The City of Waltham

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

JENNINGS ROAD SEWER REPLACEMENT AND DRAIN REHABILITATION, 2021

Virtual Zoom Bid Opening: Friday October 8th, 2021 at 10:00AM

Pre-Bid Briefing via ZOOM: Tuesday September 28th, 2021 at 11:00AM

Last Day for Written Questions: Thursday September 30th, 2021 at 12:00PM
(Via E-Mail Only to cphilpott@city.waltham.ma.us)

JENNINGS ROAD

SEWER REPLACEMENT AND DRAIN REHABILIATTION

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SECTION 00010

INVITATION TO BID

Jennings Road Sewer Replacement & Drain Rehabilitation

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the **Jennings Road Sewer Replacement & Drain Rehabilitation Project** will be received by Crystal Philpott, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **10:00 a.m., October 8, 2021** at which time and place all bids will be opened and bids read aloud via ZOOM. Bids submitted after this time will not accepted. A Pre-Bid Briefing will be held via ZOOM at **11:00 a.m., September 28, 2021.** The meeting info will be posted on our website. The project involves the following major items:

1. Replacement of approximately 2,400 linear feet of 8" gravity sewer main and manholes.
2. Replacement of approximately 330 linear feet of gravity drain main ranging from 12" to 15" diameter.
3. Replacement of water and sewer services within project area as shown on the Contract Drawings.
4. Heavy cleaning / root removal of approximately 1,400 linear feet of existing drain main ranging from 15" to 24" in diameter.
5. Existing flow management and bypass pumping for installation of new sanitary sewer and drain pipes and manholes.
5. Testing of sanitary sewer pipes and manholes for proper installation and performance.
6. Testing and disinfecting water services for proper installation and performance.
7. Site restoration work including curbing and landscaping.
8. Pavement restoration work including **daily temporary paving**; permanent trench paving; sidewalk and driveway paving; and full-width mill and overlay.
9. Other miscellaneous work shown in the Contract Documents for a complete and operational system.

Contract Documents may be obtained by visiting the City's web site at www.city.waltham.ma.us/open-bids after September 15, 2021.

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

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

END OF SECTION

SECTION 00100 - 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. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the web site.

C. **General Bids Deadline**: **10.00 A.M. Friday October 8th, 2021** in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: Purchasing Agent, where the bids will be open and read via ZOOM. See the City's website for meeting information.

D. **Pre-Bid Briefing:** Will be held via ZOOM at **11:00 A.M. Tuesday September 28th, 2021.** The meeting log in information will be posted on our website.

E. Last Day for Questions: **12:00 P.M. Thursday October 30th, 2021.** Emailed to cphilpott@city.waltham.ma.us.

1.02 BIDDING PROCEDURE

COVID-19 BID OPENING (TEMPORARY).

Based on the Public Health 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, 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's web site at www.city.waltham.ma.us/bids

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 cphilpott@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): _____

2021 Jennings Rd Sewer Replacement & Drain Rehabilitation

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. N/A

1.13 SITE VISITS

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

Site visit s during COVID 19. 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. Therefore, The City will not schedule, organize and host site visits and Pre-bid briefings. Interested contractors are encouraged to ask clarification questions via email only to cphilpott@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.

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 Complete in **90 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. <u>City of Waltham shall be a Named Additional Insured with a Waiver of Subrogation on the insurance policy for this project.</u>

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 00200

COMPLIANCE FORMS

(PLEASE COMPLETE AND SUBMIT THESE FORMS WITH YOUR RESPONSE)

ORIGINAL "WET" SIGNATURES ARE REQUIRED IN ALL OF THE FOLLOWING DOCUMENTS

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

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

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

_____
(Name of business)

TAX COMPLIANCE CERTIFICATION

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

_____, _____
Signature of person submitting bid or proposal Date

_____
Name of business

NOTE

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

CERTIFICATE OF VOTE 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 whose signature appears below as an officer

_____
Signature of Officer

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 his/her free act and deed before me, and provided to me through satisfactory evidence of identification which were _____ to be the person whose name is signed on the preceding or attached document in my presence.

Notary Public;

My Commission expires: _____

CORPORATION IDENTIFICATION

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

If a Corporation:

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

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?
Yes _____, No _____
If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

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

If an Individual:
Name _____
Residence _____

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

Signature _____

Title_____
_____
Business Address (POST OFFICE BOX NUMBER NOT ACCEPTABLE)
_____
City State Telephone Number Today's Date

CERTIFICATE OF AUTHORITY
LIMITED LIABILITY COMPANY

The undersigned, being (a/the) duly elected, qualified and active (member / manager) of _____, a Massachusetts limited Liability Company (hereinafter "the Company")

Does Hereby Certify that

1. The Articles of Organization of the Company were duly filed with the Office of the Secretary of State of the State of Massachusetts on _____, and the Articles of Organization have not been (further) amended.

2. The Company has complied with the publication requirements contained in Section 67 of the Limited Liability Company Law.

3. There exists an Operating Agreement of the Company and that the said Operating Agreement has not been amended or repealed and that the said Operating Agreement remains in full force and effect as of this date.

4. Neither the Articles of Organization nor the Operating Agreement (as amended) require any further act to be taken or a meeting to be held by its members other that as follows:

5. All said requirements, whether as contained in the Articles of Organization or in the Operating Agreement or by operation of law as to the transaction of _____, 20___ have been met.

6. The following person or persons has/have been duly authorized by the Company to execute all documents in connection with said transaction and that the signature appearing to the right of their name(s) is his/her genuine signature.

NAME	**OFFICE HELD**	**SIGNATURE**
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

IN Witness Whereof, the undersigned has executed this Certificate of Authority this _____day of _____, 20____.

_____

(Signature)

STATE OF MASSACHUSETTS, COUNTY OF _____

On the ____day of _____, 20___, before me, the undersigned personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/ they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public: _____

My Commission Expires: _____

Notary Stamp:

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.

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:	Address:	Phone No.:	Payroll No.:

Employer's Signature:	Title:	Contract No:	Tax Payer ID Number	Work Week Ending:

Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet Number

General / Prime Contractor's Name:	Subcontractor's Name:		"Employer" Hourly Fringe Benefit Contributions				
						(B+C+D+E)	(A x F)

Employee Name & Complete Address	Work Classification:	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Project Hours (A) All Other Hours	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages / Total Gross Wages	Check No. (H)

Are all apprentice employees identified above currently registered with the MA DLS's Division of Apprentice Standards? YES ☐ NO ☐

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprentice Standards. No apprentices are identified above ☐

NOTE: Pursuant to MGL c. 149, s. 27B, every contractor and subcontractor is required to submit a **true and accurate** copy of their certified weekly payroll records to the awarding authority by first-class mail or e-mail. In addition, each weekly payroll must be accompanied by a statement of compliance signed by the employer. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Date Received by Awarding Authority
/ /

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 is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw 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.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or e-mail, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

STATEMENT OF COMPLIANCE

_____, 20_____

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

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 _____

DEBARMENT CERTIFICATION

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

Company Name _____

Address _____

City _____, State_____, Zip Code _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative: _____

_____Print name. Date _____

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

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

Company Name: _____

Address: _____

Signature:_____

Title: _____

Print Name _____

Date _____

See following 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.

Form **W-9**
(Rev. December 2011)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Fill Out This Section

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶

☐ Other (see instructions) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)

City, state, and ZIP code

Requester's name and address (optional)
Chief Procurement Officer
Purchasing Department, City of Waltham
610 Main Street
Waltham, MA 02452

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ - ☐☐ - ☐☐☐☐

Fill out this sect. either SS or FID

Employer identification number
☐☐ - ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Sign & Date

Sign Here | **Signature of U.S. person** ▶ | **Date** ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

SECTION 00300

BID FORM

To the City of Waltham, Massachusetts, acting through its Department of Engineering:

Regarding: Jennings Road Sewer Replacement and Drain Rehabilitation

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

The Owner reserves the right to reject any or all bids if it deems it to be in its best interest to do so.

The Owner reserves the right to award the Contract based on sufficiency of appropriated funds to complete the work.

The Undersigned, 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 themself 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;
- The Bidder 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 their 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 the Bidder through the Contract Documents or otherwise or obtained by the Bidder in their 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 the Bidder and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefore in this BID;
- The 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;

- The Bidder agrees that, if this BID is accepted will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Contract Documents, and that the Bidder will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of 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 schedule below:

Bidders must bid on each item of the Bid. **Unbalanced bids may be rejected.** 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 products 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.

Bidders shall provide a balanced bid where each lump sum or unit price submitted adequately accounts for all work, including but not necessarily limited to, labor, equipment and incidentals necessary to complete the work required by the Contract Documents in the prescribed manner and within the allotted time frame.

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

Addenda: This BID includes Addenda numbered _____ to _____ (To be filled in by Bidder if Addenda are issued.)

(Bidder) _____

(by) _____

(Title) _____

BASE BID
Jennings Road Sewer Replacement and Drain Rehabilitation

The work of the General Bidder, being all work covered by items 1 through 24, inclusive.

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
1	Mobilization and Demobilization _____ Dollars and Cents	LS	1		
2a	10-inch, PVC SDR 35 Sewer Pipe _____ Dollars and Cents	LF	15		
2b	8-inch, PVC SDR 35 Sewer Pipe _____ Dollars and Cents	LF	2,400		
2c	6-inch, PVC SDR 35 Sewer Service Pipe _____ Dollars and Cents	LF	600		
2d	4-inch, PVC SDR 35 Sewer Service Pipe _____ Dollars and Cents	LF	900		
3a	4-foot Diameter Sewer Manhole _____ Dollars and Cents	VF	130		
3b	5-foot Diameter Sewer Manhole _____ Dollars and Cents	VF	8		
3c	Sewer Manhole Frame and Cover _____ Dollars and Cents	EA	17		
4a	24-inch, RCP Drain Pipe _____ Dollars and Cents	LF	40		
4b	15-inch, RCP Drain Pipe _____ Dollars and Cents	LF	290		
5	Heavy Clean (Mechanical) Drain Pipe _____ Dollars and Cents	LF	1,400		
6a	AC Pipe Removal and Disposal _____ Dollars and Cents	LF	120		
6b	Management and Disposal of Crushed AC Pipe and AC Impacted Soils _____ Dollars and Cents	CY	10		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
7	Relocate 6" Water Main _____ Dollars and Cents	LF	100		
8	Remove 6" CI WM at Intersection of Woodland Road and Prospect Hill Road _____ Dollars and Zero Cents	LS	1		
9a	1-inch Type K Copper Tubing _____ Dollars and Cents	LF	500		
9b	2-inch Type K Copper Tubing _____ Dollars and Cents	LF	20		
10a	1-inch service taps, including corporations, fittings, curb stops and boxes _____ Dollars and Cents	EA	24		
10b	2-inch service taps, including corporations, fittings, curb stops and boxes _____ Dollars and Cents	EA	1		
11	Additional Excavation and Backfill Below Normal Grade _____ Dollars and Cents	CY	125		
12	Exploratory Excavation (Test Pits) _____ Dollars and Cents	CY	30		
13a	Additional Common Fill _____ Dollars and Cents	CY	1,000		
13b	Additional Select Fill _____ Dollars and Cents	CY	500		
13c	Controlled Density Fill _____ Dollars and Cents	CY	50		
13d	Additional Crushed Stone _____ Dollars and Cents	CY	50		
14	Rock Excavation _____ Dollars and Cents	CY	350		
15	Miscellaneous Concrete _____ Dollars and Cents	CY	25		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
16a	Wheelchair Ramps _____ Dollars and Cents	SY	110		
16b	New Granite Curbing _____ Dollars and Cents	LF	75		
16c	Remove and Reset Granite Curbing _____ Dollars and Cents	LF	195		
17a	4-inch Temporary Trench Pavement _____ Dollars and Cents	SY	3,430		
17b	1.5” Milling (Full Width) _____ Dollars and Cents	SY	5,960		
17c	Bituminous Berm/Curb _____ Dollars and Cents	LF	50		
17d	1.5” Overlay (Full Width) _____ Dollars and Cents	SY	5,960		
17e	1.5” Milling and Permanent Trench Pavement _____ Dollars and Cents	SY	860		
17f	Miscellaneous Pavement for Sidewalks and Driveways _____ Dollars and Cents	SY	570		
18	Calcium Chloride (50-lbs Bag) _____ Dollars and Cents	EA	30		
19	Landscaping _____ Dollars and Cents	SY	200		
20	Silt Sack _____ Dollars and Cents	EA	24		
21	Rodent Control _____ Dollars and Cents	LS	1		
22	Uniformed Police Officer Allowance _____ Dollars and Cents	Allow.	$86,400	$86,400	$86,400
23	Traffic Management _____ Dollars and Zero Cents	LS	1		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
24	Miscellaneous Work and Cleanup _____ Dollars and Cents	LS	1		
				Total	**$**

TOTAL BASE BID

Total Amount of Base Bid (Item 1 through 24 inclusive). Basis of Award:

$ _____

(Amount in figures)

_____

(Amount in words)

BID ALTERNATE

The work of the General Bidder, being all work covered by items A1 through A2, inclusive.

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
A1	1.5" Milling (Full Width) – Woodland Rd. _____ Dollars and Cents	SY	2,290		
A2	1.5" Overlay (Full Width) – Woodland Rd. _____ Dollars and Cents	SY	2,290		
				Total	**$**

TOTAL FOR BID ALTERNATE

Total Amount of Bid Alternate (Items A1 and A2).

$ _____

(Amount in figures)

_____

(Amount in words)

TOTAL BID: Base Bid Plus Bid Alternate

Total Bid Amount

$

(Amount in figures)

(Amount in words)

Basis of Award: The basis of award shall be at the Owner's sole discretion, contingent on the Base Bid Price. The grand total of the Base Bid, Items 1 through 24 inclusive, will be used to determine the lowest responsive Bidder. Contract to be awarded to the lowest responsible and eligible Bidder in compliance with Sections 39M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts.

Requirements: Specific items of this Contract may be eliminated or reduced in quantity to keep within limits of available funding, at the OWNER'S option. All of the above items shall include all labor, materials, equipment, hauling, disposal, transportation, overhead, profit and insurance to cover the work as required in the Contract Documents.

The undersigned agrees that for extra work, if any, will be performed in accordance with Article 11 of the General Conditions of the Contract and will be paid for in accordance with Article 13 of the General Conditions of the Contract.

An unbalanced or unreasonable lump sum and/or unit price submitted herein may be considered as non-responsive to the Instructions to Bidders.

The bid security accompanying this BID shall be in the amount of five percent (5%) of the BID.

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.

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

If this BID is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the Contract within **90 calendar days** for the Base Bid, as stipulated in the AGREEMENT. Liquidated damages for each calendar day of delay shall be $1,000 as stipulated in the AGREEMENT.

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 undersigned as Bidder, hereby certifies that he is aware of the applicable requirements of the Williams-Steiger Occupational Safety and Health Act of 1970. (O.S.H.A.), and all latest revisions thereto, and that this Proposal is prepared on the basis of compliance with those requirements.

The undersigned as Bidder, hereby certifies that he will maintain records in reasonable detail, which accurately and fairly reflect the financial transactions and disposition of the Bidder, in accordance with M.G.L. Chapter 30, Section 30R.

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 MGL 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 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 G.L. c.62C, §49A, the undersigned Bidder certifies under penalties of perjury that the he/she/it has complied with all laws of the commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

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 FORM OF NON-COLLUSION AFFIDAVIT must be signed and submitted as part of the Bid Proposal.

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

(SEAL)

_____ By _____
(Name of Bidder) (Signature and title of authorized representative)

Date _____

_____ _____
Telephone) (Business address)

_____ _____
(Fax Number) (City and State)

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 and Project Reference List (Section 00300)
- Completed Form of Non-Collusion Affidavit
- Completed Certificate of Corporate Vote (Corporation Only)
- Completed Certificate as to Payment of State Taxes
- Completed Certificate of 10 Hour OSHA Training

The Bidder is required to list five or more of your firm's recent projects of a similar to be deemed an 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:____________________

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 00300

DOCUMENT 00 430

BID BOND

AIA Document A310 - Bid Bond, 2010 Edition - Electronic Format, is included, following this page, as an integral part of the Bid documents, for use in fulfilling Bid Security requirements in lieu of submitting a certified check.

END OF DOCUMENT

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Office of the Chief Procurement Officer, City of Waltham, 610 Main Street
Waltham, MA 02452

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
Uninterruptible Power Supply (UPS)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

Additions and Deletions Report for

AIA® Document A310™ – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:55:14 on 01/10/2013.

PAGE 1

Uninterruptible Power Supply (UPS)

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:55:14 on 01/10/2013 under Order No. 6871475021_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A310™ – 2010, Bid Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

00520
AGREEMENT

CITY OF WALTHAM

ARTICLE 1. This agreement, made this _____ day of _____, 2021 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

_____

_____

hereinafter called the CONTRACTOR.

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

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

ARTICLE 3. In consideration of the foregoing premises the CITY agrees to pay and the CONTRACTOR agrees to receive as full compensation for everything furnished and done by the CONTRACTOR under this contract, including all work required by not included in the items herein mentioned, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set forth in the accompanying bid.

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

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

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

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

_____
Robert Waters, Housing Director
Date: _____

_____
Crystal Philpott, 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 00 610

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.

