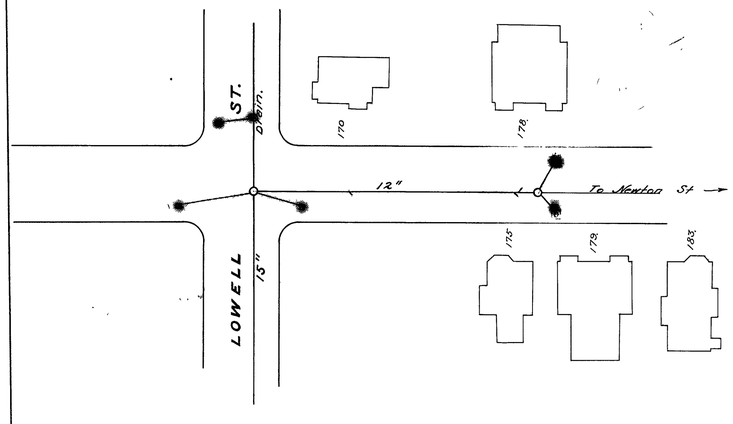
Existing Utility Record Drawings

Ash Street
Drain
17 - # 44





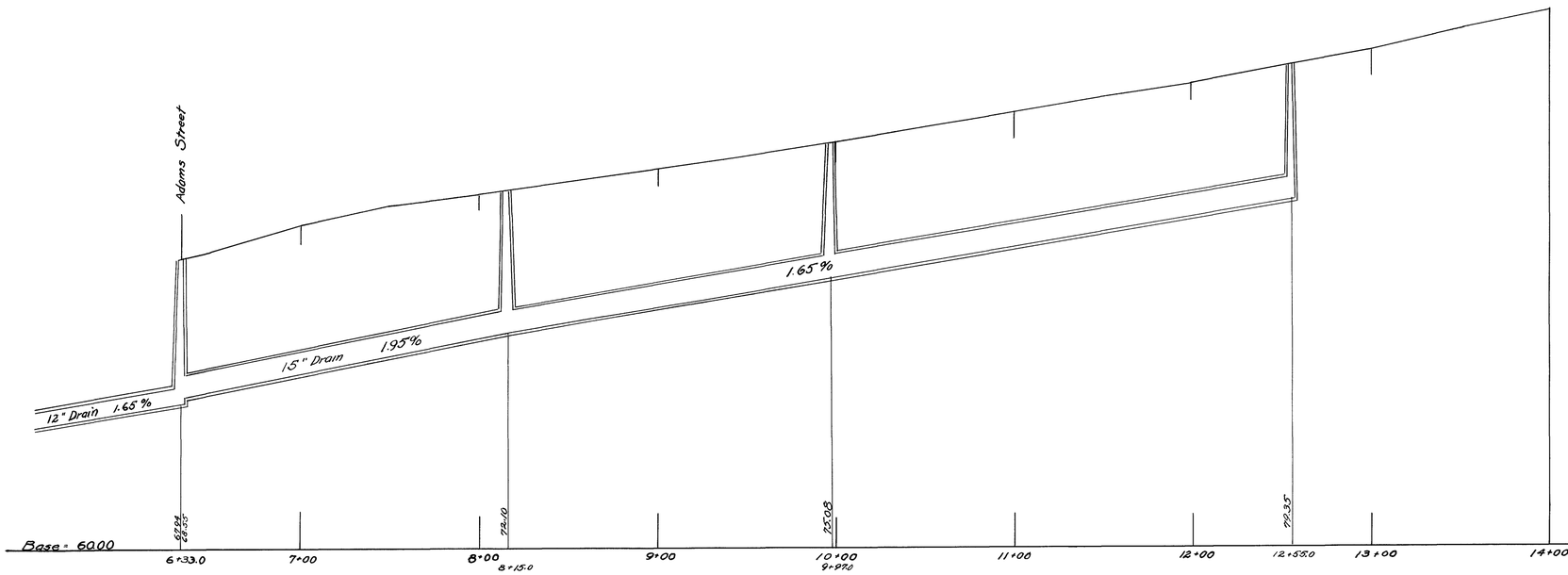




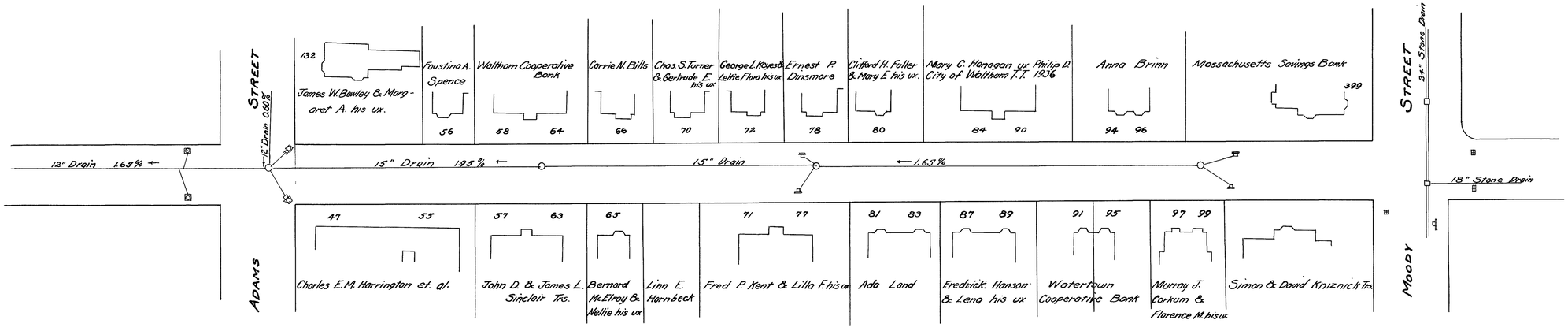
ASH ST
22-36.

ASH ST. DRAIN

Scales: 40 ft. Hor. & 4 ft. Ver. per inch



W.P.A. Project 1938 Construction



Ash Street
Drain
93 - # 179

ASH ST. DRAIN.

MOODY ST.

LOWELL ST.

12" 1.2%

Constructed Apr. 1907.

12" .8%

12" .8%

Constructed 1891.

6"Y - South 10.38
8"Y - North 7.46

82.3

83.3

0.22

1.50

70.00

MOODY ST.

6"x6" Stone Drain

4.5 Elbow Bend

18" Stone Drain

This drain is N.G. 11/19/40 mm

Connected

Connected

12"

12"

12" old 6.3 to end

LOWELL ST.

6"

93

117

122

125

128

131

132

137

138

139

142

143

146

149

150

153

154

157

158

162

163

170

175

178

179

ASH ST. B.

Ash Street
Water & Sewer
165 - # 91

ASH STREET.

MOODY ST.

LOWELL ST.

4" Ys

6" 2.00 %

6" 1.0%

6" 3.0%

11+50 | 13+89.22 | 16+50 | 19+12.50 = 2+87.5 | 0

N

E

W

S

37

8" Water

6" Chap Gate

6" Water

4" Chap Hyd & Hose Stm.

6" Eddy

6" Smith Hyd.

Bradshaw S. Tolman, Tr.

Frank W. Maynard

Elise C. Heuter

John P. Noble

Eliza J. Patrick

Mary E. Brown ux Leroy

Edm. P. Wadsworth

Clark C. Hight

Clark C. Hight

Martha S. Higgin ux E. C.

Emma K. Vinal ux Chas. W.

Abijah A. Morse

Chas. H. & E. Mann ux Wm. W.

Timothy F. Buckley

Mary H. Bergin

Mary E. Beal ux John D.

David W. Farnum

Ray G. Withredge

Mrs. Mary T. Nichols

Lewis E. Haven

Harry W. Mehring

Edward Kenney

Wm. G. Henry

Emma F. & Heirs Chauncy Hartwell

ASH ST. B

Ash Street
Water & Sewer
179 - # 267

ASH STREET.

NEWTON STREET.

PARMENTER ROAD

NEWTON ST.

CRANBERRY ST.

Base-75.

4" Y's 1.0%

6" 1.0%

75 00

+62.95 = 2+72.58

(83.39=8.2") (84.07=6.7)

(86.59) (84.59)

+52.92 = 1+18.53

Donald McLeod

Henry H. Cook

Frances A. Littlefield and Margret A. Wright

Mary A. Hill ux Wm. E.

Fred A. Buell

Fred E. Swett

Marshall C. Jackson

Albert M. Newbert

Chas. P. Ricker

John S. Alcorn

Maude S. and Frank W. Bishop

Harvey S. Hartwell

John W. Tayler

Emery

H. Brower
Geo. E. Boynton

Herbert L. Jackson

Mary J. Chase, ux Chas. E.

Ned K. and Byron L. Marsh

Martha L. Farnham

Clara F. Sargent

Arthur G. Smith

John E. Clough
Geo. E. Armstrong (Lessee)

Dexter H. Hawley

Chas E. Wright

Emily S. Davis ux Frank E.

Edward A. Safford

Ed A. Safford

Albert M. Smith

Willard B. Jones

Pryor Fulton

Julia M. Plummer

Calvin C. Hosse

Shop Mary E. Spear

Waltham Coop Bank

Hattie K. Rice & Eva M. Reed ux Sd.

Newton Chymical

Newton Chymical Company

12" Water

6" Water

8" DI WATER (1986)

ABANDONED 4"

6" Water

6" Gas

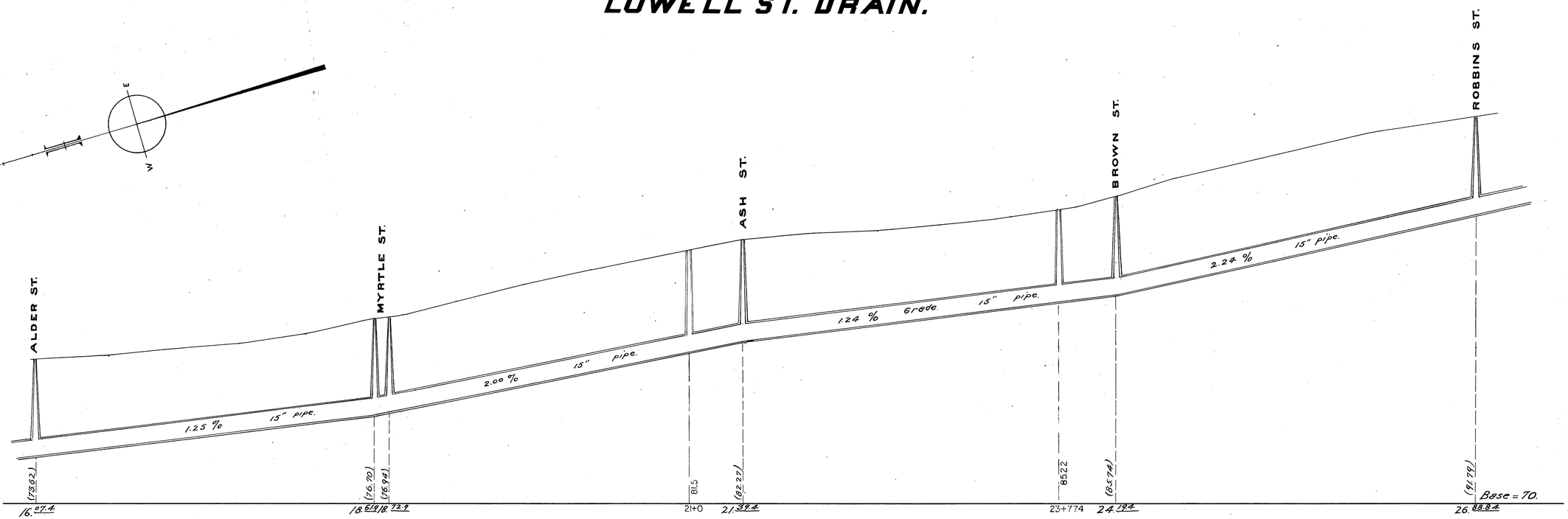
(1924) 6" Water

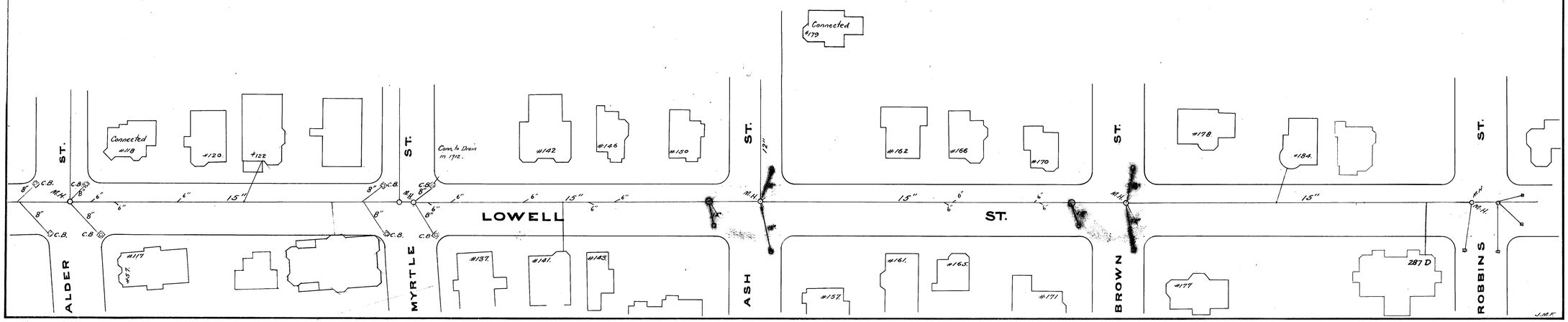
(5" Chap. Hyd. & Hose Stat.)

8x12" TS+V

Lowell Street
Drain
Alder St – Robbins St

LOWELL ST. DRAIN.





LOWELL ST.-C.
22-65.

Lowell Street
Water & Sewer
76 - # 144

LOWELL STREET

CHESTNUT ST · HEM ST · ALDEN ST · MYRTLE ST · ASH ST

8" · 0.6 % · 8" · 0.80 % · 4" Ys 8" · 1.2 % · 8" · 1.6 %

Gardner St

60.00

9+93.68 · 13+34.65 · 15+91.16 · 18+58.86 · 21+26.83

Robert M. Starh · Helen P. Edwards · Carrie W. McAllister et al · Lucy M. Lane ux L. C. · Est. Bardwell A. Goodell · Freedom F. & Heirs Arethusa H. Daniels · John L. Knox · Eugene L. Bacon · Ruth Ann Weeks ux Enoch · Heirs of Andrew Henry · Emma K. Vinal ux Chas. W. · Henry H. Cook

8" Pipe · 6" Water · 4" Water · 8" Water

5" Chap. Hyd. 3 Hose · 6" Chap. Hyd. 2 Hose Strm. · 6" Smith Gate 6" Eddy Hyd

Stand Pipe

City of Waltham · Eliza G. Derbyshire · Carrie A. Cummings · Jane L. Morton ux Geo. W. · Est. Bardwell A. Goodell · Lillian M. Kingsbury · Martha S. Hight ux Clark C. · Clark C. Hight