PERFORMANCE BOND

SECTION 00 615

PAYMENT BOND

CITY OF WALTHAM

KNOW ALL MEN BY THESE PRESENT THAT,
_____ as

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

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

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

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

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

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

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

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

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

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

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

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

SECTION 00700

GENERAL CONDITIONS

1. **INFORMATION**
   All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words "or equal as approved" are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.
2. **SUITS**
   The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.
3. **LAWS AND REGULATIONS**
   The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.
4. **PROTECTION OF PROPERTY**
   The Contractor shall take all proper precautions to protect the City's property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.
5. **PROTECTION OF PERSONS**
   The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.
6. **INSURANCE**
   A. WORKMAN'S COMPENSATION: The Contractor shall provide by insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor.

   B. COMPREHENSIVE GENERAL LIABILITY

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

   C. AUTOMOBILE (VEHICLE) LIABILITY

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

   D. UMBRELLA POLICY

General liability	$2,000,000

Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: **"The City of Waltham is a Named Additional Insured for all Insurance".** The Certificate of Insurance must be mailed directly to:

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

7. **LABOR AND MATERIALS BOND**

The Contractor agrees to execute and deliver to the City, a Performance Bond and a Labor and Materials Bond equal to 100% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

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

8. **PERSONNEL**:

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

9. **PREVAILING WAGES**

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. Copies of the Prevailing Wage Schedule is found on line at www.city.waltham.ma.us/open-bids

10. **MATERIALS**

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

11. **TERMINATION OF CONTRACT**

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

12. **CONTRACT OBLIGATIONS**

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

13. BIDDER EXPERIENCE EVALUATION

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

14. NOT-TO-EXCEED AMOUNT

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

A. FINANCIAL STATEMENTS.

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

21 BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

22 RIGHT TO AUDIT

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

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

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

20. BID OPENING INCLEMENT WEATHER

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

21 FUNDS APPROPRIATION.

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

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

23 COVID-19 BID OPENING

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives*:

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

C. *Day*:

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

D. *Defective*:

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

a. does not conform to the Contract Documents; or

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

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

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

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

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

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

2.02 *Copies of Documents*

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

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

2.03 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.05 *Initial Acceptance of Schedules*

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

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

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

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

2.06 *Electronic Transmittals*

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

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

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

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

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

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

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

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

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

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

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

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

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

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

B. *Resolving Discrepancies*:

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

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

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

3.04 *Requirements of the Contract Documents*

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

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

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

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

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

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

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

4.04 *Progress Schedule*

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

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

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

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

4.05 *Delays in Contractor's Progress*

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

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

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

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

2. abnormal weather conditions;

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

4. acts of war or terrorism.

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

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

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

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

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

5.01 *Availability of Lands*

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

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

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

5.02 *Use of Site and Other Areas*

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

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

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

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

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

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

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

5.03 *Subsurface and Physical Conditions*

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

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

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

3. Technical Data contained in such reports and drawings.

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

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

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

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

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

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

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

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

D. *Possible Price and Times Adjustments*:

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

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

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

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

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

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

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

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

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

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

5.05 *Underground Facilities*

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

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

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

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

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

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

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

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

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

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

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

E. *Possible Price and Times Adjustments*:

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

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

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

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

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

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

2. Technical Data contained in such reports and drawings.

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

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

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

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

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

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

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

6.02 *Insurance—General Provisions*

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

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

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

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

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

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

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

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

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

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

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

6.03 *Contractor's Insurance*

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

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

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

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

4. Foreign voluntary worker compensation (if applicable).

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

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

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

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

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

1. Products and completed operations coverage:

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

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

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

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.04 *Owner's Liability Insurance*

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

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

6.05 *Property Insurance*

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

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

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

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

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

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

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

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

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

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

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

6.06 *Waiver of Rights*

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

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

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

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

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

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

6.07 *Receipt and Application of Property Insurance Proceeds*

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

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

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

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

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

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

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

7.02 *Labor; Working Hours*

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

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

7.03 *Services, Materials, and Equipment*

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

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

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

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

7.04 *"Or Equals"*

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

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

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

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

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

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

4) it is not objectionable to Owner.

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

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

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

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

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

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

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

7.05 *Substitutes*

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

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

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

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

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

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

b. will state:

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

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

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

c. will identify:

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

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

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

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

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

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

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

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

7.06 *Concerning Subcontractors, Suppliers, and Others*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

O. Nothing in the Contract Documents:

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

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

7.07 *Patent Fees and Royalties*

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

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

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

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

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

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

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

7.11 *Record Documents*

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

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. all persons on the Site or who may be affected by the Work;

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

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

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

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

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

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

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

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

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

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

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

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

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

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

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

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

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

1. *Shop Drawings*:

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

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

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

2. *Samples*:

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

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

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

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

D. *Engineer's Review*:

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

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

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

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

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

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

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

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

E. *Resubmittal Procedures*:

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

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

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

7.17 *Contractor's General Warranty and Guarantee*

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

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

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

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

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

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

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

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

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

7.19 *Delegation of Professional Design Services*

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

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

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

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

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

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

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

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

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

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

8.02 *Coordination*

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

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

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

3. the extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

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

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

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

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

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

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

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

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

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

10.03 *Project Representative*

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

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

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

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

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

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

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

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

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

1. *Change Orders*:

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

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

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

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

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

11.02 *Owner-Authorized Changes in the Work*

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

11.03 *Unauthorized Changes in the Work*

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

11.04 *Change of Contract Price*

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

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

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

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

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

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

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

1. a mutually acceptable fixed fee; or

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

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

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

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

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

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

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

11.05 *Change of Contract Times*

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

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

11.06 *Change Proposals*

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

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

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

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

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

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

11.07 *Execution of Change Orders*

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

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

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

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

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

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

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

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

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

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

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

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

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

D. *Mediation*:

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

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

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

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

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

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

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

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

13.01 *Cost of the Work*

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

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

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

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

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

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

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

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

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

5. Supplemental costs including the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

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

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

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

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

13.03 *Unit Price Work*

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

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

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

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

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

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

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

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

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

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

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

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

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

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

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

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

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

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

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

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

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

14.03 *Defective Work*

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

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

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

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

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

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

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

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

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

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

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

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

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

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

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

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

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

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

15.01 *Progress Payments*

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

B. *Applications for Payments*:

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

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

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

C. *Review of Applications*:

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

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

a. the Work has progressed to the point indicated;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

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

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

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

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

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

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

15.04 *Partial Use or Occupancy*

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

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

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

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

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

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

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

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

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

   a. all documentation called for in the Contract Documents;

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

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

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

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

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

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

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

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

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00710

PREVAILING WAGE SCHEDULE

Please visit the City Web Site at www.city.waltham.ma.us/bids for a copy of the schedules

SECTION 00810

SUPPLEMENTAL CONDITIONS

Unless otherwise noted, all paragraphs are additive to similarly numbered paragraphs in SECTION 00700 – GENERAL CONDITIONS. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2013, Rev1 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

PART I AMENDMENTS TO GENERAL CONDITIONS

Article No.

1.0	DEFINITIONS AND TERMINOLOGY
2.0	PRELIMINARY MATTERS
3.0	DOCUMENTS: INTENT, REQUIREMENTS AND REUSE
4.0	COMMENCEMENT AND PROGRESS OF WORK
5.0	AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS
6.0	BONDS AND INSURANCE
7.0	CONTRACTOR'S RESPONSIBILITIES
8.0	OTHER WORK AT THE SITE
9.0	OWNERS RESPONSIBILITIES
10.0	ENGINEER'S STATUS DURING CONSTRUCTION
11.0	AMMENDING CONTRACT DOCUMENTS: CHANGES IN WORK
12.0	CLAIMS
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14.0	TEST AND INSPECTIONS
15.0	PAYMENTS TO CONTRACTOR
16.0	SUSPENSION OF WORK AND TERMINATION
17.0	FINAL RESOLUITION OF DISPUTES
18.0	MISCELLANEOUS

PART II ADDITIONS TO GENERAL CONDITIONS

PART III STATE AND FEDERAL GOVERNMENT PROVISIONS

PART I AMENDMENTS TO GENERAL CONDITIONS

1.0 DEFINITIONS AND TERMINOLOGY

A. The following language shall be added at the beginning of the definition entitled "Contract Documents" in the General Conditions (1.01.A.13).

"The Invitation to Bid, Instructions to Bidders"

B. 1.01.A.18, Add the words "or plans" after the word "drawings in the first line of the definition entitled "Drawings" in the General Conditions.

C. 1.01.A.38, Delete the definition of Specifications in the General Conditions in its entirety and add the following in its place:

"Sections included under Division 1 through Division 16 of the Contract Documents"

D. 1.01.A.40 The definition of Substantial Completion shall be deleted in the General Conditions in its entirety and add the following in its place:

Substantial completion shall mean either that the work required by the Contract has been completed except for work having a contract price of less than one percent o the then adjusted total contract price, or substantially all of the work has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the Contract.

E. The following new definitions shall be added at the end of Article 1 of the General Conditions:

Conditions of the Contract–The combined General Conditions and Supplementary Conditions.

Engineer – GCG Associates, Inc., 84 Main Street, Wilmington, MA, 01887, said corporation to be considered an agent of the Owner.

Site – The specific area adjacent to and including the area upon which the construction work is performed.

2.0 PRELIMINARY MATTERS

A. Delete paragraph 2.03A in its entirety and insert in it place:

2.03. A: Contract time will commence on the date specified in the Notice to Proceed.

3.0 DOCUMENTS: INTENT, REQUIREMENTS AND REUSE

Four paragraphs shall be added immediately after paragraph 3.01.E of the General Conditions which is to read as follows:

3.01.F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

3.01.G. Contract Documents shall forthwith be physically amended to make such insertion.

3.01.H. In case of any discrepancy between these Conditions of the Contract and any Federal Government provisions, the Federal Government provision shall prevail.

3.01.I. In case of any discrepancy between these between these Conditions of the Contract and any Commonwealth of Massachusetts provisions, the Commonwealth of Massachusetts provision shall prevail.

3.01.J In the event of conflicts, inconsistencies or discrepancies among the Contract Documents, to the extent applicable, the better quality or greater quantity of work shall be provided without change to the Contract Price. In the event of such conflicts, inconsistencies or discrepancies which do not relate to the quality or quantity of work, the Contractor shall request clarifications or interpretations from the Engineer as provided in Article 10.

5.0 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

A. A new paragraph shall be added immediately after paragraph 5.01.C of the General Conditions which is to read as follows:

D. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, the Contractor shall begin the work upon such land and rights-of-way as the Owner has previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for work, Contractor shall not be entitled to make or assert claim for the damage by reason of said delay, or to withdraw from the Agreement except by consent of the Owner. Time for

completion of the work will be extended as provided in Article 11, to such time as the Owner determines will compensate for the time lost by such delay.

B. A new paragraph shall be added immediately after paragraph 5.03.B of the General Conditions which is to read as follows (if borings performed):

5.03.C. The Engineer has relied upon the data obtained from subsurface investigations made at the site in the form of test borings and probes. Such data is in the form of logs which are included in the Section 00220 and soil samples which may be examined at the Engineer's office during regular business hours. The locations of the test borings and probes are indicated on the Drawings. Such logs and samples are not part of the Contract Documents.

C. Two new paragraphs shall be added immediately after paragraph 5.05.E of the General Conditions which is to read as follows:

5.05.F. Information on Drawings and any statements of the Contract Documents referring to the conditions under which the work is to be performed or the existence of utilities or other underground structures are not guaranteed to be correct or to be complete representation of all existing data with reference to conditions affecting the work. Efforts have been made however, to make this information complete and accurate on the basis of all data and information which could be procured by Engineer. If, in the opinion of Engineer, permanent relocation of a utility not otherwise provided for, is required, he shall direct the Contractor, in writing, to perform the work. Work, so directed, will be paid as provided in Article 11 of the General Conditions.

5.05.G. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law, Chapter 30, Section 39N.

6.0 BONDS AND INSURANCE CONTRACTOR'S (AND SUBCONTRACTOR'S) PUBLIC LIABILITY, PROPERTY DAMAGE AND VEHICLE LIABILITY INSURANCE

The following shall be added to 6.0.

A. The liability limits for the insurance required by the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

The Contractor shall purchase and maintain such insurance as will protect him for claims set forth herein which may arise out of or result from the Contractor's operations be by himself or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them are liable.

1. Claims under workman's compensation, disability benefit and other similar employee benefit and other similar employee benefit acts;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and

5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

B. The required insurance shall be written for not less than the following limits of liability, or as required by law, whichever is greater.

The work shall be entirely at the contractor's risk until the same is fully completed and accepted, and he will be held liable to the amount of the City's interest in the same as shown by payments account.

The contractor shall, during the progress of the work, maintain insurance on all work included in the contract until the final or conditional acceptance of the work**. The City shall be named as an additional insured on all insurance.** Failure to provide and continue in force such insurance as specified shall be deemed a material breach of the contract and shall operate as an immediate termination thereof.

A contractor shall not commence work under any contract until he has obtained all insurance required, nor shall the contractor allow any subcontractor to commence work on a sub-contract until all similar insurance required has been obtained.

1. Workmen's Compensation Insurance

   The contractor will maintain, during the life of the contract, the statutory Worker's Compensation and Employer's Liability for all employees to be engaged in work on the project under the contract and in case any such work is sublet. The contract shall require the sub-contractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all employees engaged in the project.

2. Automobile Bodily Injury and Property Damage

   There shall be provided insurance for not less than $1,000,000 for injuries, including wrongful death, to any one person, $3,000,000 aggregate. Any one accident shall be covered to a limit of $1,000,000 bodily injury each

occurrence, $3,000,000 aggregate. There shall be property damage insurance provided to the amount of $1,000,000 on account of any one accident and included owned, hired and non-owned automobiles.

3. Comprehensive General Liability

   The contractor shall purchase and maintain such insurance as required to protect the owner's interest for the duration of the contract and until acceptance of the work.

   Comprehensive General Liability Coverage covering bodily injury and property damage with limits of $1,000,000 each occurrence, $3,000,000 aggregate, shall include coverage for premises, operations XCU included, products completed operations, contractual insurance, brand form property damage, independent contractor's personal injury coverages.

4. Property Coverage

   For materials and supplies being transported by the contractor.

5. Umbrella Liability

   $3,000,000/occurrence, $3,000,000 aggregate.

C. The Contractor shall procure and maintain Owner's Protective Liability Insurance as herein specified.

6. In addition to the Owner the Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

7. Said policy shall provide that the coverage afforded thereby, shall be primary coverage to the full limit of liability state in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

8. The original and one certified copy of the policy specified shall be forwarded to the Engineer for the Owner prior to commencement of any work.

9. The limits of Owner's Protective Liability Insurance shall be not less than One Million Dollars ($1,000,000) on account of any one accident and Three Million Dollars ($3,000,000) on account of all accidents.

D. The Contractor's and Subcontractor's insurance shall provide adequate protection against the following special hazards:

1. Blasting or explosion

2. Collapse of trench walls and underground damage
3. Use of all equipment and tools

E. The Contractor shall not commence work under this Contract until he has obtained all insurance required hereunder and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required of subcontractor has been so obtained and approved. Approval of insurance required under this article shall be kept in force during the life of the Contract.

1. Certificates in triplicate of all General Contractor's policies specified shall be filed with the Engineer for the Owner. Any certificates filed with the Engineer which shall be found to be incomplete or not according to form will be returned as unsatisfactory. Rejected certificates of insurance and copies of policies shall be corrected as necessary and resubmitted until approved.

F. Each and every policy shall contain an endorsement stating that the Insurance Company will to, prior to completion of project or any policy expiration date shown on policy and certificate, whichever occurs first, terminate policy or change any coverage therein without first mailing by registered mail, written notice of such action at least fifteen (15) days prior to termination or change, to Owner at whose request policy and certificates are issued.

G. Delete paragraph 6.05 of the General Conditions in its entirety.

H. Delete paragraph 6.06 of the General Conditions in its entirety.

I. Delete paragraph 6.07 of the General Conditions in its entirety.

J. The following new paragraphs shall be added immediately after paragraph 6.07 of the General Conditions which is to read as follows:

6.08. The Contractor may purchase and maintain excess liability insurance in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the general conditions in the form of a certificate indicating the policy numbers and limits of liability of all underlying insurance. The umbrella liability insurance shall have a combined single limit of not less than $3,000,000. Such insurance shall contain a provision that the coverage afforded will not be cancelled or materially changed until at least thirty days prior written notice has been given to Owner.

6.09. If the aggregate limits of liability indicated in the Contractor's insurance provided in accordance with above limits is not sufficient to cover all claims for damages arising from his operations under this contract and from any other work performed by him or if policies of insurance do not provide that the aggregate limits of liability for bodily injury and property damage apply to each

contract or project separately, Contractor shall have such policies amended so that the aggregate limits of liability required by this Contract will be available to cover all claims for damages due to operations under this Contract.

6.10 PROOF OF CARRIAGE OF INSURANCE

Policies shall contain a clause automatically extending date of expiration to coincide with any extended date of completion granted under the Contract.

6.11 OWNER'S PROTECTIVE LIABILITY INSURANCE

The Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

Said policy shall provide that the coverage afforded thereby shall provide that the coverage afforded thereby shall be primary coverage to the full limit of liability stated in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

7 CONTRACTOR'S RESPONSIBILITIES

A. The following new paragraphs shall be inserted immediately after paragraph 7.02.B of the General Conditions.

C. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or subcontractor contracting for any part of the work shall require or permit any laborer or mechanic to be employed on the work in excess of eight hours in any calendar day or in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such work week, as the case may be.

D. Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by the Owner's governing body or other duly designated official.