CHESTNUT · HIGH · ALDEN · MYRTLE · ASH

LOWELL ST. B

Lowell Street
Water & Sewer
156 - # 229

LOWELL STREET

LOWELLST-C

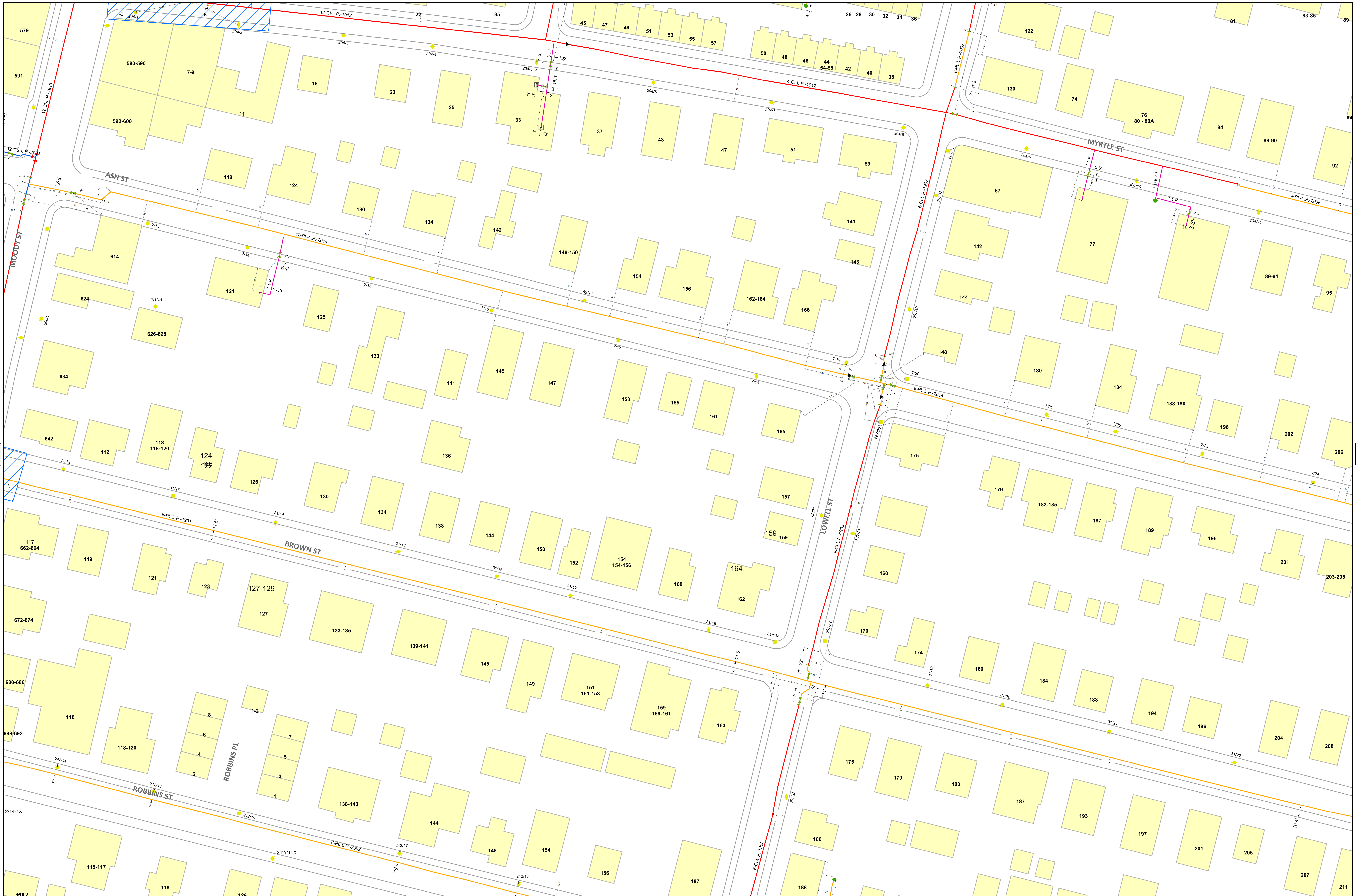
CALL BEFORE YOU DIG
1-888-DIG-SAFE
NOTE
THE LOCATION OF SURFACE AND
UNDERGROUND OBJECTS SHOWN
ARE NOT WARRANTED TO BE CORRECT

NATIONAL GRID

WAL2756

Generated by [illegible] 10/22/2019 [illegible]:01:43 AM on 10/22/2019

WAL2766



WAL2768

WAL2778

N
W E
S

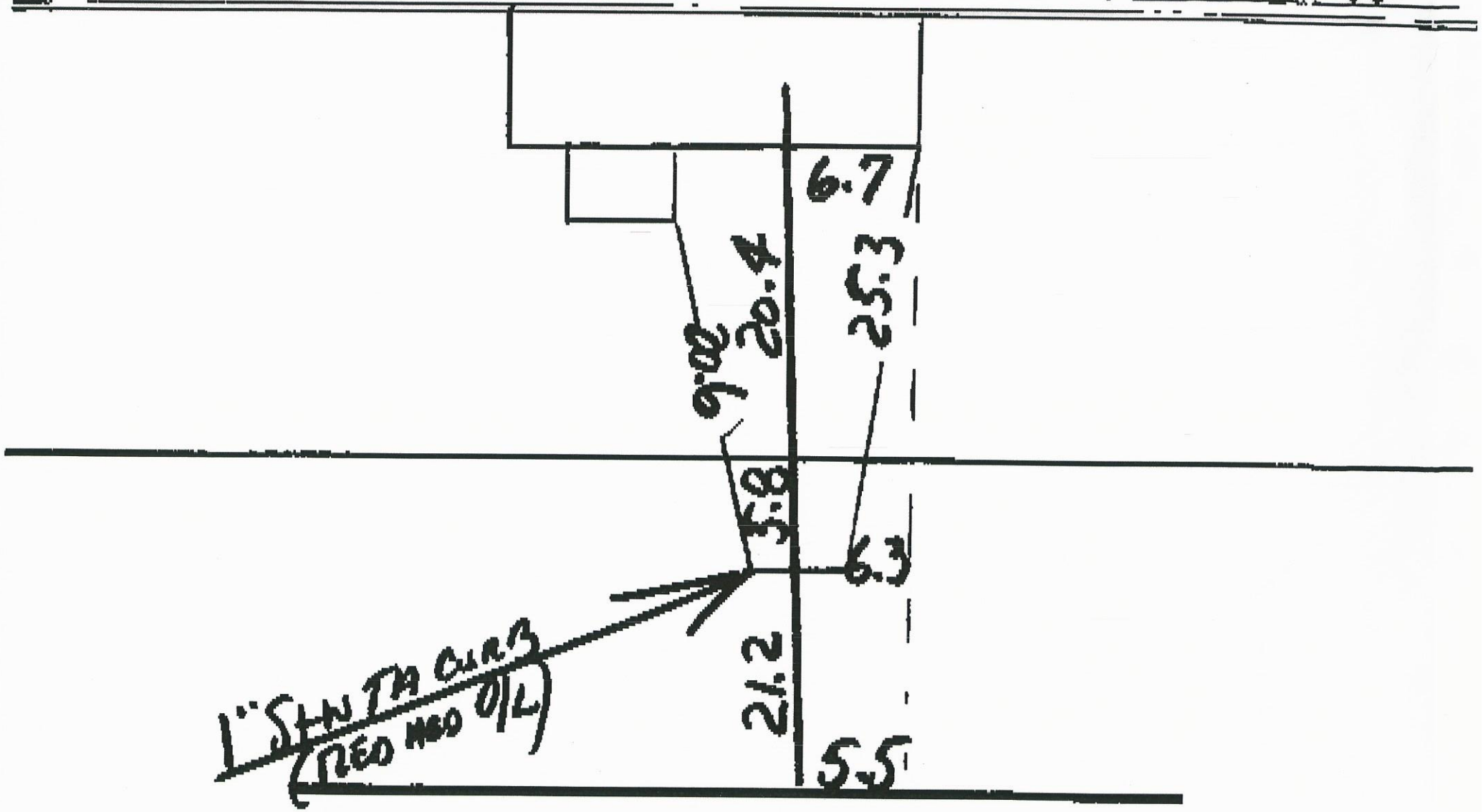
WAL

NOTE1: The location of service pipes and corrosion components are not guaranteed to be correct. SPIPE, as well as original record documents, should be utilized for this information.

NOTE2: The mains in NH without dimensions are not drawn to scale. These mains are intended to show the existence of gas main on the street and do not reflect the exact location of the main in the street.

2767

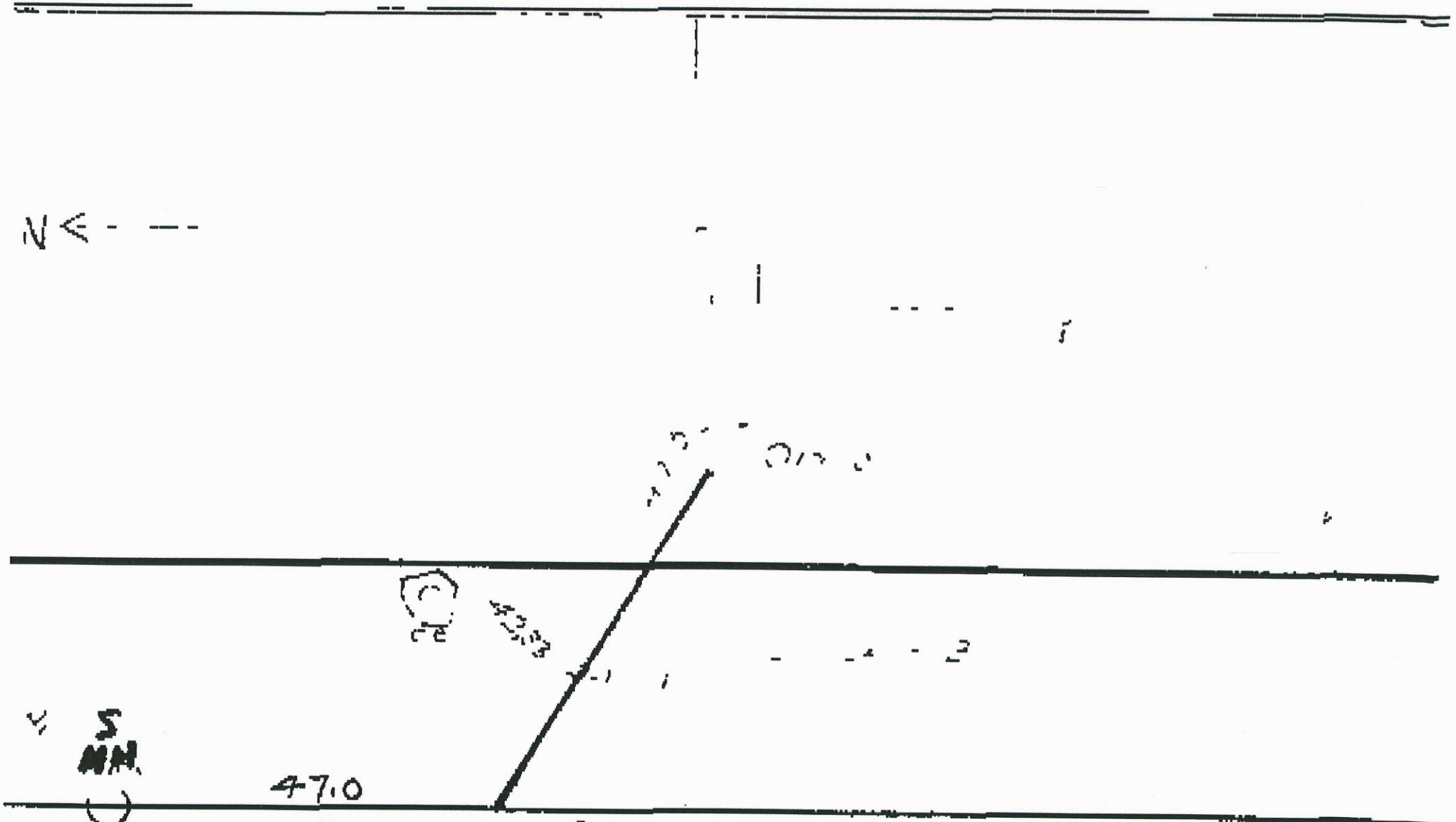
NO 156-158 LONELL ST SERVICE NO 2565-W



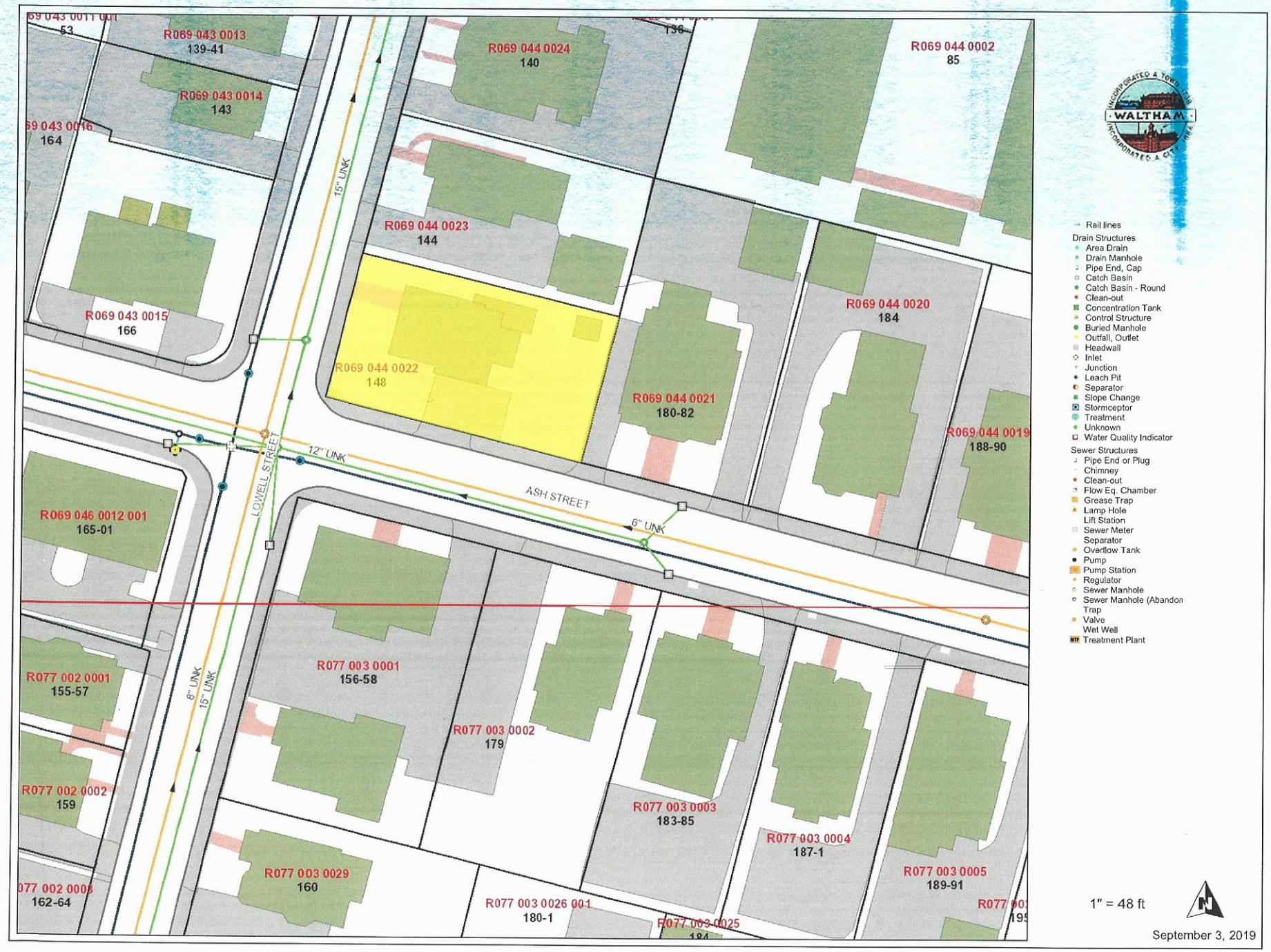
4/20/80 REPAIRED AT CURB — NEW 1" DOW PACJAB (USED [illegible])

(① 1" 2 BOLT CLAMP)