E. The Contractor shall employ only competent men to do the work and whenever the Owner shall notify Contractor, in writing, that any man on the work appears to be incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such man shall be removed from the project and shall not again be employed on it except with the consent of the Owner.

F. The Contractor and all subcontractors shall, insofar as practicable, give preference in the hiring of workers for the project to qualified local residents

with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

G. The Contractor and all subcontractors shall pay to all laborers and mechanics employed for the construction covered by this contract the minimum rates of pay as determined by the Secretary of Labor in accordance with the Act of March 3, 1931, as amended, known as the Davis-Bacon Act (40 U.S.C. 276a through 276a-7). Furthermore, the Contractor and subcontractors shall adhere to the stipulations and provisions published by the Secretary of Health, Education, and Welfare in "Labor Standards (Federal Water Pollution Control Act)". The Wage Rate Schedule as prepared by the Secretary of Labor and the "Labor Standards" are part of this Contract and are included in Part II of these Supplementary Conditions.

H. The Contractor and all subcontractors shall comply with the Regulations of the Secretary of Labor made pursuant to the Anti-Kickback Act of June 30, 1940 (40 U.S.C. 276c) and all amendments or modifications thereto. The Contractor and all subcontractors shall furnish the Owner with weekly Statements of Compliance. In case of subcontracts, the Contractor shall cause appropriate provision to be inserted in all subcontracts for the work which he may let to insure compliance with said Anti-Kickback Act by all subcontractors subject thereto, and Contractor shall be responsible for the submission of all Statements of Compliance required by subcontractors by said Anti-Kickback Act except as the Secretary of Labor may specifically provide for reasonable limitations, variations, and exemptions from the requirements thereof. These Regulations are part of this Contract and are included in Part II of these Supplemental Conditions.

B. Paragraph 7.06.A of the General Conditions shall be deleted in its entirety and insert the following in its place:

7.06.A The Contractor shall not employ any subcontractor, supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Acceptance of any subcontractor, other person or organization by the Owner shall not constitute a waiver of any right of Owner to reject defective work. The Contractor shall not be required to employ any subcontractor, other person or organization against whom the Contractor has reasonable objection.

C. The following language shall be added at the end of paragraph 7.09 of the General Conditions:

7.09.B. Except as required otherwise by Massachusetts General Law Chapter 149, Section 44F.

The materials and supplies to be used in the work of this contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. The Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of Chapter 14 of the Acts of 1966 and any amendments thereto.

F. The following language shall be added at the end of paragraph 7.12.G of the General Conditions:

7.12H. In the event of temporary suspension of the work, or during inclement weather, or whenever the Engineer may direct; the Contractor shall, and shall cause Subcontractors, to protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

J. A new paragraph shall be added immediately after paragraph 7.19.E of the General Conditions which is to read as follow:

7.19.F The Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records. This requirement primarily provides for the Contractor to maintain for at least six years after final payment books, records, and accounts in reasonable detail, available for examination. This requirement further provides for the Contractor to document and submit descriptions and reasons for any changes in record keeping methods, and to prepare and submit annual financial statements.

10.0 ENGINEER'S STATUS DURING CONSTRUCTION

A new paragraph shall be added immediately after paragraph 10.09 of the General Conditions which is to read as follows:

10.10 The Engineer's interpretations will be made in accordance with Massachusetts General Law Chapter 30, Section 39P which is included in Part II of the ADDITIONAL ARTICLES.

15.0 PAYMENTS TO CONTRACTORS AND COMPLETION

A new Paragraph 15.09 of the General Conditions shall be added after 15.08.

15.09 Progress Payments will be made in accordance with Massachusetts General Law, Chapter 30, Section 39G. Retainage shall be 5%, in accordance with M.G.L., Chapter 30, Section 39G.

15.10. If, after 60 days following submission of a monthly payment estimate for pipe and fitting items, the pipe and fittings for which payment is requested has not been successfully tested, the Owner may withhold up to 10% of the amount requested for such pipe and fitting items until the pipe has been so tested, however, in the case of a major (pipe diameter 24 inches or greater) pipe and fitting instillation, sums retained by the Owner pursuant to this paragraph shall not exceed two percent (2%) of the costs of such pipe items. This retainage shall be in addition to any other retainage required by this Contract.

The Contractor shall make payments to subcontractors in accordance with Massachusetts General Law, Chapter 30, Section 39F which is included in ADDITIONAL ARTICLES.

15.11. If, on the basis of the Engineer's observation of the work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation – all as required by the Contract Documents, Engineer is satisfied that the work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Engineer will indicate in writing his recommendation of payment and present the Application to the Owner for payment. Thereupon the Engineer will give written notice to the Owner and the Contractor that the work is acceptable subject to the provisions of paragraph 14.16. Otherwise, the Engineer will return the Application to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application. If the Applications and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Massachusetts General Law, pay Contractor the amount recommended by Engineer.

15.12. Final payment will be reduced by excessive costs of plant inspection of pipe; the Contractor shall have no claim thereto. Excessive inspection costs are defined as the costs of inspection of that amount of pipe which exceeds 125 percent of the aggregate length of each type installed.

16.0 SUSPENSION OF WORK AND TERMINATION

Paragraph 16.01 of the General Conditions shall be deleted in its entirety and insert the following in its place:

16.01. The Owner may order, at any time and without cause, suspension of the work in accordance with Massachusetts General Law, Chapter 30, Section 39O.

17.0 DISPUTE AND RESOLUTION

Article 17 of the General Conditions shall be deleted in its entirety.

18.0 MISCELLANEOUS

A new paragraph shall be added immediately after paragraph 18.08 of the General Conditions which is to read as follows:

18.09. Both the address given in the Bid Form upon which this Agreement is founded, and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters, and other communications to the Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, if any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor: and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor, and delivered to the Owner and shall be deemed to preclude or render inoperative the service of any notice, letter, or other communications upon the Contractor personally.

WAGE RATES

The following 4 new paragraphs shall be added immediately after paragraph 18.09 of the General Conditions:

18.10. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be part of these Contract Documents. Copies of the wage schedule are included in Section 00820. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such approved minimum rate shall be paid at not less than such rates as shall be determined by the officials administrating the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the Owner of his intention to employ persons in trades or occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations.

A. The schedules of wages referred to above are minimum rates only, and the Owner will not consider any claims for additional compensations made by the Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be adjusted by Contractor.

B. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the

work. Minimum Wage Rates as determined by the Commissioner of the Department of Labor and Industries, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who are not covered by this schedule of wage rates, but who may be employed for the proposed work under this Contract.

C. State schedules of minimum wage rates are included in Section 00820 – ADDITIONAL ARTICLES. Where rates differ, the higher rates shall apply as a minimum for that trade.

PART 2 ADDITIONS TO GENERAL CONDITIONS

None this Contract

PART 3 STATE AND FEDERAL GOVERNMENT PROVISIONS

State and Federal Government Provisions are included in Section 00820 and selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contact shall be deemed to be also inserted in herein.

1.0. COMMONWEALTH OF MASSACHUSETTS AND FEDERAL PROVISIONS
1.1. The Owner and Contractor agree that the following Commonwealth of Massachusetts and Federal Provisions apply to the Work to be performed under this Contract and that these provisions of this Contract and that these provisions supersede any conflicting provisions of this Contract.
1.2. Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program.
1.3. Massachusetts General Laws
1.3.1. Chapter 30, Section 39F
1.3.2. Chapter 30, Section 39G
1.3.3. Chapter 30, Section 39M
1.3.4. Chapter 30, Section 39N
1.3.5. Chapter 30, Section 39O
1.3.6. Chapter 30, Section 39P
1.3.7. Chapter 30, Section 39R
1.3.8. Acts of 1983 Chapter 353
1.4. All documents in section 00500 – Agreement and additional Contract Documents

END OF SECTION

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH AND METRIC UNITS
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price

The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at http://www.mhd.state.ma.us/ within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment

The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

******** END OF DOCUMENT ********

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	**FUEL FACTORS**	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

October 11, 2018

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will ***not*** include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

BASE PRICES

The Department's table of Base Prices specified above is updated monthly. The current table is attached to this Document 00813 and included in each new contract.

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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END OF DOCUMENT

SECTION 00815

BASE PRICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. In accordance with Massachusetts General Law (MGL) Chapter 30, Section 38A, contracts for water and sewer projects awarded under MGL Chapter 30 Section 39M shall include price adjustment clauses for fuel (both diesel and gasoline), liquid asphalt and Portland cement contained in cast-in-place concrete.

B. The work under this Contract includes price adjustments for hot mix asphalt, Portland cement, diesel fuel, and gasoline. Base Prices for hot mix asphalt, Portland cement, diesel fuel, and gasoline under this Project are defined as the Price presented on the Massachusetts Department of Transportation (MassDOT)website.
MassDOT posts Price Adjustments on their Highway Division's website at http://www.massdot.state.ma.us/Highway/ under the following linksequences:

Website: massdot.state.ma.us
Tab1: Highway
Link1: Doing Business with Us
Link2: Construction
Link3: Price Adjustments

Prices may not be available for the month in which the project is Bid at the time the project is advertised for Bid. The Base Price will be confirmed after Contract Award and before the first monthly payment requisition. For this project, the recent Base Price History for the specified items is presented within Table 1.

Table 1. Base Prices for the Contract

Adjustment Period	Diesel	Gasoline	Liquid Asphalt	Portland Cement
	Gallon	Gallon	Ton	Ton
August 2021	$ 2.517	$ 2.500	$ 562.50	$ 149.65

*Published prices as of August 2021.

END OF SECTION

SECTION 00821

PERMITS

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

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

1.02 PERMITS

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

END OF SECTION

SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

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SECTION 01010

SUMMARY OF WORK

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 SCOPE OF WORK

A. The Work under this Contract includes, but is not necessarily limited to, the replacement of approximately 2,400 feet of existing sewer main along Jennings Road, Woodland Road, and Prospect Hill Road. The work also includes replacing of existing sewer manholes, sewer services, connections it existing collection system, 360 feet of drain pipe replacement, 1,400 feet of root removal in drain lines, replacement of existing water services, and temporary and final full width mill and overlay paving.

B. The Work shall consist of furnishing all labor, equipment, materials, tools, apparatus and all other incidental work required to complete the replacement of the existing sewer main and transferring existing services from the abandoned main as specified and shown on the Drawings. The Work shall include, but not necessarily be limited to the following:

1. Perform all required testing of the new sewers.

2. Obtain all required permits for trench openings and street access.

3. Furnishing all materials and performing all excavations, backfilling of excavated areas, and restoration of surface pavement.

4. Remove and replace water services.

5. Remove and replace sewer mains and services, including the removal and replacement of sewer structures. The Contractor shall provide a temporary bypass plan to the Engineer for review.

6. Remove and replace drain trunk lines as show on the drawings. Including connections to existing drain manholes.

7. Removal of a water main section at the intersection of Woodland Road and Prospect Hill Road. The section is required to be removed to accommodate the new alignment of sewer main and manholes. The water main is a working

line that will require a shutdown, which shall be coordinated with the City of Waltham.

8. Remove roots and debris from drain trunk lines by mechanical means. CCTV reports are provided in the Appendix of the specifications.

9. Milling and installation of permanent bituminous concrete pavement overlay along the project route and restoration of other disturbed areas for permanent pavement repairs, as specified or as directed.

10. Installation of permanent trench pavement along Woodland Road in accordance with the Base Bid unless otherwise directed by the Owner and Engineer. If Alternate A is accepted, full-width paving will occur on Woodland Road instead of permanent trench paving.

11. Restoration of sidewalks, driveways, granite curbs and berms, and landscaped areas that have been disturbed during utility work and as directed by the Engineer. The Contractor is to save and reuse granite curbing that is determined by the Engineer to be in serviceable condition. Sidewalks are to be replaced in-kind (asphalt/concrete) in areas that are only disturbed by the utility trench work. Tree trimming, clearing and grubbing may be necessary to install sidewalk or ramps in some areas.

12. New ADA Wheelchair ramps are required as shown on the drawings. Standard MassDOT details are provided in Appendix E. Tree trimming, clearing and grubbing may be necessary to install sidewalk or ramps in some areas.

13. Furnishing, installation and maintenance of all traffic control and safety measures during the construction period, including signs, barricades, detours, maintenance of safe vehicular and pedestrian access to abutting properties, businesses and commercial establishments and assuring an uninterrupted supply of utility services to all public amenities, businesses and abutters within the project area, at all times.

14. Maintenance and repair of all work for a period of one (1) year following the issuance of the Certificate of Substantial Completion.

15. The Work shall also conform to such additional Drawings and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of bid proposals and to such Drawings in explanation of details, or as may be furnished by the Engineer from time to time during the construction.

16. Work, materials, equipment, and storage areas, which are necessary for construction, but which are not specifically referred to in the Specifications or shown on the Drawings, but implied by the contract, shall be furnished by the Contractor at his own cost and expense, and shall be such as will correspond

with the general character of the Work, as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these Specifications to produce a complete, finished job, whether shown in every detail or not.

1.3 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit the use of the premises for his/her Work and for storage to allow for:

1. Owner occupancy, including Easements.

2. Public use.

B. Coordinate use of premises with Owner.

C. Contractor shall assume full responsibility for security of all his/her and his/her subcontractors' materials and equipment stored on the site.

D. If directed by the Owner or Engineer, move any stored items which interfere with operations of Owner or other contractors.

E. Obtain and pay for use of additional storage areas or work areas as necessary and required to perform the Work.

1.4 OWNER OCCUPANCY

A. Owner will occupy premises during performance of the Work for the conduct of his/her normal operations. Coordinate all construction operations with Owner to minimize conflict and to facilitate Owner usage.

B. A general description of the Work to be performed under this contract shall include, but will not be limited to, the following construction operations:

1. Coordination of all construction activities with the appropriate local and State authorities and utilities.

2. Attending the pre-construction conference and required job progress meetings.

3. Submission of a construction schedule, list of subcontractors and submission of all required shop drawings, in a timely manner, to the Engineer for review.

4. Mobilization to the site.

5. Protection of existing structures and installation of environmental control measures.

1.5 UTILITIES

A. The utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. It shall be the Contractor's responsibility to locate all existing utilities and to protect same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of its Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01010

SECTION 01024

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 SUMMARY

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

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

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

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

E. The prices for those items which involve excavation shall include compensation for disposal of surplus excavated material, handling of water, and any required shoring or bracing for compliance with OSHA regulations.

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

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

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

I. Final payment shall not be issued until the Contractor submits project record drawings approved by the Engineer.

J. In accordance with Chapter 150 of the Acts of 2013 (An Act Relative to Price Adjustments for Certain Materials in Construction Projects), specifically Section 38A, of Massachusetts General Laws Chapter 30, the following materials will be eligible for price adjustments in accordance with the Appendices and applicable Specification Sections: fuel (both diesel and gasoline); liquid asphalt; and, portland cement (contained in cast-in-place concrete). The noted material price adjustments are applicable on a monthly basis only when the monthly cost change in base prices exceeds +/- 5%.

1.2 BASE BID ITEM DESCRIPTIONS

A. Item 1: Mobilization and Demobilization.

1. Measurement for payment of mobilization and demobilization costs shall be on a lump sum basis but the cost shall not exceed 5 percent of the total of bid items 2 - 24 inclusive.

2. Payment of the lump sum price bid in the Bid Form for Item 1 shall be full compensation for all costs associated with initiation and closeout of the Contract, exclusive of the cost of materials, with 50% payable on completion of mobilization. Payment shall include compensation for all insurance, bonds, site preparation, construction equipment delivery, and in general the costs associated with establishing and terminating the work on site. There shall be no additional costs for any remobilization.

B. Item 2 (2a, 2b, 2c, and 2d): PVC SDR 35 Sewer Pipe

1. PVC sewer pipe under Items 2a and 2b will be measured in place on a linear basis. Measurement for payment does not signify that the pipe is accepted.

2. Measurement of SDR 35 PVC pipe, Items 2a and 2b, for length will be along the horizontal centerline of the pipe with no deduction for fittings and will be to the center of manholes. Measurement will be to the nearest tenth of a foot.

3. Measurement of 6-inch and 4-inch service connections, Items 2c and 2d respectively, will be measured along the horizontal centerline of the pipe from either the face of the wye-branch or tee, or from the centerline of the chimney to the end of the pipe as installed.

4. Payment under Items 2a, 2b, 2c, and 2d inclusive for the PVC pipe as specified will be made at the Contract unit price stated in the Bid Proposal for the quantities as measured in place on a linear foot basis. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for construction of PVC pipe complete. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 14); dewatering including installation of dewatering systems, proper discharge of ground water as

specified herein; support of excavation, bedding with crushed stone for pipe; backfilling with suitable material, compaction as shown on the Typical Trench Detail and steel plating prior to final paving; restoring the trench surface to grade needed for trench pavement including sub-base; pipe warning tape; all restoration required within the trench limits; protection or temporary removal and replacement of existing utilities and structures; laying, jointing, cleaning and testing the gravity sewer pipe; water for construction; temporarily plugging open ends or providing a permanent plug on future service connections; bracing the plug; wood markers at the end of service pipe; insulation; flow handling; fittings and gaskets; connections to existing sewers including couplings, access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

5. Payment will be made for pipe only when it is installed in the ground tested, and accepted by the Engineer, and no proportional payment shall be made for pipe on the site but not yet installed. PVC pipe installed but not successfully tested will be paid for at a maximum of 90 percent of the unit prices bid under Item 2 of the proposal. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

C. Item 3 (3a, 3b, 3c): Sewer Manholes

1. Precast concrete manholes (Items 3a and 3b) for sewers will be measured in vertical feet from the invert of the lowest pipe invert to the bottom of the manhole frame. Manhole frame and covers (Item 3c) will be measured as a complete unit each in place.