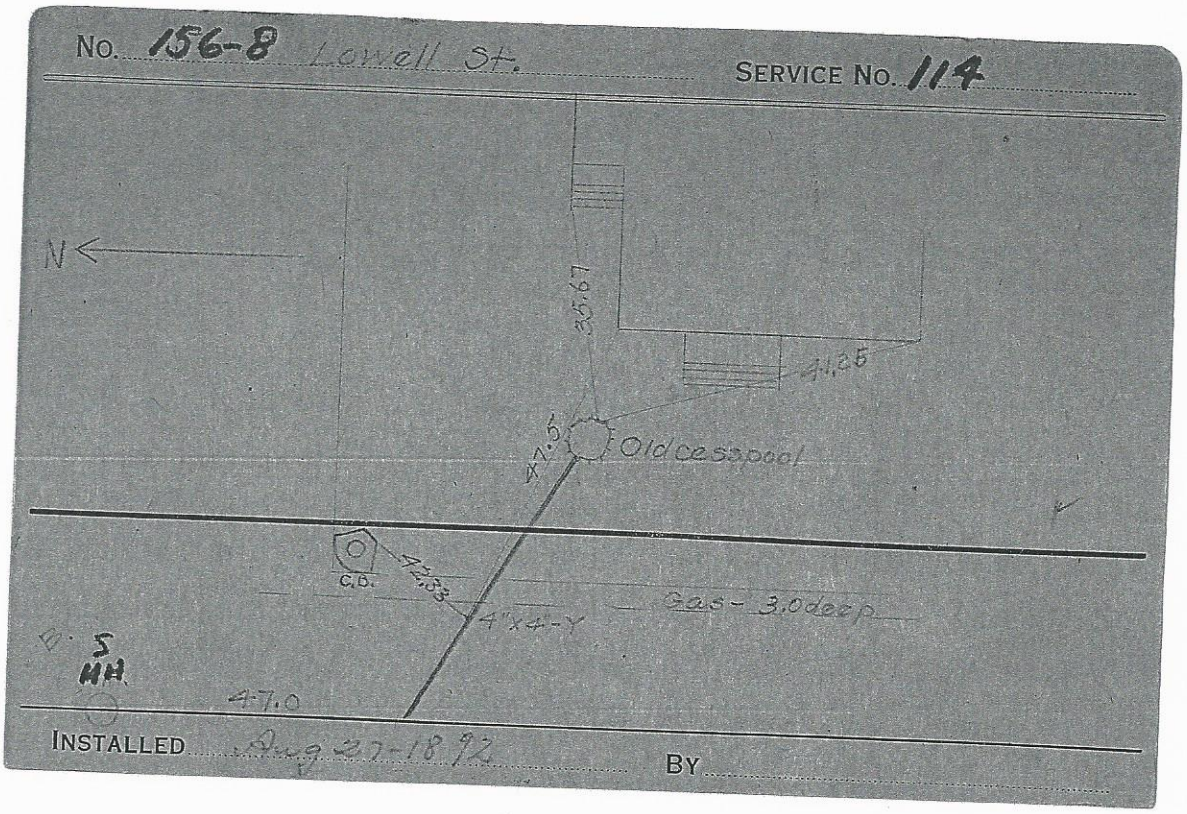
NO 156-8 ...ell St. SERVICE NO 114



INSTALLED Aug 27-1892 BY

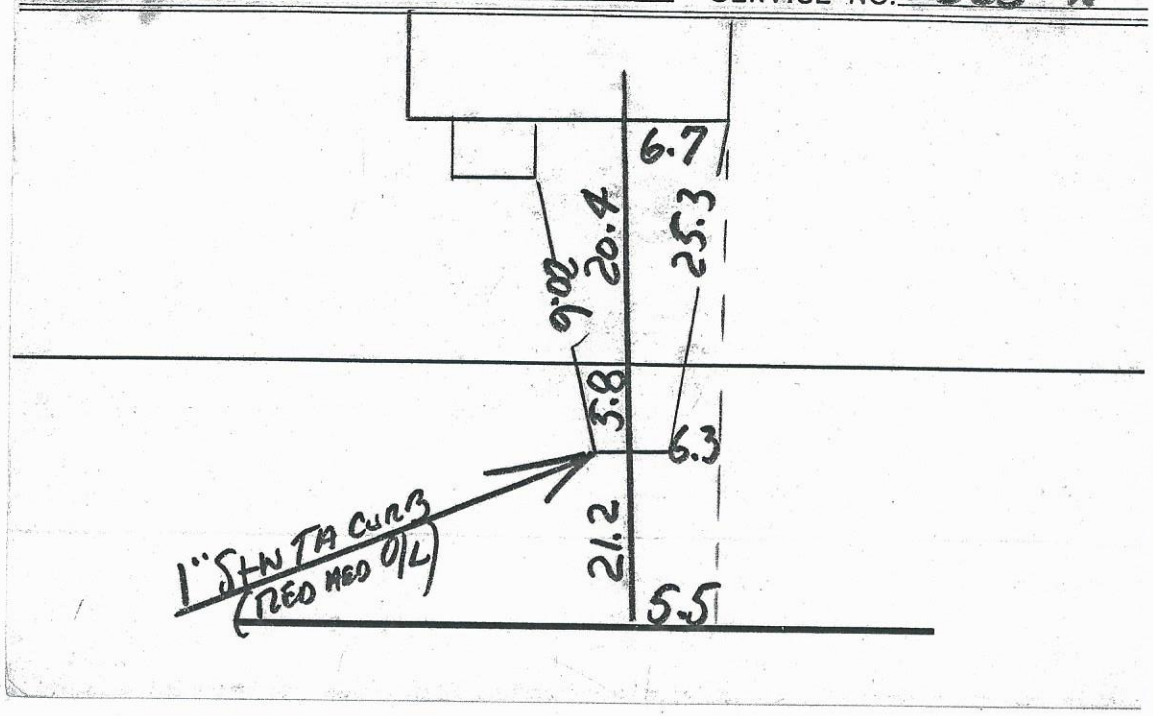

R069 043 0013
139-41
R069 043 0014
143
R069 043 0016
164
R069 043 0015
166
R069 044 0024
140
R069 044 0002
85
R069 044 0023
144
R069 044 0022
148
R069 044 0020
184
R069 044 0021
180-82
R069 044 0019
188-90
15" UNK
12" UNK
6" UNK
LOWELL STREET
ASH STREET
R069 046 0012 001
165-01
R077 002 0001
155-57
R077 003 0001
156-58
R077 003 0002
179
R077 002 0002
159
R077 003 0003
183-85
R077 003 0004
187-1
R077 003 0005
189-91
R077 003 0029
160
R077 003 0026 001
180-1
R077 003 0025
Rail lines
Drain Structures
Area Drain
Drain Manhole
Pipe End, Cap
Catch Basin
Catch Basin - Round
Clean-out
Concentration Tank
Control Structure
Buried Manhole
Outfall, Outlet
Headwall
Inlet
Junction
Leach Pit
Separator
Slope Change
Stormceptor
Treatment
Unknown
Water Quality Indicator
Sewer Structures
Pipe End or Plug
Chimney
Clean-out
Flow Eq. Chamber
Grease Trap
Lamp Hole
Lift Station
Sewer Meter
Separator
Overflow Tank
Pump
Pump Station
Regulator
Sewer Manhole
Sewer Manhole (Abandon
Trap
Valve
Wet Well
Treatment Plant
1" = 48 ft
September 3, 2019

No. 156-8 Lowell St. SERVICE No. 114

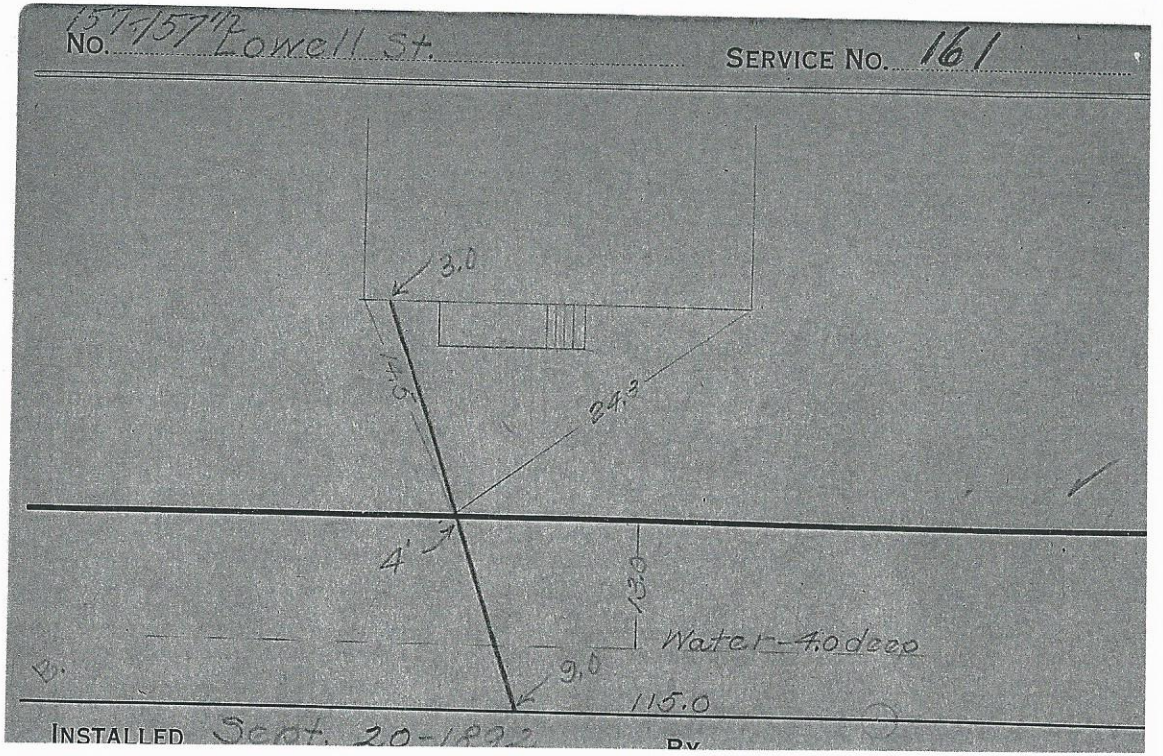


INSTALLED Aug 27-1892 BY

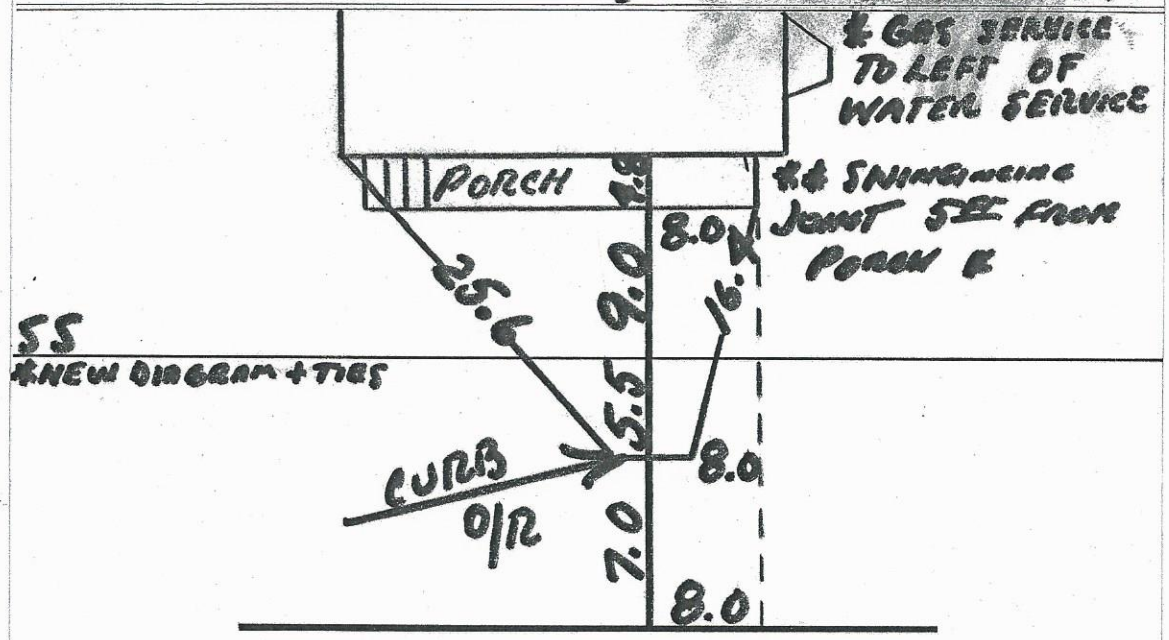
NO. 156-158 LOWELL ST SERVICE NO. 2565-W