2. Payment for providing 4-ft diameter and 5-ft diameter concrete manholes complete in place will be made for the quantity as above determined at the price per vertical foot of manhole for Items 3a and 3b of the Bid Form. This price and payment shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals required, including: excavation (except rock excavation covered under Item 14), dewatering including installation of dewatering systems, proper discharge of ground water as specified herein, support of excavation, bedding, backfilling, precast sections and bases, platforms, subbase, all forms, reinforcing, concrete and masonry materials including brick inverts and chimneys, dampproofing, drop connection piping and accessories as shown on plans, cone sections and flat top slabs for shallow manholes (if used), vacuum testing, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form. Payment shall include removal and disposal of existing sewer manholes and piping as directed by the City or Engineer.

3. Payment for providing manhole frames and covers (Item 3c) complete in place will be made for the quantity as above determined at the price each in the Bid Form.

D. Item 4 (4a and 4b): RCP Drain Pipe

1. Reinforced Concrete Pipe (RCP) for drain under Items 4a and 4b will be measured for payment by the linear foot of drain furnished, installed, complete and accepted in place.

2. Measurement for length will be along the horizontal centerline of pipe as installed including couplings and fittings from the inside face to the inside face of manholes and catch basins. Connections to existing structures shall be measured to the inside face of the wall. Plugged pipe stubs in manholes shall be measured from end to end of the stub. Spot repairs shall be measured from repair coupling to repair coupling.

3. Payment shall constitute full compensation for furnishing and installing pipe of the type and size specified on the Bid Form for Items 4a and 4b for the respective quantities as determined above at the applicable bid price. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for construction of RCP complete. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 14); dewatering including installation of dewatering systems, proper discharge of ground water as specified herein; support of excavation, bedding with crushed stone for pipe; backfilling with suitable excavated material, compaction as shown on the Typical Trench Detail and steel plating prior to final paving; filter fabric; restoring the trench surface to grade needed for trench pavement including sub-base; pipe warning tape; all restoration required within the trench limits; protection or temporary removal and replacement of existing utilities and structures; laying, jointing; water for construction; insulation; flow handling; fittings and gaskets; connections to existing drain structures including coring, mortar and brick; access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

4. The cost for reconstruction of manholes or for connecting to existing culverts, manholes and catch basins by coring or cutting a hole into the manholes, culverts and catch basins and grouting in the pipe, and modifications to masonry inverts shall be included in the price of the associated pipe item.

E. Item 5: Heavy Clean Drain Pipe

1. Measurement: Work under this item shall be per the actual linear foot of piping heavily cleaned for root removal, as directed and accepted by the Engineer. The length shall be measured from the start of maintenance defect (root or other deposits) to the end of the defect removed. All pipe to be cleaned up to and including 24-inch in diameter.

2. Payment: Under the Unit Price for Item 5, the Contractor shall include furnishing all labor, tools, materials, and equipment necessary to satisfactorily remove roots, grease deposits, obstructions, and debris within sanitary sewer by heavy cleaning. This item also includes providing standard and special jetting nozzles, chain cutter nozzles, robotic cutters, and any other equipment required to mechanically clean the pipe; hoses; water for construction; protection of property; restoration and clean-up; vactor of all pipe debris during cleaning and proper disposal of the debris; CCTV work, including post CCTV inspection; bypass piping (as required) and all other incidentals required to complete the work.

F. Item 6a: AC Pipe Removal and Disposal

1. Asbestos cement pipe removal and disposal, Item 6a, will be measured as it exists in place on a linear basis if uncovered during construction. Measurement of Item 6a for length will be along the horizontal centerline of the pipe with no deduction for fittings.

2. Payment for Item 6a, removal and disposal of asbestos cement sewer pipe, will be made at the Contract unit price stated in the Bid Proposal for the quantities as measured in place on a linear foot basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing and disposing of asbestos cement pipe indicated on the Drawings, as specified herein, or as discovered during construction. Handling and disposal shall be according to Section 02076. The linear foot cost for asbestos cement pipe removal and disposal shall include up to one cubic foot of underlying soil for every 12 linear feet of pipe. The work includes, but is not limited to: remove, handle, and dispose of asbestos cement pipe and soil; all controls necessary to maintain compliance with regulatory requirements relative to asbestos; procuring all health and safety equipment; protecting and securing the excavation and storage areas from accidental entry; air monitoring; controlling the spread of airborne contaminants; and, all notifications, fees, permits, and taxes. The Contractor will not be paid any additional costs under this item resulting from improper pipe removal activities that result in soil contamination. Asbestos cement pipe excavated and removed will be paid for at a maximum of 50 percent of the unit price bid under Item 6a after it is removed from the City of Waltham. The remaining 50 percent will be paid upon receipt of the return manifest or certified weight slip and accompanied by the appropriate MassDEP Waste Shipment Record. Payment shall not be made for soil excavation and disposal if the removal is necessitated by the Contractor’s failure to properly protect underlying soil by placement of polyethylene sheeting per Section 02050. No additional payment shall be made under this item for improper pipe removal activities that result in soil contamination. All reductions in payment will be made prior to normal retainage.

3. Payment for Item 6a shall not include handling, excavating, managing and disposing of asbestos cement pipe exposed during excavation and found to have been broken or crushed in place or disposed of in the area of excavation prior to excavation by the Contractor.

G. Item 6b: Management and Disposal of Crushed AC Pipe and AC Impacted Soils

1. Measurement for Item 6b will be based on each cubic yard of asbestos contaminated materials and associated soil removed and disposed of as measured in place by the Engineer's Resident Project Representative. Contractor will not be paid any additional costs under this item resulting from improper pipe removal activities that result in soil contamination. Asbestos Contaminated Materials excavated and removed will be paid for at a maximum of 50 percent of the unit price bid under Item 6b of the proposal after it is removed from the City of Waltham. The remaining 50 percent will be paid upon receipt of the return fully executed manifest or certified weight slip and accompanied by the appropriate fully executed MassDEP Waste Shipment Record. All reductions in payment will be made prior to normal retainage.

2. Payment for Item 6b shall include furnishing all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing and disposing of asbestos containing material and soil resulting from unforeseen conditions, including asbestos cement pipe exposed during excavation and found to have been broken or crushed in place or disposed of in the area of excavation prior to excavation by the Contractor. This item shall not include pipe broken by the Contractor in the course of removing piping under Items 2 and 3. The work includes, but is not limited to: remove, handle, and dispose of all asbestos cement pipe and asbestos containing material including soil up to six inches below limits of asbestos containing material and/or asbestos pipe; all controls necessary to maintain compliance with regulatory requirements relative to asbestos in soils; procuring all health and safety equipment; protecting and securing the excavation and storage areas from accidental entry; the spread of airborne contaminants; and, all notifications, fees, permits, and taxes.

H. Item 7: Relocate 6-inch Water Main

1. This item shall be used only when water main piping is required by the Engineer or Owner to be relocated. Ductile iron water main pipe, fittings, restrained joints, and caps under Item 7 will be measured for payment by the linear foot of water main furnished, installed, completed, and accepted in place. Measurement will be along the water main centerline without deduction for valves and fittings. Hydrant branch lines will be measured from the center of the main line tee to the centerline of the hydrant.

2. Under Item 7, payment for the water pipe as specified will be made at the Contract unit price stated in the Bid Proposal for the quantities as measured in place on a linear foot basis. Payment shall be considered as full compensation for furnishing, installing, maintaining, and removing all labor, equipment, materials, devices, services, and related appurtenances including all pipe, fittings, restrained joints, caps and plugs, tapped caps and corporations; underground warning tape with metal core; insulation as required; polyethylene "V-BIO" encasement as required; environmental protection measures; connections to existing mains and hydrants where required; decommissioning of existing hydrants, couplings not included for payment elsewhere; trench excavation (except rock excavation covered under Item 14); bracing including trench boxes and trench shields; protection of utilities; cutting or excavation of existing sheeting; trench dewatering; decommissioning gate valves on abandoned lines and removing gate boxes; backfilling and compaction, and steel plating prior to final paving; restoring the trench surface to grade; calcium chloride for dust control as directed by the Engineer; removal and legal disposal of existing water main as indicated; removing and resetting guardrails (if necessary); disposal of excavated materials; pressure testing; providing water for pressure and leakage tests; disinfection; flushing; sampling; laboratory analyses; returning physical features to their original condition; clean up; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Proposal.

3. Water pipe installed but not successfully tested and/or chlorinated will be paid for at a maximum of 90 percent of the unit prices bid under Item 8 of the proposal. The remaining 10 percent will be paid upon receipt of successful written test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

I. Item 8: Remove 6-inch CI WM at Intersection of Woodland Road and Prospect Hill Road

1. For the lump sum payment under Item 8 inclusive for the removal of 6-inch cast iron water main, 6-inch valve, and appurtenances at the intersection of Woodland Road and Prospect Hill Road as shown on the drawings, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for all work necessary to remove the section of water main and return to service. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 14); dewatering including installation of dewatering systems, proper discharge of ground water as specified herein; support of excavation, backfilling with suitable excavated material, compaction as shown on the Typical Trench Detail and steel plating prior to final paving; capping the existing 6-inch water main, rodded restraints, restoring the trench surface to grade needed for trench pavement including sub-base; all restoration required within the trench limits; protection or temporary removal and replacement of existing utilities and structures; chlorination; water for construction; thrust

blocks; wood markers at the end of pipe; access to compacted backfill for compaction testing; and all incidental work, coordination with the City of Waltham for water service shutdown, notifications to residents for shutdown, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Measurement for Item 8 shall be lump sum paid on the percentage of work completed as determined by the Engineer.

J. Item 9 (9a and 9b): 1-inch and 2-inch Water Services, Type K Copper Tubing

1. Water service tubing to be paid for under the appropriate subdivisions of Item 9a and 9b will be measured for payment by the actual number of linear feet of water services, as specified, measured in place along the centerline of the pipe from the proposed water main to the locations indicated on the standard details and drawings (or staked in the field prior to installation).

2. Water services will be paid for at the unit prices bid under the appropriate subdivisions of Items 9a and 9b of the Bid Form for the above determined quantities. This price and payment will be considered full compensation for all labor, equipment, materials, bedding material and backfill, including compaction and services necessary for installing the type K copper tubing, including tracer wire, warning tape, excavation, dewatering, cutting or excavating existing sheeting, sheeting and shoring, sand bedding, backfill, compaction, connections to existing services, adapters, insert stiffeners, flushing, and all else incidental for the satisfactory completion of the work, and dispose of any excess materials.

K. Item 10 (10a and 10b): 1-inch and 2-inch Water Service Taps

1. Service taps, including corporation stops, fittings, saddles, curb stops and boxes, to be paid for under Item 10a and 10b will be measured as the actual number of services connected to the new water main in the completed project as accepted by the Engineer. Each service tap shall be complete and include corporation stops, fittings, curb stops and boxes. Service tubing will be paid for under Item 9.

2. Payment for furnishing and installing service taps under Item 10a and 10b will also be considered full compensation for furnishing all labor, equipment, materials, adaptors, services, excavation, bedding material and backfill, including compaction, and all else incidental thereto for which separate payment is not provided.

L. Item 11: Additional Excavation and Backfill Below Normal Grade

1. Under the unit price bid for Item 11, the Contractor shall excavate below the specified depth to clear utilities or match existing mains, or to remove peat or

other unsuitable material, below the grade of pipe, when and as directed by the Engineer; load, transport, and waste such material away from the job as directed; furnish and place approved fill material in the place of material removed.

2. Measurement for payment will be on the basis of cubic yards of material excavated within the detailed trench payment width and at authorized depth, as measured by the Engineer.

M. Item 12: Exploratory Excavation (Test Pits)

1. Under the unit price bid for Item 12, the Contractor shall excavate and refill, as directed and approved by the Engineer, such materials as are necessary to locate pipe, utilities and possible obstructions. Included under the unit price is payment for excavation, dewatering including installation of dewatering systems, proper discharge of ground water as specified herein, backfill, compaction, surface restoration, landscaping, all labor, services and equipment necessary for exploratory excavations in the locations of this Contract. Measurement for payment will be on the basis of cubic yards of exploratory excavation as measured and approved by the Engineer. Paving shall be included for payment as specified under the appropriate Item.

N. Item 13 (13a, 13b, 13c, and 13d): Fill Materials

3. Additional Common Fill (Item 13a) when its use is required and approved by the Engineer and when furnished, placed, and compacted for trench backfill to replace unsuitable materials and miscellaneous uses, will be measured in cubic yards at actual in-place dimensions as determined by the Engineer. When used in trenches, the payment limits shall not exceed the trench payment widths defined for rock. No allowance will be made for loss from consolidation of material. Truck measurement will not be permitted. No additional payment will be made under this item for reuse of excavated material and any surplus material generated from the construction of this project.

4. Additional Select Fill (Item 13b) when its use is approved and when furnished, placed and compacted for replacement of unsuitable materials and for miscellaneous uses will be measured in cubic yards at actual in-place dimensions as determined by the Engineer. When used in trenches, the widths for payment shall not exceed those defined for rock excavation or as approved by the Engineer. No allowance will be made for loss from consolidation of material. Truck measurement will not be permitted. Excavated material, which is reused as pavement sub-base, will not be measured for payment. This item will be used for pavement subbase in road widening areas.

5. Under the unit price bid for Item 13c, the Contractor shall furnish and place controlled density fill, when used to abandon pipe and utility structures as specified or directed by the Engineer. Measurement for payment will be on the

basis of cubic yards of material placed to the designated thickness as measured in place, as shown in the trench detail, Drawings or as specified. Payment for Item 13c will include furnishing labor and installation of pipe and utility structure bulkheading with brick and mortar or other methods, backfill, compaction, subbase and all other incidentals required to complete the abandonment of utilities.

6. Under the unit price bid for Item 13d, the Contractor shall furnish and place crushed stone, as specified or directed by the Engineer. Measurement for payment will be on the basis of cubic yards of material placed and compacted to the designated thickness as shown in the trench detail or as specified.

7. Payment for gravel sub-base for trenches indicated on the drawings for PVC sewer pipe, RCP drain pipe, ductile iron water main, and precast manholes will be included under the respective pipe items.

8. Payment for pipe and manhole bedding and blanket will be included within the respective pipe items.

9. Payment for common fill for trenches indicated on the drawings for ductile iron, PVC pipe, RCP pipe, and precast manholes will be included under the respective items.

10. Payment for common fill materials to refill rock and boulder excavation will be included under Item 14.

11. No payment will be made under Item 13 for excavated backfill materials that are re-used for the project. All bedding and excavated backfill used for pipe and manholes as shown on the drawings is included in the items, and not included under this Item 13.

O. Item 14: Rock Excavation

1. Under the unit price bid for Item 14, the Contractor shall excavate, remove, and dispose of ledge and rock from trenches and excavated areas. Included in the price bid per cubic yard shall be related costs such as hoe-ramming, expansive grout or similar materials, drilling, pre-blast survey, blasting, and replacement with suitable and compacted gravel borrow material, removal, and disposal of excavated material. Rock that is excavated by normal excavation methods will not be measured under this Item.

2. Measurement for payment will be on the basis of cubic yards of ledge or rock excavated as measured by the Engineer.

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 common fill at the Contractor's expense.

P. Item 15: Miscellaneous Concrete

12. Measurement for payment for concrete shall be the actual number of cubic yards placed or as determined by the Engineer. Concrete placed for thrust blocks, pipe encasement, and miscellaneous purposes where requested and approved by the Engineer will be measured in cubic yards.

13. Payment for miscellaneous concrete will be made for the quantity as determined above at the unit price bid for Item 15 in the Bid Form and shall be full compensation for furnishing and placing the concrete including form work, reinforcing, finishing, and other materials required, complete as shown on the Drawings and as specified herein.

14. Concrete for sidewalks and curbing shall be covered under item 16.

Q. Item 16: Sidewalk and Curbing

15. Payment for Item 16a, cement concrete wheelchair ramps, shall be made at the unit price bid under Item 16. The price shall include all labor, materials, tools, and equipment necessary to complete the work as specified and as shown on the drawings. The items shall also include, disposal of existing sidewalk materials and subbase, subbase, compaction, formwork, high and low side transitions, detectable warning panels, concrete reinforcement steel, testing, finishing, resetting signs and posts, protection of trees, tree cutting, clearing, grubbing as necessary to install sidewalk and ramps, removal of all debris and excess materials, and all other incidentals required to complete the work and not specifically paid for under other items of work.

16. Measurement for payment of Item 16a shall be the actual number of square yards of concrete poured in place as determined by the Engineer.

17. Payment for Item 16b, new granite curbing, shall be made at the unit price bid under Item 16 when existing granite curbing cannot be removed and reset (Item 16c) as determined by the Engineer. The price shall include all labor materials, tools, and equipment necessary to complete the work as specified and as shown on the drawings. The items shall also include removing existing granite, subbase, concrete, setting, saw cut pavement, excavation and disposal of bituminous concrete, excavation and disposal of surplus subgrade material, backfill to grade including all bedding materials, compacting, restoration, and replacement, daily and final cleanup, and all other incidental work relative thereto and not specifically paid for under other items of work.

18. Measurement for payment under Item 16b shall be for the number of linear feet of new curb placed, including straight, curved, and transition curbs, curb wall,

granite inlet curb, and curb corners, all sizes furnished and installed, as measured by the Engineer.

19. Payment for Item 16c, remove and reset granite curbing, shall be made at the unit price bid under Item 16. The price shall include all labor materials, tools, and equipment necessary to complete the work as specified and as shown on the drawings. The items shall also include removing existing granite curb in-tact, subbase, concrete, setting, saw cut pavement, excavation and disposal of bituminous concrete, excavation and disposal of surplus subgrade material, backfill to grade including all bedding materials, compacting, restoration, and replacement, daily and final cleanup, and all other incidental work relative thereto and not specifically paid for under other items of work.

20. Measurement for payment under Items 16c shall be for the number of linear feet of curb removed and reset, including straight, curved, and transition curbs, curb wall, granite inlet curb, and curb corners, all sizes furnished and installed, as measured by the Engineer.

21. Bituminous concrete sidewalk will be covered under Item 17d.

R. Item 17 (17a, 17b, 17c, 17d, 17e, and 17f): Pavement

1. The quantities of temporary and permanent pavement, for roadways, driveways, sidewalks, and parking lots, Type I-1 bituminous pavement, to be measured for payment under the appropriate subdivisions of Item 17 will be measured based on square yardage or the number of tons as measured in place (approximate coefficient of 0.056 tons per square yard per inch of thickness) as described below. Measurement of initial pavement over trenches shall be limited to a maximum width of 5' where depth of excavation is 7 feet deep or less, and 7 feet where the excavation greater than 7 feet deep. The Contractor shall maintain initial pavement in good repair and flush with the existing pavement at all times during the duration of the Contract. If defects occur in surfacing constructed by the Contractor, remove bituminous concrete and base course as is necessary to properly correct defect. Replace base course and bituminous concrete. Also included for payment under the appropriate subdivisions of Item 17 are the services, labor, equipment and materials required to replace pavement markings and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required.

2. The unit price listed for Item 17a shall constitute full compensation for furnishing and placing the 4-inch thick (compacted thickness) trench pavement that will be placed at the end of each week of pipe work within paved areas. Measurement for Item 17a shall be by square yards with a pay width limit equal to the trench width pay limit.

3. The unit price listed for Item 17b shall constitute full compensation for full width bituminous excavation by cold planning (up to 1.5-inch in depth curb to curb). The measurement of payment shall be by square yards.

4. Payment for replacement of bituminous berm/curb will be made at the unit price bid per linear foot for Item 17c in the proposal. Compensation will include all labor and materials to replace berms/curbs disturbed under this contract.

5. The unit price for Item 17d shall constitute full compensation for furnishing and placing 1.5-inch full width overlay of modified top course bituminous concrete permanent pavement. The unit prices will include the leveling course as required, tack coat, materials, tools, equipment, labor, and work necessary or incidental to the satisfactory completion of all items shown on the details or specified, and shall also include raising all existing valves, castings, gas gate valves, and service boxes to grade, line painting and striping, except those paid for elsewhere. The measurement of payment shall be by square yards.

6. The unit price listed for Item 17e shall constitute full compensation for furnishing and placing the permanent 1.5-inch thick (compacted thickness) trench pavement on Woodland Road upon completion of work. This work shall only be performed if Alternate A is not accepted. If Alternate A is accepted, Woodland Road will receive a full width mill and overlay. Measurement for Item 17e shall be by square yards with a pay width limit equal to the trench width pay limit plus two feet.

7. Payment for hand placement of bituminous paving materials in driveways, sidewalks, waterways and runoffs shall be made at the unit price bid under Item 17f. The price bid shall include all labor, materials and equipment necessary to complete the work as specified.

S. Item 18: Calcium Chloride

1. Calcium chloride will be measured as the actual number of bags of material placed as measured by the Engineer. Dust control by use of water is considered to be included in the cost of pavement replacement.

2. Payment for calcium chloride for dust control will be made for the quantity as determined above at the price per 50 lb. bag for Item 18 in the Bid Proposal for which price and payment will be considered full compensation for all labor, materials, equipment and incidental work thereto required for application of calcium chloride to control dust.

T. Item 19: Landscaping

1. Payment for landscaping shall be made at the unit price bid for Item 19 includes furnishing all labor, materials, tools and equipment required to for loam and seed as shown on the details, wood chips, mulch, and landscaping

stone up to a 6" layer. No payment will be made for loam and seed or sod until areas are properly fertilized, watered, lime applied, and growth occurs.

2. Measurement for Item 19 shall be based on the square yards of material placed obtained by multiplying the length of area by the width of material placed to a maximum trench width pay limits and up to 3 feet past the back side of sidewalk and curbing or the utility maximum trench width.

U. Item 20: Silt Sack

1. Under the unit price for Item 20, the Contractor shall furnish, place and maintain silt sacks for sedimentation/erosion control and protecting catch basins, drains, etc., where shown on the Drawings.

2. Payment will be made at the unit price bid for each silt sack furnished and installed. Payment will be based on the number of silt sacks placed as measured by the Engineer. Payment will include all costs for labor, materials, and equipment required to furnish, install, maintain, replace, remove and dispose of silt sacks.

V. Item 21: Rodent Control

1. Under the lump sum price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to provide rodent control on site as specified.

2. Measurement for payment for Item 21 will be on a percent of the work completed as approved by the Engineer.

W. Item 22: Uniformed Police Officer Allowance

1. Payment for uniformed police officers will be made for expenses billed to the Contractor by the Police Department in the normal course of providing supervision for traffic control during construction operations. Traffic control when required by the Chief of Police will be paid under Item 22. Allowance is approximate, and the actual amount to be paid may be more or less but shall match the actual amount paid to the traffic police as authorized by the Engineer. The Contractor shall record the actual amount paid to traffic police and at the end of each month he shall submit the total amount paid during the month, in four copies, to the Engineer who will review such amounts, when verified, in monthly payment requests from the Contractor to the Owner.

2. If the police expenses are greater than the stated allowance, the Contractor will be reimbursed the difference in the actual costs as billed. Any unexpended amount will remain with the Owner as a credit on the total base bid.

3. No mark-up for Item 22 will be allowed. Only documented police invoice amounts will be reimbursed to the Contractor. No payment will be allowed for police details ordered but not utilized due to cancellation of work crews.

X. Item 23: Traffic Management

22. Under the lump sum price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to provide, maintain, relocate, and remove Traffic Management and Control to areas directly or indirectly influenced by construction within the limits of work or outside the limits of work; along truck routes inside or outside the limits of work; as delineated in the approved Traffic Management Plan , by the MUTCD, ADA, and MHD standards; and as further directed by the Owner and Engineer. The work further includes, but is not limited to; obtaining permits; coordination with the City of Waltham; coordination with private property owners within the limits of work; preparing, submitting, reviewing, implementing, and revising traffic management and control plans; furnishing, installing, relocating and removing construction signs; furnishing, installing, and maintaining traffic management devices based on approved traffic management and control plans including precast concrete barriers with fencing and plywood panels, reflectorized drums, lane delineators, portable barricades, temporary crosswalks, and cones; temporary pavement markings; removal of temporary and existing pavement markings; furnishing, installing, pinning, maintaining, and removing steel road plates; ordering and coordinating police details; furnishing and installing temporary construction fencing; maintaining roadways and sidewalks inside or outside the limits of work; establishing and dismantling detours; covering existing traffic signs; obtaining, posting and maintaining “No Parking” signs; meeting with police details daily; coordinating police detail locations; and all incidental work, whether listed here or not, required to provide maintenance and protection of traffic and pedestrians.

23. Measurement for payment for Traffic and Pedestrian Management will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

Y. Item 24: 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, which is not included in Bid Items 1 through 23. This shall include, but is not limited to, the following:

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

b. Attending the pre-construction conference and all required job progress

and community meetings, and coordination of all construction activities with the appropriate local authorities and utilities. Obtaining necessary permits and licenses, and payment of associated fees, if any.

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

d. Maintenance and repair of all work for one (1) year period.

e. 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.

f. Implementation of the Health and Safety Plan.

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. Temporary facilities.

i. Construction Photographs.

j. Field verification of all existing utilities.

k. Provide a complete set of "red-line" record drawings to the Engineer and City of Waltham prior to substantial completion.

l. Providing material testing, laboratory analysis of materials, and quality assurance testing for earthwork and concrete activities.

m. Coordination of all construction activities with the Engineer and City of Waltham.

n. Contract closeout and all other project related direct and indirect costs not described above.

1.3 ALTERNATE A ITEM DESCRIPTIONS

A. Item A1: 1.5" Milling (Full Width) – Woodland Rd.

1. The unit price listed for Item A1 shall constitute full compensation for full width bituminous excavation by cold planning (up to 1.5-inch in depth curb to curb). The measurement of payment shall be by square yards.

2. Final paving on Woodland Road under the Base Bid shall be trench milling and paving. Final paving on Woodland Road under Bid Alternate A shall be full width milling and paving.

B. Item A2: 1.5” Overlay (Full Width) – Woodland Rd.

1. The unit price for Item A2 shall constitute full compensation for furnishing and placing 1.5-inch full width overlay of modified top course bituminous concrete permanent pavement. The unit prices will include the leveling course as required, tack coat, materials, tools, equipment, labor, and work necessary or incidental to the satisfactory completion of all items shown on the details or specified, and shall also include raising all existing valves, castings, gas gate valves, and service boxes to grade, line painting and striping, except those paid for elsewhere. The measurement of payment shall be by square yards.

2. Final paving on Woodland Road under the Base Bid shall be trench milling and paving. Final paving on Woodland Road under Bid Alternate A shall be full width milling and paving.

This work shall only be performed if Alternate A is not accepted. If Alternate A is accepted, Woodland Road will receive a full width mill and overlay.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01024

SECTION 01040

PROJECT COORDINATION

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 supervisory requirements necessary for Project coordination including, but not necessarily limited to:

1. Coordination.

2. Administrative and supervisory personnel.

3. General installation provisions.

4. Cleaning and protection.

B. Progress meetings and preconstruction conferences are included in Section 01200 – “Project Meetings".

C. Requirements for the Contractor's Construction Schedule are included in Section 01300 – “Submittals”.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Inspect the conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner, and at no additional cost to the Owner.

B. Manufacturer's Written Instructions: Comply with manufacturer's written installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation.

Reject damaged and defective items, and at no additional cost to the Owner.

D. Provide attachment and connection devices and methods for securing work. Secure work true to line and level. Allow for expansion and utility movement.

E. Recheck measurements and dimensions before starting installation or erection.

F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material to prevent deterioration.

G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Install protective covering to ensure protection from damage or deterioration.

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Air contamination or pollution.
5. Water or ice.
6. Solvents.
7. Chemicals.
8. Heavy traffic.
9. Misalignment.
10. Unprotected storage.
11. Improper shipping or handling.
12. Theft.
13. Vandalism.

END OF SECTION 01040

SECTION 01046

CONTROL OF WORK

PART 1 - 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 OCCUPYING PRIVATE LAND

A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment any land outside the rights of way or property of the 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, 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 DigSafe (www.digsafe.com). Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

B. Assistance will be given to 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 Total Price Bid in the Bid Form.

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

E. The Contractor shall notify Massachusetts Dig Safe (1-888-344-7233) 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.

F. The Contractor shall notify all utility companies at least 72 hours (excluding Saturdays, Sundays and legal holidays) before excavating in any public way.

G. 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 City 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 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.

1.6 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 thorough workmanlike manner. Fences and other features removed by the Contractor shall be replaced 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 at no additional cost to the City.

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 City 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) by a Professional Land Surveyor at the Contractors expense. If a bound is in the way of required excavation, the Contractor will notify the Engineer with as much notice as possible prior to performing excavation near the bound.

A. 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 Total Price Bid in the Bid Form.

1.7 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 any 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.

B. 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.

1.8 COORDINATION WITH LOCAL AGENCIES

A. The Contractor shall attend a Pre-Construction Meeting approximately one week prior to start of work. The contractor will provide the proposed schedule at that time (see Submittals, Section 01300).

B. The Contractor shall attend weekly Construction Progress Meetings. During this meeting the Contractor shall provide an updated schedule, report on the work completed to date, and indicate any potential construction issues.

1.9 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.

1.10 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 work, 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01046

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SECTION 01063

MISCELLANEOUS REQUIREMENTS

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 SUMMARY

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

1.3 INTERFERENCE WITH EXISTING WORKS

A. The Contractor shall at all times conduct his operations so as not to interfere with existing works. The Contractor shall develop a program, in cooperation with the Engineer and 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 therefrom are expressly permitted. All 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 when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. 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. The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01063

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SECTION 01095

REFERENCE STANDARDS AND DEFINITIONS

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 DEFINITIONS

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

B. 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.

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

D. 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.

E. 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.

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

G. 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.

H. Replace: The term replace means dismantle, remove, and dispose of existing equipment and materials and furnish and install new specified item.

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 name, such a 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.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses

are subject to change and are believed, but not assured, to be accurate and up-to-date as of date of Contract Documents.

ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, Michigan 48331-3439 Telephone: (248) 848-3700
Al	Asphalt Institute 2696 Research Park Drive Lexington, Kentucky 40512-4052 Telephone: (859) 288-4960
ANSI	American National Standards Institute 25 West 43rd Street, 4th Floor New York, New York 10036 Telephone: (212) 642-4900
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428-2959 Telephone: (610) 832-9500
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, Colorado 80235 Telephone: (303) 794-7711
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, N.E. Vienna, Virginia 22180 Telephone: (703) 281-6613
NAPA	National Asphalt Pavement Association 6811 Kenilworth Avenue Calvert Building Suite 620 Riverdale, Maryland 20737 Telephone: (301) 779-4880
NFPA	National Fire Protection Association One Batterymarch Park Quincy, MA 02169 Telephone: (617) 770-3000
WSC	Water Systems Council 600 South Federal Street Suite 400 Chicago, Illinois 60605

Telephone: (312) 922-6222

NASSCO National Association of Sewer Service Companies
2470 Longston Lane, Suite M
Marriottsville, Maryland 21104
Telephone: (410) 442-7473

WEF Water Environmental Federation
601 Wythe Street
Alexandria, VA 22314
Telephone: (800) 666-0206

F. Federal Government Agencies: Names and titles of Federal Government standard- or specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or specification-producing agencies of the Federal Government. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of the date of the Contract Documents.

CFR Code of Federal Regulations
(available from the Government Printing Office)
North Capitol Street between G and H Streets, N.W.
Washington, D.C. 20402
Telephone: (202) 783-3238

(Material is usually first published in the "Federal Register)

EPA Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
Telephone: (202) 382-2090

NIST National Institute of Standards and Technology
(U.S. Department of Commerce)
Gaithersburg, Maryland 20899
Telephone: (301) 975-2000

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, D.C. 20402
Telephone: (202) 523-6091

1.4 GOVERNING REGULATIONS AND AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information to prepare Contract Documents. Contact authorities having jurisdiction directly for information and decisions regarding the work.

City Engineer: Stephen Casazza, P.E.
Telephone: 781-314-3830

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, warranties, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01095

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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. 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 Workshop held by the Contractor and Engineer to discuss planned pest control methods and coordination.

B. The supervisor shall meet with the Contractor and Engineer weekly to discuss pest control activities.

3.2 SURVEY

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

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

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

3.3 APPLICATION FOR RODENT CONTROL

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

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

C. Surface Applications

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

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

D. Subsurface Applications

1. General. For situations involving underground construction/demolition, utility relocation, or utility construction, and for other situations when determined necessary by the Owner or Engineer, initiate subsurface baiting and rid underground environments of all detectable rodents before construction begins. Assign an identifying number to each manhole and catch basin where bait is placed so that locations of bait placements can be identified and rodent activity (droppings, bait consumed, and 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 3.7below.

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 01105

SECTION 01110

ENVIRONMENTAL PROTECTION MEASURES

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.

C. The CONTRACTOR shall take sufficient precautions during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens and calcium chloride into the supplies and surface waters of the State.

D. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.

E. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the CONTRACTOR's responsibility to determine the specific construction techniques to meet these guidelines.

F. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Massachusetts Department of Environmental Protection.

G. The CONTRACTOR is responsible for preparing and submitting all applicable regulatory construction permits required to perform the work.

H. CONTRACTOR shall be responsible for maintenance of the erosion control structures and devices, and replacing as needed to maintain the required protection and performance.

I. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

1.2 RELATED SECTIONS

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

1.3 APPLICABLE REGULATIONS

B. Comply with all applicable Federal, State and local laws, regulations, and orders of conditions concerning environmental pollution control and abatement.

1.4 NOTIFICATIONS

A. The ENGINEER will notify the CONTRACTOR in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the CONTRACTOR in writing, through the ENGINEER, of any non-compliance with State or local requirements. The CONTRACTOR shall, after receipt of such notice from the ENGINEER or from the regulatory agency through the ENGINEER, immediately take corrective action. Such notice, when delivered to the CONTRACTOR or his/her authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the CONTRACTOR fails or refuses to comply promptly, the OWNER may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR unless it is later determined that the CONTRACTOR was in compliance.

1.5 IMPLEMENTATION

A. Prior to commencement of the work, meet with the ENGINEER to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

B. Remove temporary environmental control features, when approved by the ENGINEER, and incorporate permanent control features into the project at the earliest practicable time.

PART 2 – PRODUCTS

2.1 EROSION CONTROLS

A. Filter sock to be used for run-off control to protect adjacent wetlands and other environmentally protected areas.

B. Non-woven Filter Fabric or Silt Sacks to be used where inserted into existing catch basins to prevent siltation of the existing drainage system, as necessary.