NO. 157-157 Lowell St. SERVICE NO. 161

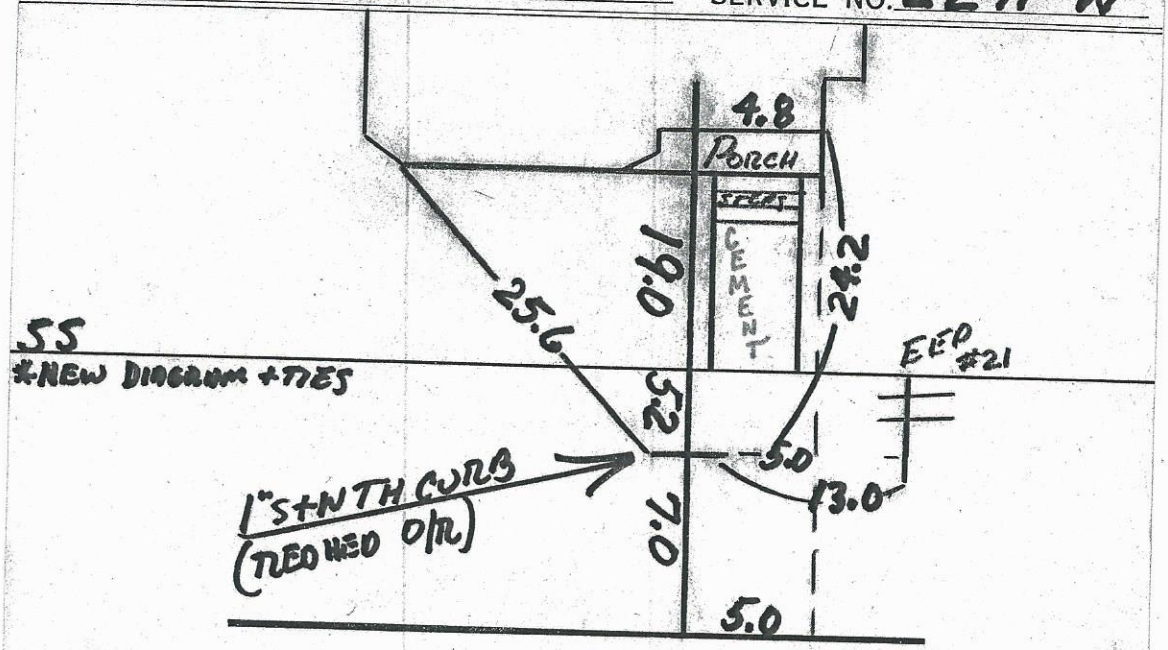


NO. 157 LONELL ST SERVICE NO. 2426-W



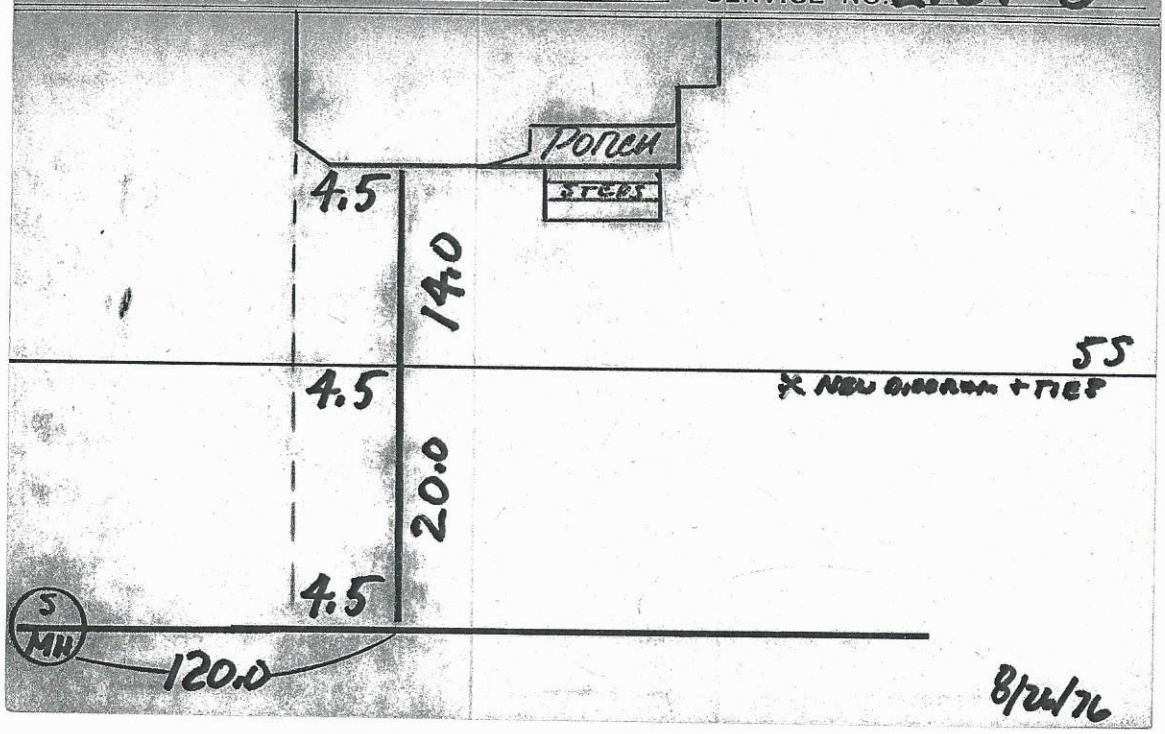
5/20/76

NO. 159 LONELL ST SERVICE NO. 2271-W



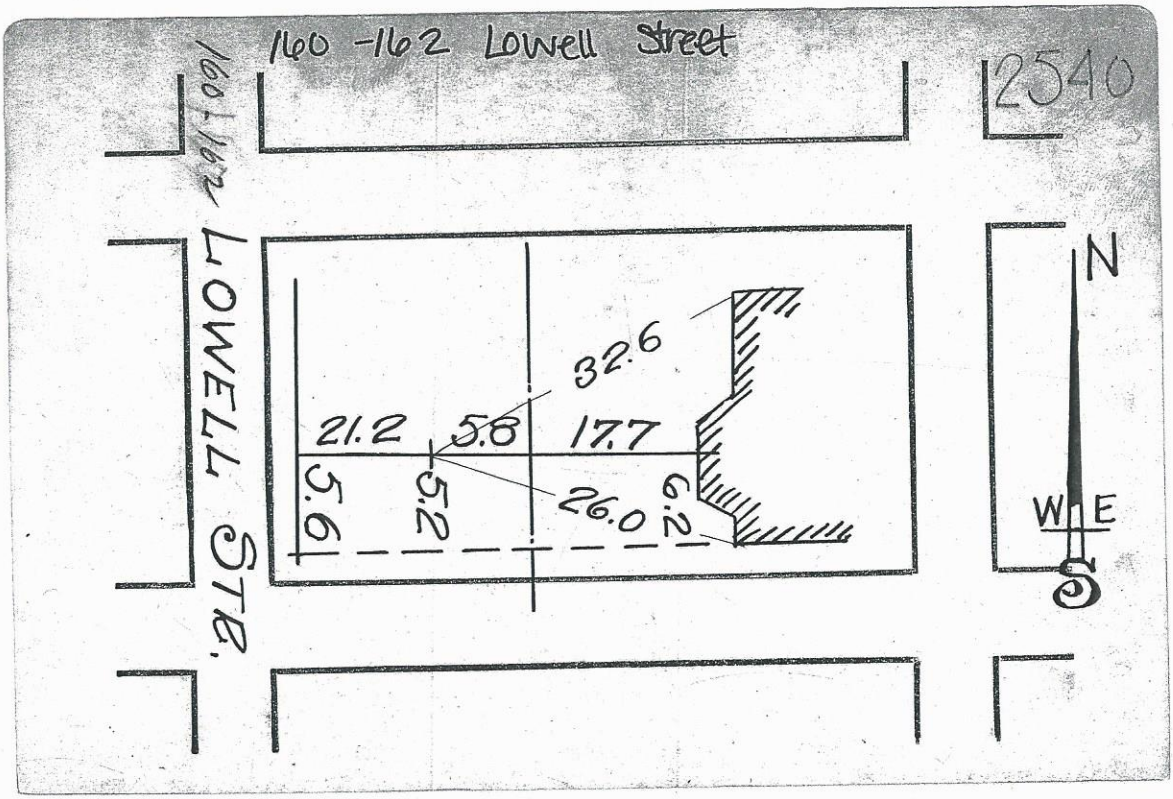
8/26/76

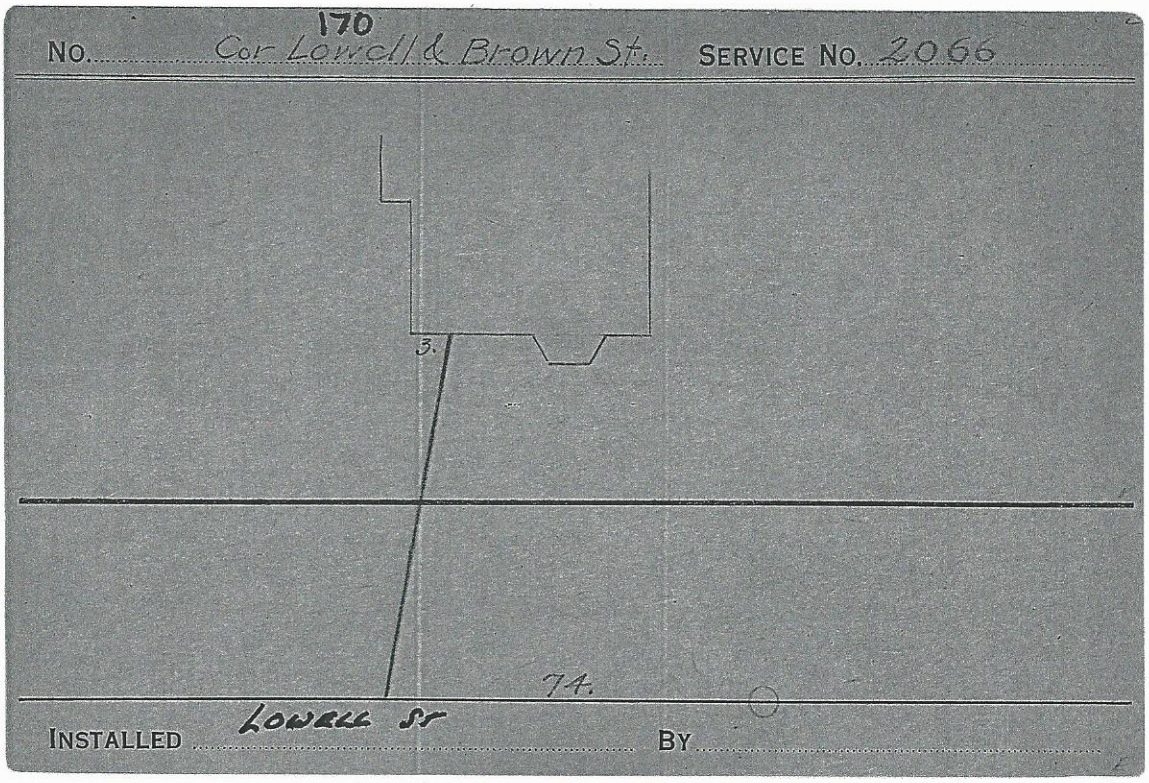
NO 159 LOWELL ST SERVICE NO. 2167-S

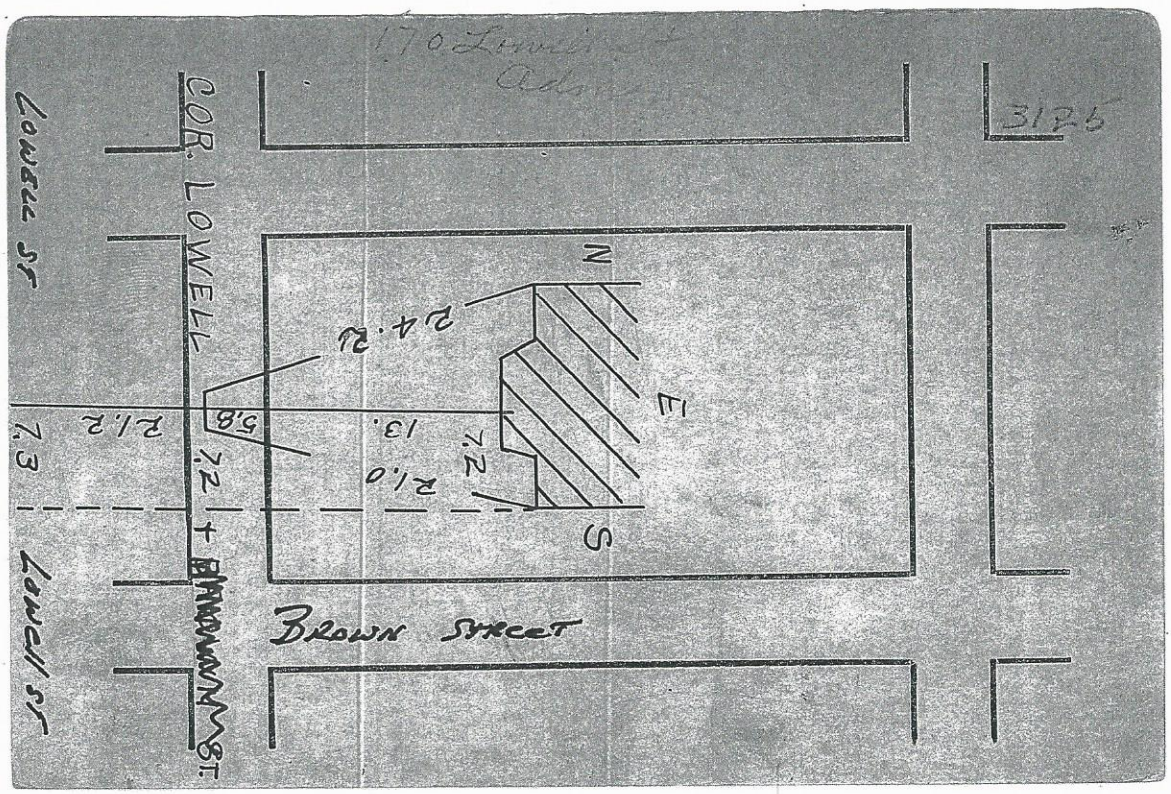


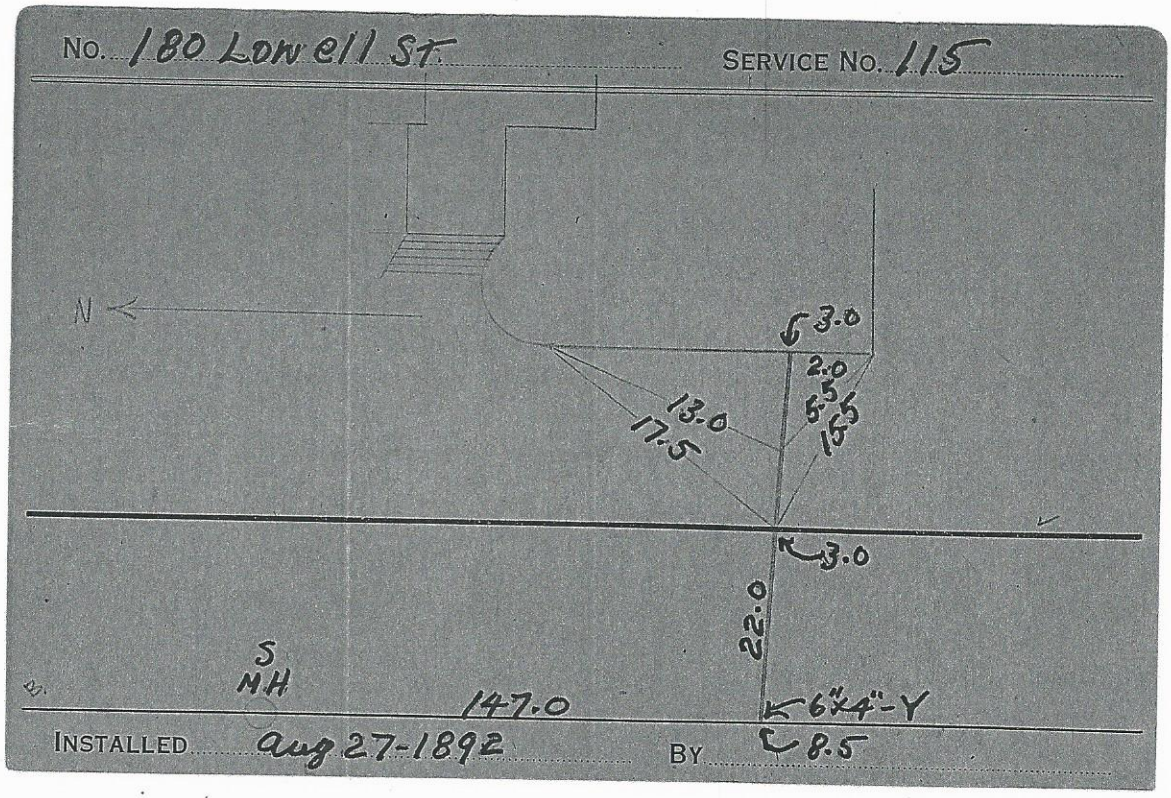
X NEW DRAIN + TIE

8/24/76

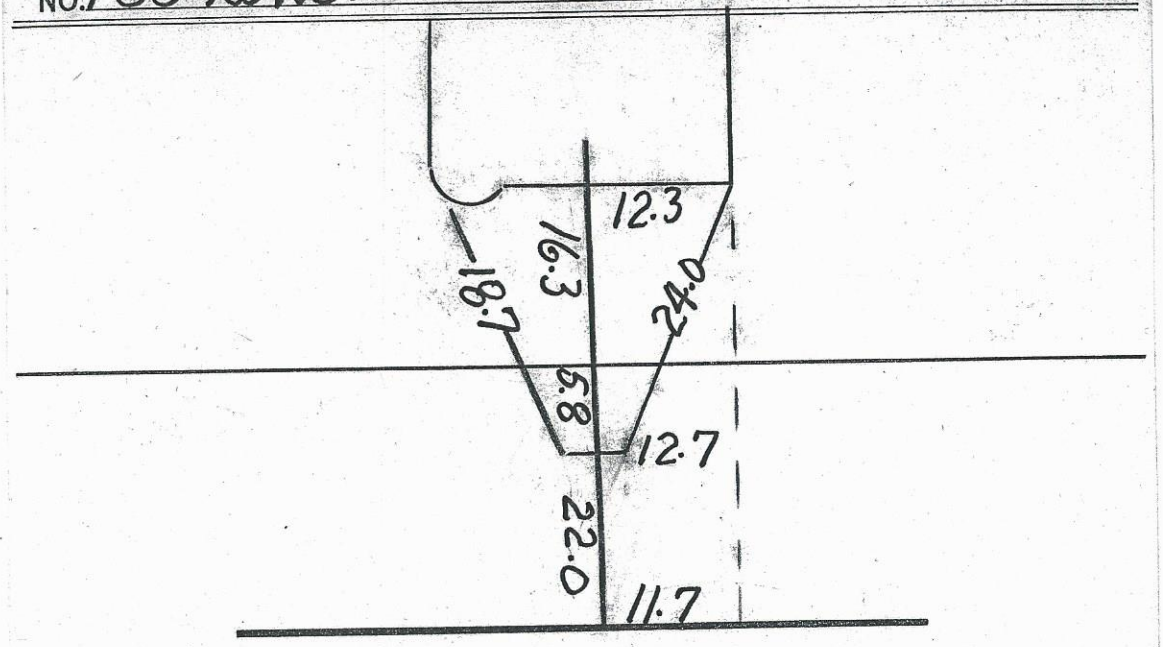

160 -162 Lowell Street
2540
160-162 LOWELL STR.
32.6
21.2
5.6
17.7
5.6
5.2
26.0
6.2
N
W
E
S


NO. 170 Cor Lowell & Brown St.
SERVICE NO. 2066
3.
74.
INSTALLED Lowell St
BY


180 Lowell St
Addition
3126
LOWELL ST
COR. LOWELL ST.
BROWN STREET
LOWELL ST
N
S
E
24.2
13.
7.2
2.0
2.2
7.3
5.8
7.2


No. 180 LOWELL ST.
SERVICE No. 115
N
3.0
2.0
13.0
17.5
5.5
15.5
3.0
22.0
S
M H
147.0
6"x4"-Y
8.5
INSTALLED aug 27-1892
BY

NO. 180 LOWELL ST SERVICE NO. 2739-W



DEC. 18-1891