C. Where silt fence is required, provide the following woven geotextile fabric for silt fence:

1. Amoco 2122 as manufactured by Amoco Fabrics and Fibers Co., Atlanta, GA.

2. Mirafi 100X as manufactured by Mirafi, Pendergrass, GA.

3. Geotex 910SC as manufactured by Synthetic Industry, Chattanooga, TN.

4. Or acceptable equivalent product.

2.2 MATERIALS

A. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be:

B.

	Property	ASTM Test Method	Units	Value
1.	Grab Strength	D4632	lbs [N]	100 [450](min.)
2.	Permissivity	D4491	sec - 1	0.10 (min.)
3.	Apparent Opening Size	D4751	Sieve #	20-30
4.	Ultraviolet Stability	D4355	%	70 (min.)

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install sedimentation barriers in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the ENGINEER.

B. Install all erosion controls and environmental protection measures in accordance with manufacturer’s printed instructions.

C. Overlap silt fence 18 inches minimum for unsewn lap joint. Overlap fabric 6 inches at seam for sewn joint.

D. Construct earth berms or diversions to intercept and divert runoff water from critical areas.

E. Protect catch basins and drainage swales from sedimentation by installing inlet protection under catch basin grating casting as shown on the Drawings.

F. Do not place excavated soil material adjacent to water-course in manner that will cause it to wash away by high water or runoff.

G. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

H. Do not dump spoiled material into any streams, wetlands, surface waters, or unspecified locations.

I. Prevent indiscriminate, arbitrary, or capricious operation of equipment in streams, wetlands or surface waters.

J. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.

K. Prevent damage to vegetation adjacent to or outside of construction area limits.

L. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in streams, wet-lands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.

M. Do not alter flow line of any stream unless indicated or specified.

N. Clean and dispose of debris from sedimentation barriers on a weekly basis.

O. Upon completion of work and upon approval of ENGINEER, remove and legally dispose of sedimentation barriers and environmental protection measures.

3.2 PROTECTION OF WETLANDS RESOURCE AREAS

A. Care shall be taken to prevent or reduce to a minimum any disturbance to the adjacent wetlands, drainage ditch, surface water body, storm drain or sewer from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the receiving body shall not be directly returned to the surface water

body. Such water will be diverted through a settling basin or filter before being directed into the surface water body.

B. The CONTRACTOR shall not discharge water from dewatering operations directly into a wetland, surface water, or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels. All dewatering discharges shall also include energy dissipation to prevent scouring.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action drawing or plan approved by the Massachusetts Department of Environmental Protection. CONTRACTOR shall submit two copies (2) of approved contingency drawings or plans to the ENGINEER.

D. Equipment refueling operations must take place in a supervised area outside of any well zone 1 radius with appropriate secondary containment measures in place and spill response materials accessible on-site for the duration of construction.

3.3 PROVISIONS FOR CONTROL OF EROSION

A. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion. Erosion control measures, such as siltation basins, hay check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented.

B. Disposal of drainage shall be in an area approved by the OWNER. The CONTRACTOR shall prevent the flow or seepage of drainage back into the drainage area. Drainage shall not be disposed of until silt and other sedimentary materials have been removed. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

C. As a minimum, the following shall apply:

1. Silt fence shall be provided at points where drainage from the work site may contain polluting substances. The point of control shall be within the limits of the new construction and shall be contained in such a way as to not allow sediment to pass. Other methods which reduce the sediment content to an equal or greater degree may be used as approved by the ENGINEER.

2. Drainage leaving the site shall flow to water courses in such a manner to prevent erosion.

D. Measures for control of erosion must be adequate to assure that turbidity in the receiving water will not be increased more than 10 standard turbidity units (s.t.u.), or as otherwise required by the State or other controlling body, in waters used for public

water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted.

3.4 PROTECTION OF STREAMS

A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before being directed into the streams.

B. The CONTRACTOR shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the Massachusetts Department of Environmental Protection.

3.5 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.

B. Outside of areas requiring earthwork for the construction of the new facilities, the CONTRACTOR shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the ENGINEER. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The CONTRACTOR shall in any event be responsible for any damage resulting from such use.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the CONTRACTOR's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the CONTRACTOR's equipment or operations shall be restored as nearly as possible to its original condition. The ENGINEER will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

E. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

F. Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the CONTRACTOR and are beyond saving in the opinion of the ENGINEER, shall be immediately removed and replaced.

G. The locations of the CONTRACTOR's storage, and other construction buildings, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the ENGINEER and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the ENGINEER.

H. If the CONTRACTOR proposes to construct temporary roads or embankments and excavations for plant and/or work areas, he/she shall submit the following for approval at least ten days prior to scheduled start of such temporary work.

1. A layout of all temporary roads, excavations and embankments to be constructed within the work area.

2. Details of temporary road construction.

3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.

4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of the CONTRACTOR's approved drawings shall be made only with the written approval of the ENGINEER. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.

I. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the ENGINEER. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as approved by the ENGINEER.

J. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.6 PROTECTION OF AIR QUALITY

A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control. The CONTRACTOR will be required to maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.

C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the ENGINEER.

D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the CONTRACTOR must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the ENGINEER.

3.7 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.8 NOISE CONTROL

A. The CONTRACTOR shall make every effort to minimize noises caused by his/her operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal regulations.

B. CONTRACTOR should note local residences within proximately of the work and shall make all efforts to minimize noise disruptions.

C. Construction activities and operating equipment shall not begin before 7:00 A.M.

END OF SECTION 01110

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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 SEQUENCE OF WORK

A. Milling and final pavement shall not be conducted until the trench paving has been in place for at least 120 days, unless otherwise directed in writing by the Engineer.

1.3 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.

1.4 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 OWNER 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 OWNER 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) 314-3855 during normal

working hours or the Waltham Police Department (781) 314-3600 after hours. Upon being advised by the City 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 one thousand dollar ($1,000.00) 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 OWNER 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 OWNER, solely at the discretion of the OWNER.

E. The Contractor shall not use any OWNER 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.

1.5 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 **and the General Foreman of Waltham Water & Sewer at 781-314-3836** (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 may be obtained by the Water Department. The CONTRACTOR will be responsible for all associated fees and charges for water use.

B. The CONTRACTOR shall notify DIGSAFE at 811 or 888-DIG-SAFE 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. The CONTRACTOR shall follow the procedures outlined in Massachusetts 220 CMR 99.00 and MGL C. 82, Section 40 through 40E ("DIG SAFE").

1.6 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01170

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE OWNER

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

1.3 PRE-BID CONFERENCE

A. Prior to the opening of the bids, a site conference shall be held with prospective bidders. All Contractors are urged to attend. Refer to Invitation to Bid.

1.4 PRECONSTRUCTION CONFERENCE

A. A preconstruction 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 preconstruction conference will be held.

1.5 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 each week with times and place coordinated between CONTRACTOR’s superintendent and ENGINEER. 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 work 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 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 through 16 (as applicable) Specification Sections, apply to this section.

1.2 DESCRIPTION OF REQUIREMENTS

A. This section specifies the general methods and requirements of submissions applicable to the following work-related submittals.

1. Shop Drawings.

2. Product Data.

3. Samples.

4. Construction Photographs

5. Construction or Submittal Schedules.

6. Or Equal submittals.

B. Additional general submission requirements are contained in the General Conditions.

C. Detailed submittal requirements will be specified in the technical specifications section.

1.3 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) drawings of concrete reinforcement, structural details and piping layout, 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 and working drawings shall be prepared on standard size, 22-in. by 34-in. sheets, except those which are made by changing existing standard shop or working drawings.

3. All shop drawings shall be submitted using a transmittal form approved by the ENGINEER. Submittal form shall include identification of transmittal number and specification section number.

4. All shop drawings submitted by Subcontractors for review shall be sent directly to the CONTRACTOR for approval. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

5. 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.

6. All details on shop drawings submitted for approval shall show clearly the relation of the various parts of 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.

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 printed installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances including certificates of compliance 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 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.

1.4 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 ENGINEER a copy of each submittal transmittal form for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the ENGINEER.

1. Submittals received “WITHOUT” Certification Statement shall not be reviewed.

C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the CONTRACTOR shall make specific mention of the deviations in the Transmittal Form furnished by the ENGINEER and provide a description of the deviations in a letter attached to the submittal.

D. The review and approval of shop drawings, samples or product data by the ENGINEER shall not relieve the CONTRACTOR from his 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 not have responsibility therefore.

E. 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.

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

1. Manufacturer's printed installation instructions; a part of product data submitted to the ENGINEER will not be reviewed and are for informational purposes only.

1.5 "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, structural/foundation, piping, instrumentation, 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.

1.6 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. All complete submittals shall be submitted sufficiently in advance of construction requirements to provide no less than twenty-five (25) days, excluding Saturdays, Sundays and legal holidays for review from the time received at the ENGINEER's reviewing office. For submittals of major equipment, that require more than twenty-five (25) days to review, due to its sheer complexity and amount of detail and also requiring review by more than one engineering discipline, a letter will be sent by the Project Manager or his/her designee to the CONTRACTOR informing him/her of the circumstances and the date it is expected the submittal will be returned to the CONTRACTOR.

C. Number of submittals required:

1. Shop Drawings: Unless otherwise stated in the respective Specifications Sections, submit six (6) copies.

2. Product Data: Unless otherwise stated in the respective Specifications submit six (6) 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, Mass Highway, 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.

E. Each shipment of drawings shall be accompanied by a transmittal form furnished by the ENGINEER giving a list of the drawing numbers and the names mentioned above.

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

A. The ENGINEER's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the CONTRACTOR from compliance with the contract plans and specifications or from departures there from. 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.

B. The review of shop drawings, data, and samples will be general. 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.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the 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. Two (maximum) copies of shop drawings or product data will be returned to the CONTRACTOR. Samples will not be returned.

E. 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" 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" 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 10 calendar days of the date of the ENGINEER's transmittal requiring the confirmation.

Code 4 "REVISE AND RESUBMIT" 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 10 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.

F. 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.

G. 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 option provide a list or mark the submittal directing the CONTRACTOR to the areas that are incomplete.

H. 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.

I. 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.

1.8 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 resubmittal (if required), coordination with other submittals, inspection, testing (off-site and on-site), 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.

1.9 CERTIFICATION FORMS

A. If specifically specified in other sections and appendices of these Specifications, the CONTRACTOR shall submit the applicable certification form(s) for each item required, and if applicable, the form attached to this section, completely filled in and stamped.

1.10 CERTIFICATES OF COMPLIANCE

A. Certificates of Compliance specified in the specifications shall include and mean certificates, manufacturer’s certificates, certifications, compliance reporting forms, certified copies, letters of certification and certificate of materials.

B. The CONTRACTOR shall be responsible for providing Certificates of Compliance requested and specified in Division 0, Division 1, and the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in 6 copies unless otherwise specified/approved. Each certificate shall be signed by an official authorized to certify on behalf of the CONTRACTOR, Subcontractor, or manufacturing company (as appropriate), and shall contain the individual's name and title, address of the Supplier, the project name and location, and if applicable, the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the CONTRACTOR, Subcontractor, or Supplier from providing additional means of verification or from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.11 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.

1.12 RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings

2. Specifications

3. Addenda

4. Change orders and other modifications to the Contract

5. Reviewed shop drawings, Product Data, and Samples

6. Manufacturer's instruction for assembly, installation, and adjusting

B. Record information concurrent with construction progress, not less than weekly. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer’s name and product model and number.

2. Product substitutions or alternates used.

3. Changes made by Addenda and modifications.

B. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, including fire hydrants, gate valves, and service boxes, referenced to permanent surface structures.

2. Field changes of dimension and detail.

3. Details not on original Contract drawings.

1.13 SCHEDULES

A. Provide all schedules required by the General Conditions.

B. The CONTRACTOR shall submit a progress schedule before starting any work, in accordance with the General Conditions and Section 01311. 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01300

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the Commonwealth of Massachusetts and that he/she has been employed by (Name of CONTRACTOR)
_____ to design _____ in accordance with Specification Section _____ for the replacement of the water main. The undersigned further certifies that he/she has performed the design of the _____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the OWNER or the OWNER's representative with seven days following written request therefor by the OWNER.

_____
P.E. Name

_____
Signature

_____
Address

_____
CONTRACTOR's Name

_____
Signature

_____
Title

_____
Address

CHANGE ORDER FORM

For

Jennings Road Sewer Replacement and Drain Rehabilitation

City of Waltham, MA

Date: _____ Change Order No.:_____

To: _____

_____

_____

_____

The terms and conditions of the original Contract for this project shall govern this change.

Description of Change:

Total Amount of this Change Order: $ _____

Original Contract Price: $ _____

Adjusted Contract Price due to Previous Change Orders: $ _____

The New Contract Price due to this Change Order will be: $ _____

Change to Contract Time: _____ days

RECOMMENDED BY: _____

_____

Title

ACCEPTED BY: _____

_____

Title

ACCEPTED BY: _____

City of Waltham

_____

Title

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SECTION 01311

CONSTRUCTION PROGRESS SCHEDULES

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.

B. Section 01170 – Special Provisions

C. Section 01300 – Submittals

1.2 SUMMARY

A. Prepare and submit to Engineer for review projected construction schedules. Update and revise schedules periodically to reflect progress of work.

1.3 FORM OF SCHEDULES

A. Prepare in form of network analysis system using the Critical Path Method.

B. Perform data preparation, analysis, charting and updating in accordance with pertinent recommendations contained in current edition of "CPM in Construction" manual of the Associated General Contractors.

C. The network analysis system shall consist of a detailed network, mathematical analysis and a network diagram.

1. The network diagram shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.

2. Detailed network activities shown on the network diagram shall include, in addition to environmental protection and construction activities, the submittal for approval of samples and shop drawings, the procurement of critical materials and equipment and their installation and testing.

3. Related activities shall be grouped on the network. The activities on the critical paths shall be highlighted. The network shall be time scaled using units of approximately one-half inch equals one week or other suitable scale approved by the Engineer. Weekends and holidays shall be indicated. Where slack exists, the activities shall be

shown at the earliest time they are scheduled to be accomplished. Sheet size shall be 11"x17" minimum.

4. The mathematical analysis of the network diagram shall include a tabulation of each activity shown on the detailed network diagram. The following information shall be furnished as a minimum for each activity.

    a. Preceding and following event numbers.
    b. Activity description.
    c. Estimated duration of activities in units of working days (being the best estimate available at time of computation).
    d. Earliest start date (by calendar date).
    e. Earliest finish date (by calendar date).
    f. Scheduled or actual start date (by calendar date).
    g. Scheduled or actual finish date (by calendar date).
    h. Latest start date (by calendar date).
    i. Latest finish date (by calendar date).
    j. Slack or float.
    k. Monetary value of activity.
    l. Responsibility for activity (Prime Contractor, subcontractors, suppliers).
    m. Manpower required by trade and by total. Graphic representatives will be allowed.
    n. Equipment required.

5. The mathematical analysis shall list the activities in sorts or groups as follows:

    a. By the preceding event number from lowest to highest and then in the order of the following event number.
    b. By the amount of slack, then in order of activity number.
    c. By responsibility in order of earliest start date.

1.4 REVIEW OF SYSTEM

A. Participate in a review and evaluation of the proposed network diagrams and analysis by the Engineer. Revisions necessary as a result of this review shall be resubmitted to the Engineer within 10 days after the conference. Twenty days will be allowed for checking and further action by the Engineer. Progress payments will be withheld pending attainment of a mutually acceptable schedule. The mutually acceptable schedule shall then be the schedule to be used by the Contractor for planning, organizing, directing and executing the Work and for reporting progress. If the Contractor thereafter desires to make changes in his method of operating and scheduling he shall notify the Engineer in writing stating the reasons for the change. If the Engineer considers these changes to be of a major nature he may require the Contractor to revise and submit, without additional cost to the Owner, all of the affected portion of the network diagram and mathematical analysis to show the effect on the entire project. A change may be considered of a major nature if the time estimated to be required or actually used for an activity or the logic of sequence of activities is varied from the original plan to a degree that there is reasonable

doubt as to the effect on the Contract completion date or dates. Changes which effect activities with adequate slack time shall be considered as minor changes, except that an accumulation of minor changes may be considered as a major change when their cumulative effect might affect the Contract completion date.

1.5 UPDATES

A. Submit at intervals of 30 days a report of the actual construction progress by updating the mathematical analysis. All contract changes, including pending and approved change orders and field orders shall be included in the update schedule. Revisions causing changes in the detailed network shall be noted on the network or a revised issue of the affected portions of the detailed network furnished. The network shall be revised as necessary for the sake of clarity.

B. The report shall show the activities or portions of activities completed during the reporting period and their total value as basis for the Contractor's periodic request for payment. Coordinate with the schedule of breakdown of lump sum items. The report shall state the percentage of the Work actually completed and schedule as of the report date and the progress along the critical path in terms of days ahead or behind the allowable dates. If the project is behind schedule, progress along other paths with negative slack shall be reported. Percentage of work actually completed will be reviewed by the Engineer. If the Contractor fails to submit the required monthly reports and updates within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required reports and updates. Three copies of the report shall be submitted for each update.

C. Simultaneously submit a narrative report with the updated analysis which shall include but not be limited to a description of the problem areas, current and anticipated delaying factors, their impact, and an explanation of corrective actions taken or proposed.

1.6 SUBMITTALS

A. Within 15 days after execution of the AGREEMENT, submit 3 copies of a preliminary schedule indicating planned operations during first 60 days. Include cost of activities expected to be completed before submission and approval of the complete schedule.

B. Within 30 days after execution of the AGREEMENT, submit 3 copies of the complete network analysis system. After review, submit 3 copies of the mutually acceptable system.

C. Submit 3 copies of monthly reports and updates by the tenth day of the month.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01311

SECTION 01350

HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall, prior to the start of work on the site, prepare and submit for review, a site-specific health and safety plan. Work may not proceed at the project site until the OWNER and/or ENGINEER have reviewed and approved the CONTRACTOR's health and safety plan. Any delays incurred by the CONTRACTOR relating to reviews of the health and safety plan shall be the responsibility of the CONTRACTOR and constitute no additional costs or claims to the OWNER.

B. Individuals involved in the excavation of potentially impacted soils shall be properly informed and trained in the recognition and response strategies involved with the hazards posed by these contaminants. The excavation of contaminated soils areas is not anticipated. However, the CONTRACTOR shall provide appropriate equipment (e.g., temporary fencing, drums) in the event hazardous materials are spilled or encountered.

C. The CONTRACTOR shall be cognizant of the minimum standards set forth in OSHA 29 CFR 1910.120. The health and safety plan shall include, but not be limited to the following:

1. Identification of CONTRACTOR's Site Safety Officer.

2. Identification of CONTRACTOR's Designated Field Personnel.

3. Type of Medical Surveillance Program.

4. Identification of Hazard and Risks Associated with Project.

5. CONTRACTOR's Standard Operating Procedures including Personnel Training and Field Orientation; Personal Hygiene Requirements & Guidelines; Field Monitoring Requirements of Site Contaminants; Respiratory Protection Training & Requirements; Levels of Protection and Selection of Equipment Procedures; Zone Delineation of the Project Site; Site Security and Entry Control Procedures; Contingency and Emergency Procedures; and Listing of Emergency Contacts.

6. The CONTRACTOR must be aware of site specific requirements such as site security during non-working hours, limited work space, and minimizing the effects of soil excavation to adjacent structures.

7. The CONTRACTOR shall make available complete sets of personal protective equipment and clothing to the OWNER and ENGINEER for use during site

inspections by the OWNER and ENGINEER. These shall be supplied and maintained at no cost to the OWNER, and shall be returned to the CONTRACTOR upon completion of the Work, except for expendable disposal protective clothing. CONTRACTOR shall provide a repository for collection of disposable health and safety materials. Collection and disposal of contaminated expendable supplies shall be at cost to the CONTRACTOR.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01350

SECTION 01370

SCHEDULE OF VALUES

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 SUMMARY

A. This section includes the following:

1. Provide schedule of values covering each lump sum bid item.

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Schedule of values.

a. Revise and resubmit schedule until acceptable to the Engineer.

2. Itemize separate line item cost for work involving each lump sum item.

a. Ensure that the sum of the items listed in the schedule of values for each lump sum item equals the price bid for the respective lump sum item.

b. For "Mobilization and Demobilization", items such as Bond premium and temporary construction facilities may be listed separately in the schedule, provided amounts can be substantiated.

3. Breakdown installed costs into:

a. Delivered cost of product.

b. Total installed cost with overhead and profit.

(1) Do not list overhead and profit as separate items.

c. For water pipelines, include a breakdown for testing, chlorinating and putting into service.

4. An unbalanced schedule of values providing for overpayment on items of work performed first will not be accepted.

1.4 SEQUENCING AND SCHEDULING

A. Prepare schedule of values covering each lump sum item after review of tentative schedule at preconstruction conference, but before submission of first application for payment.

B. Before submitting any application for payment, obtain the Engineer's approval of the Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01370

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other 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 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 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 fills, embankment fills, backfill materials, compaction 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 asphalt mixtures, moisture-density (Proctor) and 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, 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 General Conditions.

B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are 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.

C. 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.

D. 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 specification 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 (21) days' notice to the ENGINEER so that the ENGINEER may witness CONTRACTOR and/or 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 manufacturer's 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 - Submittal Procedures.

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 be 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

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 TEMPORARY UTILITIES

A. Temporary Light and Power: The Contractor shall at his own expense, provide his own temporary light and power as required for the execution and completion of work.

B. Temporary Heat: The Contractor shall, at his own expense, provide sufficient temporary heat to maintain a minimum temperature of 50 degrees F at all times in all areas that may be designated elsewhere in these documents.

C. Temporary Telephone: The Contractor shall have installed at his own expense a job telephone for his use. The Contractor shall pay all phone charges.

D. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees, as may be necessary to comply with the requirements and regulations of the local and state departments of health.

E. Maintaining Operation of the Existing Facilities:

1. The Contractor shall be responsible for careful consideration of the construction, scheduling and anticipation of potential interference with existing utilities, operations and structures. The Contractor shall maintain close communications with the Engineer and provide the Engineer with a detailed description of each proposed activity sufficiently in advance of its commencement for review and comments to be made.

2. Temporary facilities which may be required include, but are not limited to, electrical power; lighting; heating; cooling; ventilating; telephone; potable water; fire protection; drainage; sanitary facilities; trench covers; protection of existing utilities; structures; streams; trees and shrubs; access roads; sewage conveyance; piping.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01500

SECTION 01610

DELIVERY, STORAGE AND HANDLING

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 SUMMARY

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 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.

1.4 STORAGE AND PROTECTION

A. 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.

B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

C. 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.

D. 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01610

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

1.2 SUMMARY

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

1. Closeout procedures

2. Record Documents

3. Final cleaning

4. Adjusting.

1.3 RELATED WORK

A. Cleaning up requirements are included in Section 01710.

1.4 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for ENGINEER's inspection.

B. Provide submittals to ENGINEER that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.

D. Submit all warranties.

E. Submit written notice that all subcontractors and suppliers have been paid in full.

F. Submit written notice showing the disparition of all insurance filings and claims.

G. Copy of “Statement of Compliance” filed with the Division of Labor and Workforce Development, as required under the State Wage Rate Provisions.

1.5 RECORD DOCUMENTS

A. Maintain on site, one set of the following documents; actual revisions to the Work shall be recorded in these documents:

1. Contract Drawings

2. Specifications

3. Addenda

4. Change orders and other Modifications to the Contract

5. Reviewed shop drawings, product data, and samples

6. Written interpretations and clarifications

7. Field orders

8. Field test reports properly verified

9. Upon completion of the project Record Drawings shall be submitted to the ENGINEER.

B. Store As-built Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer’s name, address and telephone number and product model and serial number

2. Product substitutions or alternates utilized

3. Changes made by Addenda and Modifications.

E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical location of excavation limits referenced to permanent surface bounds

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work

4. Field changes of dimension of detail

5. Details not on original Contract Drawings.

1.6 FINAL CLEANING

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean.

3. Wipe surface of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

4. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.7 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01700

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SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

1.2 SUMMARY

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. The CONTRACTOR shall thoroughly clean all materials and equipment installed by him and his sub-contractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition. All mechanical equipment shall be left fully charged with lubricant and ready for operation.

E. 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 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01710

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.

1.3 RELATED WORK

A. Refer to General Conditions of the Contract for the general requirements relating to warranties and bonds.

B. General closeout requirements are included in Section 01700 - Contract Closeout.

C. Specific requirements for warranties for the Work and products and installations that are specified to be under warranty are included in the individual Sections of Division 2, inclusive.

D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.4 SUBMITTALS

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement data for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document

that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.

D. Refer to individual Sections of Divisions 2 for specific content requirements, and particular requirements for submittal of special warranties.

E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the “Warranties and Bonds” binder.

F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-in. by 11-in. paper.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the “Warranties and Bonds” binder, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.

H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.

I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.

J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.5 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting Work under warranty that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of Work under warranty.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding; reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements

of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.6 DEFINITION

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION 01740

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SECTION 01850

TRAFFIC MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Appendix D – Traffic Management Plan

1.2 SUMMARY

A. This section includes the following:

1. Pedestrian, vehicular traffic and other safety control devices, construction signs, requirements, and management for the protection of the traveling public and working personnel during construction and related operations.

2. Establishing, maintaining, and removing detour routes as shown on the Plans or as directed by the Owner and/or Engineer in order to perform the proposed construction.

3. The design, application, and installation of all devices required by this section shall conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) latest edition, Part VI, published by the Federal Highway Administration (FHWA), the Massachusetts Amendments to the MUTCD latest edition, MassDOT Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors, MassDOT Construction and Traffic Standard Details (1996), Americans with Disabilities Act (ADA), and the Massachusetts Department of Transportation Standard Specifications for Highways and Bridges with all subsequent Special Provisions and Supplemental Specifications, hereinafter referred to as the "MassDOT Standard Specifications", Section 850, and MassDOT "Standard Details and Drawings for the Development of Temporary Traffic Control Plans", except as modified herein.

4. Traffic management during construction and maintenance operations includes installing and maintaining temporary vehicular, pedestrian and construction facilities, furnishing, installing, inspecting, positioning, repositioning, and removing channelization devices necessary to maintain pedestrian and vehicular traffic during construction and fencing of excavations as required for the protection of the public and all project personnel.

5. All construction vehicles not protected by any form of traffic control device on a project which is open to traffic shall have an amber flashing light mounted on the cab roof or on the highest practical point of the machinery. The light shall be in operation whenever the equipment is working on the highway or travelled way. Amber flashers must be a minimum of 40 candelas and have a flashing frequency of 50 to 60 times per minute. Either rotating beacons or strobe lights meeting these requirements are acceptable.

6. All materials provided by the Contractor under the items of this section shall remain the property of the Contractor upon completion of the project, unless otherwise specified below.

7. Any traffic management and traffic detours proposed by the Contractor shall be subject to approval by the Owner and/or the Engineer. The Contractor shall provide detailed Traffic Management Plans and detour maps indicating the proposed detour routes, all proposed signs, the proposed hours of operation, the proposed locations of police detail officers and barricades for each phase of construction two weeks before the intended implementation date for approval by the Owner and/or the Engineer. Work shall not proceed without specific notice to and approval of the Owner and/or the Engineer. Any detours or changes in normal traffic patterns or road closures shall be coordinated by the Contractor with the Owner and/or Engineer, local Police Department, and Fire Department.

8. "Approved by the Owner" throughout this Section shall mean the approval of the City of Waltham.

1.3 HOURS OF OPERATION

A. Daily restricted hours of operation shall be between 7:00 am and 4:00 pm Monday through Friday. Construction shall be coordinated around other nearby construction projects and traffic which may further prohibit construction in the streets during certain periods to retain adequate circulation.

B. Construction during any time outside the work hours outlined above cannot be performed without permission from the Owner and/or the Engineer.

1.4 SUBMITTALS

A. Shop Drawings: Contractor shall submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES:

1. Traffic Management Plans: Where designs for pedestrian and traffic control devices are not specification indicated on the Contract

Drawings or for any variations from the Traffic Management Plans on the Contract Drawings, the Contractor shall prepare and submit to the Owner and/or Engineer for approval, a traffic management plan, complete with details of the proposed methods, including materials for approval two weeks before implementation. This includes but is not limited to road closures and detour routes for each phase of construction including time periods of work, temporary pedestrian and construction facilities, locations of signage, portable changeable message signs, police and other traffic control devices to maintain traffic and access to abutting properties.

2. Shop Drawings

   a. Submit complete shop drawings for traffic management plans, including temporary pedestrian sidewalks and driveways, as needed, certified by a Professional Engineer registered in the Commonwealth of Massachusetts.

   b. Show on the shop drawings all materials, including traffic control devices, signs and methods of installation.

   c. Include with the shop drawings alignment tapers, lane widths, police detail locations, temporary pavement markings, barriers and traffic control device spacing.

   d. The Contractor shall submit in writing proposed road closures and anticipated detour routes and signage based on the provided information for approval two weeks prior to implementation.

3. Safety Signing for Construction Operations. Where not indicated on the Contract Drawings, the Contractor shall submit temporary traffic management plans and sign placement and size sketches showing the proposed sign setups he intends to use to provide the necessary traffic control and protection during the progress of the work, plus the sign and legend size and layout. These sketches shall also be submitted to the Owner and/or Engineer for review and approval two weeks before work begins. Particular care shall be taken to establish and maintain methods and procedures that will not create unnecessary or unusual hazards to public safety. Traffic control devices required only during working hour operations shall be removed and the appropriate signs shall be covered at the end of each working day.

4. The Contractor shall submit to the Owner and/or Engineer the information required by this section a minimum of two weeks prior to the start of construction and prior to the start of construction at any new location throughout the duration of Work under this Contract for approval. Work shall not proceed without specific notice to and

approval of the Owner and/or Engineer.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400.

1.6 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610 and as specified.

B. No material shall be stored within the work area or on adjacent roadways or residential streets except which is needed for work being performed for that day.

1.7 TRAFFIC CONTROL REQUIREMENTS

A. The Contractor shall meet the following conditions, unless otherwise specifically approved by the Owner and/or Engineer:

1. All Work shall be prosecuted with proper regard for the convenience of the Public and in a manner to permit unimpeded traffic flow whenever possible. The interruption of traffic will not be permitted unless specifically allowed by the Owner and in accordance with the requirements of the Owner and/or Engineer and in conformance with MUTCD requirements.

2. Traffic control devices and signs shall be removed, demounted or properly covered for those periods of the day not in use or not applicable.

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

4. Streets, roads, private ways, and walks under construction and not closed shall be maintained passable and safe at all times by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.

5. The Owner and/or Engineer shall be notified of any re-routing of traffic two weeks in advance. Approval must be obtained from the Owner and/or Engineer prior to any rerouting of traffic (except emergencies). Following receiving approval form the Owner and/or Engineer, it will be the Contractors responsibility to coordinate with other agencies or departments including Police and Fire Department

in writing a minimum of 72 hours prior to road closures. This will include providing the Police Department, Fire Department and Department of Public Works with the following information:

a. A list of streets and intersections where work will be in progress to be supplied at intervals as required by the Owner and/or Engineer.

b. Immediate notification of any utility breaks.

6. The Contractor is responsible for notifying abutters of anticipated construction adjacent to their property and the anticipated temporary alterations in circulation through distribution of written notices 72 hours in advance.

7. No operations shall be conducted, including the loading or unloading of vehicles, on or near the traveled lanes or road shoulders without first erecting warning signs and channelizing devices as directed. These precautions shall be maintained at all times while work is in progress.

8. Construction signs and channelizing devices shall be used to separate traffic from the work areas and for traffic control. Placement, other than as shown in the Contract Drawings or the MUTCD, will require prior approval from the Owner and/or Engineer.

9. Temporary signs and channelizing devices shall not be set up until there is adequate visibility or appropriate construction lighting. The Contractor shall schedule his work so that temporary signs and channelizing devices are removed and traffic is returned to its normal pattern before the end of the work period.

9. Work operations shall not be performed on the roadway in such a manner that traffic is obstructed or endangered from either side of the roadway.

10. The Contractor shall keep all roadway areas open to traffic as clear as possible at all times. Materials shall not be stored on any roadway area or within 10 ft. of the traveled way. Material shall be delivered to the installation areas as they are needed to provide a continuous installation. Location of storage areas shall be subject to approval.

11. The Contractor shall remove all equipment and construction vehicles from the traveled way and shoulders open to traffic during non-work hours. Vehicles shall be parked no closer than 10 feet from the traveled way in pre-approved areas unless specifically permitted.

12. Temporary signs and channelizing devices shall not be set up in

inclement weather.

13. The Contractor shall provide necessary, unimpeded access for fire apparatus and other emergency vehicles through the work zones to abutting properties at all times.

14. Sweeping and cleaning of surfaces beyond the limits of the project required cleaning up material caused by spillage or vehicular tracking during the various phases of the work shall be considered as incidental to the work being performed under the Contract and there will be no additional compensation. Sweeping and cleaning shall be done daily.

1.8 EXCAVATIONS

A. The Contractor shall excavate for the amount of work to be completed and subsequently backfilled that same day. Open excavations shall not remain open through non-work hours, unless prior approval is obtained from the Owner and/or Engineer.

B. All open excavations shall be adequately safe guarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Owner and/or Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, special construction procedures shall be taken, such as limiting the length of open trench.

C. The Contractor shall not enter upon or occupy with men, tools, equipment or materials any property outside the rights-of-way or property of the Owner, except after the written consent of the Owner and/or Engineer.

D. The Contractor shall erect substantial barriers at the ends of open ditches; stockpiled construction materials or other obstructions and shall erect warning signs and provide adequate lights or flares to guard the barriers, trenches, and excavation.

E. At the end of each work day the Contractor shall fill in all open trenches, test pits or other excavations. Steel plates shall only be used with the approval of the Owner and Engineer. Steel plates shall be of adequate strength to carry traffic. Steel plate strength shall be approved by the Engineer or the Owner. The roadway shall be free of construction debris and excavated material and shall be relatively smooth to provide safe passage.

F. At the end of each work week, backfilled excavations shall be paved with hot mix asphalt in accordance with the Drawings and Section 02576 of these specifications. Temporary paint pavement markings that match the existing markings disturbed by the excavation shall be applied to the new pavement in accordance with the MassDOT Standard Specifications and MUTCD.

1.9 COORDINATION OF WORK AREAS

A. The Contractor shall be responsible for the coordination of his/her work with all utility or roadway work being performed by the City and/or utility owners in relation to this project or projects near this project in order to retain adequate circulation throughout the area. The Contractor shall phase all Work in a manner that will provide positive and safe through movement of traffic passing the construction site.

1.10 ACCESS TO PROPERTIES

A. At least one serviceable driveway access to all residences and businesses within the project shall be maintained at all times.

B. The Contractor shall coordinate the work with the schedules of delivery trucks to the adjacent stores and property owners so as not to impede their access.

1.11 HAULING

A. The Contractor is advised that all roads and bridges within or adjacent to the project shall be subject to legal loads and vehicles.

B. The Contractor is advised that no agreements have been made by the City of Newburyport or the MassDOT with surrounding cities or towns to relieve the Contractor of liability for damage to local roads and bridges caused by the Contractor's operation. The Contractor shall contact appropriate officials of the surrounding cities or towns concerning hauling over city or roads and bridges.

C. The Contractor shall furnish 60" x 30" approved signs reading "CONSTRUCTION VEHICLE - DO NOT FOLLOW" to be used on trucks hauling to the project, when such signs are deemed necessary by the Engineer. The color, type of sheeting and size of lettering shall conform to that of the permanent construction signs.

D. Each driver of any vehicle used on this contract shall be furnished written instructions concerning the manner of operation for that vehicle. Specifically, these instructions shall warn against stopping on the traveled portions of the roadway, against passing other vehicles, and against traveling in close proximity to other vehicles. A copy of these instructions shall be given to the Engineer.

1.12 DETOUR ROUTE

A. Temporary detours routes will not be permitted without prior approval by the Owner. Contractor shall submit detour routes and Traffic Management Plans to the Owner and/or Engineer for approval a minimum of two weeks prior to

anticipated implementation.

B. The Contractor shall coordinate and time construction with other construction projects nearby to maintain adequate circulation.

C. Temporary traffic control devices installed prior to the detour shall be covered or rendered inoperative until the detour begins. Temporary traffic control devices no longer needed after the last day of the detour shall be covered until they are removed.

D. Portable Changeable Message Signs (PCMS) will be in place and operational one week prior to anticipated construction to warn drivers of altered circulation patterns. Locations and messages for PCMS's will be shown on the Contractor's submitted Traffic Management Plans and as approved by the Owner and/or Engineer.

E. The Contractor shall cover all existing traffic signs that are in conflict with the detour route. Existing pavement markings that conflict with detour traffic shall be removed in accordance with the MassDOT Standard Specifications, Section 850.

F. Upon completion of the detour, the Contractor shall restore all pavement markings to the existing conditions and uncover existing traffic signs.

1.13 PEDESTRIAN TRAFFIC

A. Sidewalks shall be maintained at all times throughout the construction period. Temporary sidewalks, pedestrian detours, and pedestrian and construction facilities shall be constructed as needed to maintain pedestrian traffic and business access, as shown on the Plans or as directed by the Owner and/or Engineer. Walkways of 5 feet minimum width (not including curb width) will be provided at all times unless otherwise approved by the Owner and/or Engineer. All permanent and temporary sidewalk construction shall be in accordance with ADA requirements including clearance around obstructions, slopes, and alignments.

B. Pedestrian access will be provided to abutting land uses such as residences and businesses at all times, as approved by the Owner and/or Engineer and in accordance with ADA requirements.

C. Temporary pedestrian walkways shall be separated from roadway and constructed areas by barricades as approved by the Owner and/or Engineer.

1.14 CONSTRUCTION AND ADVANCE WARNING SIGNS

A. Construction and advance warning signs shall be in accordance with the MUTCD, MassDOT Standard Specifications, Section 850 – Traffic Controls for Construction and Maintenance Operations and the provisions of this

Section.

B. Construction and advance warning signs shall be replaced, covered, uncovered, furnished, positioned, repositioned, inspected, maintained, and removed as often as necessary and or directed by the Owner and/or Engineer, including regulatory, warning, and guide signs and temporary bus stop signs and taxi stop signs and their supports.

C. All signs which are damaged or are missing from their location will be replaced by the Contractor without additional compensation.

D. All signs will be maintained by the Contractor in a satisfactory manner including the removal of dirt or road film that causes a reduction in sign retroreflectivity.

E. Special construction signs will be furnished and installed by the Contractor during the work to improve traffic flow or safety, as directed by the Owner and/or Engineer.

1.15 TRAFFIC CONTROL DEVICES

A. Install, inspect, maintain, reposition and remove all temporary traffic control devices and construction elements as often as necessary and as directed by the Owner and/or Engineer in accordance with an approved construction staging sequence and traffic management plan.

B. Materials required for the work of this Section need not be new, but must be in first-class condition and acceptable to the Owner and/or Engineer and meeting requirements set for the MUTCD and MassDOT standards. Any materials, that in the judgment of the Owner and/or Engineer, are unsatisfactory in appearance or performance shall be removed and immediately replaced by the Contractor with acceptable units.

C. All traffic control devices shall be in accordance with MassDOT Standard Specifications, Section 850 and the provisions of this Section.

D. Temporary Safety Signing

1. Safety Signing shall consist of furnishing, positioning, repositioning, covering and uncovering, maintaining and removing, as needed and/or as directed: regulatory, warning, and guide signs together with their supports. If additional supports are needed due to site conditions they will be considered incidental to the work.

2. Any temporary safety sign no longer applicable shall either be removed or covered as soon as possible.

3. No temporary safety sign shall be visible to traffic that may conflict

with actual roadway conditions.

4. Signs over 50 square feet will require approval of design calculations and shop drawings of the breakaway support system if the signs are installed at an unprotected location.

5. Site conditions including signage will be returned to pre-construction conditions at the completion of that phase of construction.

E. Sign Covers

1. Cover any existing regulatory and warning signs as necessary and as directed by the Owner and/or Engineer.

2. Use a cover approved by the Owner, which shall be securely fastened to the existing sign and shall completely cover the legend of the existing sign. The cover shall remain in place as long as necessary at which time it shall be promptly removed.

3. Signs shall be covered without causing any damage to the existing sign. Damaged signs will be replaced by Contractor at no additional cost to the Owner.

F. Temporary Pavement Markings

1. Temporary Pavement Markings shall consist of furnishing, applying, maintaining and removing temporary white and yellow reflectorized pavement markings during construction and maintenance operations.

2. Temporary markings shall be effective for a period of 90 days. Re-application or replacement within the 90 day period shall be done at no additional cost to the Owner.

G. Pavement Marking Removal

1. Pavement Marking Removal shall consist of removing existing pavement markings no longer applicable as required to support the Traffic Management Plan through the approved techniques outlined, or as directed by the Owner and/or Engineer.

H. Arrow Board

1. Arrow Board shall consists of providing, operating, positioning, repositioning, maintaining and removing a portable truck-mounted or trailer-mounted flashing arrow unit on the project at designated locations as shown on the approved traffic management plans or as directed.

I. Reflectorized Drums

1. Reflectorized Drums consists of furnishing, positioning, repositioning, maintaining, and removing reflectorized plastic drums and necessary ballast, as needed and/or as directed by the Engineer including locations of lane closures, shifting traffic, road closures, channelizing or otherwise re-directed traffic. The use of cones will not be permitted.

2. Traffic Drums shall conform to Drawing No. TR.7.1 of the MassDOT Construction and Traffic Standard Details, 1996 edition and MUTCD.

J. Pavement Marking Removal

1. Pavement Marking Removal shall consist of removing existing pavement markings as required to support the Traffic Management Plan or as directed through the approved techniques, outlined.

K. Temporary Barrier

1. Temporary Barrier shall consist of furnishing, installing, maintaining and final removal of temporary barriers, including delineation, for traffic control or work zone protection in construction zones. This barrier shall be continuous as a unit across bridges and other limited construction areas unless designated on the plans as “Temporary Restrained Barrier.”

2. Vehicular traffic within 30 feet of the travelled way shall not be exposed to blunt ends of barrier without acceptable impact attenuators with delineation.

3. Temporary Barrier shall be removed, transported and reset from the alignments established along the roadway to new alignments as required by the construction and staged construction operations for the control of traffic or work zone protection.

4. Temporary Barrier shall be installed where required by the Owner to protect the work zones and excavations, which cannot be completed and backfilled within a daily work period. Barriers shall be removed when no longer required.

5. Temporary barrier for use for temporary pedestrian and construction facilities shall have three (3) sleeves cast in each section of barrier to receive a post for panel and fence installations.

6. Temporary barrier shall conform to Drawing Nos. E403.1.0 to E403.7.0 of the MassDOT Construction Standard Details dated June

2014 with the latest revision.

L. Temporary Restrained Barrier

1. Temporary Restrained Barrier shall consist of furnishing, installing, removing, transporting, resetting, maintaining and final removal of temporary restrained barriers on bridge decks and other locations including delineation, in accordance with details as shown on the traffic management plans and/or bridge plans and as directed by the Owner and/or Engineer.

2. The work shall also include furnishing and installing all hardware and associated materials necessary to restrain the barriers in position, or attach the barriers to the roadway or the bridge deck.

3. Only barrier systems that have been crash tested and approved by FHWA are acceptable for the intended use.

M. Portable Breakaway Barricades Type III

1. Portable Breakaway Barricades Type III shall consist of furnishing, positioning, transporting, repositioning, maintaining, and final removal of portable barricades as shown on the approved traffic management plan or as directed by the Owner and/or Engineer.

2. Barricades shall be maintained in good and serviceable condition throughout the duration of the Contract.

N. Temporary Impact Attenuators

1. Temporary Impact Attenuators shall consist of furnishing, installing, removing, relocating, reinstalling, maintaining, and final removal of temporary impact attenuators in conformance with the specifications of the manufacturer and MassDOT.

O. Truck Mounted Attenuator

1. Truck Mounted Attenuator shall consist of furnishing a moveable impact attenuator equipped with a flashing arrow board. The impact attenuator can be either a truck-mounted or a tow-behind unit and shall conform with the specifications of the manufacturer and MassDOT.

P. Temporary Fence

1. Temporary fence shall consist of furnishing and installing, removing and resetting and the dismantling of 6-foot high temporary fence to separate construction activities from public access and as determined

and required by the Owner and/or Engineer.

2. The temporary fence shall be constructed at locations as directed by the Owner and/or Engineer. The Contractor shall install and maintain temporary construction fences around the construction site, stockpile areas, and any and all exposed excavations located outside the defined roadway area, accessible to the public until such time it is no longer necessary as determined by the Owner and/or Engineer. Carefully protect all areas of the site from intrusion and trespass. Protect Public Health Safety and Welfare at all times.

3. The Contractor is responsible for relocating the fence as many times as required to properly protect construction activities.

1.16 POLICE DETAILS

A. The Contractor shall coordinate with the Owner, Police Department, and Engineer to determine daily uniformed police detail requirements for the control of pedestrians and vehicular traffic within the project area for each stage of construction.

B. The decision to use a police detail at a specific project location shall be shown on the traffic management plans approved by the Owner and/or Engineer or as directed by the Owner and/or Engineer.

C. Contractor is responsible for scheduling of all uniformed police details. The Police Department will invoice the Owner directly for accepted Police Details.

D. It is the Contractor's responsibility to cancel Police Details a minimum of four hours in advance of the start of the shift if conditions so warrant. The Contractor will be responsible to reimburse the Police when the cancellation notice is not given by the Contractor in a timely fashion. Lateness or failure to show on the part of the Contractor or inclement weather shall not excuse the Contractor from the obligation to give adequate notice to the Police Department. Payment for Police Details not cancelled as required will be the responsibility of the Contractor.

E. Road closures shall not be allowed without prior permission of the Owner, Police Department, and Fire Department.

1.17 PERMITS

A. The Contractor shall be responsible for obtaining any permits to perform the work.

PART 2 - PRODUCTS

2.1. GENERAL

A. Devices required under this Section need not be new but must be in first class condition and acceptable to the Owner and/or Engineer. The condition of the work zone traffic control devices shall meet the quality standards set forth in the Quality Standards for Work Zone Traffic Control Devices compiled by the American Traffic Safety Services Association (ATSSA). Any devices that, in the judgment of the Owner, are unsatisfactory in appearance and/or performance shall be removed and immediately replaced by the Contractor with acceptable devices.

2.2. PORTABLE CHANGEABLE MESSAGE SIGN

A. The Portable Changeable Message Sign shall be capable of performing all functions at ambient temperatures ranging from -31º to 165 º F (–35 º to 74 º C). There shall be no degradation of operation due to fog, rain or snow. A radar detector activator meeting the requirements shall be considered part of this item.

B. Maintenance shall include periodic cleaning. When not being used the sign shall be stored in a secure area approved by the Owner and/or Engineer.

C. The Portable Changeable Message Sign shall consist of the following major components:

1. Message Sign:
    a. Type – The technology can be LED or a combination of both Flip Disk and LED (Hybrid).

    b. Matrix Displays – Shall be character, line or full matrix.

    c. Size – The message sign shall have a minimum height of 6 feet, maximum height of 6.5 feet and a minimum width of 8 feet, maximum width of 12 feet.

    d. Colors – The display shall be either fluorescent yellow or ITE amber.

    e. Lines – The message sign shall have the capability of displaying at least three lines of 18 inch characters with a minimum of 8 characters per line.

    f. The sign shall be illuminated for nighttime visibility.

2. Operator Interface: A means of creating and controlling the display message(s) on–site and remotely through an NTCIP compatible IP addressable modem, shall be provided with each sign. The operator interface shall contain as a minimum the following:

a. Display terminal with keyboard to allow previewing the message content and format before it is sent to the sign panel. The keyboard shall be of a standard design.

b. Controller (CPU).

c. Lockable weatherproof enclosure for interface components.

3. Controller: The Controller shall possess, at a minimum, the following features:

a. Full 32K user memory with the option for additional archive memory.

b. Capacity to store a minimum of 50 messages .

c. Changeable message flash rate capability.

d. A minimum of 24 hour battery back-up.

e. Password activation shall be software available.

4. Power Supply: The sign shall be capable of operation from a diesel powered generator, a battery or solar power. The power supply shall be protected from the weather and be locked for security.

5. Trailer: The trailer shall have at least the following features:

a. A current Registry of Motor Vehicles registration.

b. Swivel jacks capable of leveling the trailer on a 1:6 (1 vertical to 6 horizontal) slope and capable of stabilizing the trailer in winds of up to 80 miles per hour.

c. The sign shall be capable of being locked in a stowed position while being towed.

d. A lift mechanism shall be provided to elevate the sign to its operating position.

e. The capability to lock the sign panel in several off-angle positions with respect to the trailer axis.

2.3. TRAFFIC CONTROL DEVICES

A. Temporary Safety Signing

1. Rigid signs shall be fabricated from plywood, aluminum or approved

alternate substrate material.

2. Plywood sign material shall be 5/8 inch Exterior MDO – General (one sided).

3. Aluminum sign material shall be Type A, 0.08 inches thick as specified in MassDOT Standard Specification Subsection 828.42.

4. Route marker overlay on directional sign panels shall be fabricated from Aluminum Alloy 5052-H38 0.08 inches thick.

5. The entire sign face shall be retro-reflectorized. Reflective sheeting shall meet the requirements of ASTM D4956 and AASHTO M268, and as Flexible High Intensity Prismatic (HIP) Sheeting to ASTM Type VII or better.

6. Rollup signs shall be fabricated from vinyl microprismatic retroreflective material.

7. Background sheeting for all construction warning signs shall be of a fluorescent orange color. The minimum spectral radiance factor, in accordance with Section 5.1 of ASTM E991, for the fluorescence shall be as follows:

New	110% minimum
Weathered	60% minimum

B. Temporary Pavement Markings

1. Glass beads, tapes and paints used for temporary pavement markings shall be lead free, conform to MassDOT Standard Specification, Subsections M7.01.07, M7.01.16, M7.01.23 and M7.01.24, and meet the retroreflectivity requirements of the MUTCD for a period of 90 days. Final determination as to pavement marking quality shall be made by the Engineer. The Contractor shall supply a retroreflectometer for this purpose.

2. The colors of the marking materials shall be the standard highway colors of white or yellow and as outlined in the MUTCD.

C. Arrow Board

1. The unit shall consist of a black background panel meeting the requirements of MUTCD Type C and shall contain at least 15 amber lamps of approximately 8,000 initial maximum candelas each.

2. Panels shall have the capability of the following mode selections: (1) left or right flashing or sequential arrows; (2) left or right sequential chevrons; (3) flashing double arrow; (4) flashing caution and (5)

alternating diamond caution.

3. Panels shall automatically provide for a minimum of 50 percent dimming from their rated lamp voltage at night. The flashing rate of the lamps shall not be less than 25 or more than 40 flashes per minute.

4. Minimum mounting height should be 7 feet above the roadway to the bottom of the panel, except on vehicle-mounted panels, which should be as high as practicable.

5. The arrow board shall include a radar detector activator meeting its requirements.

D. Reflectorized Drums

1. Reflectorized drums shall be plastic and shall meet the applicable requirements of the MUTCD.

2. Reflective sheeting for drums shall meet the requirements of ASTM D4956 and AASHTO M268, and the Flexible High Intensity (H/I) Sheeting for ASTM Type VI and shall be six inches wide.

3. Reflectorized drums are listed on the MassDOT Qualified Construction Materials list.

4. The first five drums used for any taper or as designated on the Traffic Management Plan shall be equipped with flashing lights, or as directed by the Owner and/or Engineer.

E. Temporary Barrier

1. Temporary barriers shall be precast and manufactured in accordance with the plans and Section 629 of the MassDOT Standard Specifications.

2. The Contractor shall supply a barrier and anchorage system that was crash tested in accordance with NCHRP 350, TL-3 or MASH, TL-3 and accepted by FHWA.

F. Temporary Restrained Barrier

1. Temporary restrained barriers for use on roadways or on bridges shall be restrained by blocking or other system, affixed to the roadway by pinning, set into the roadway surface or other tested system or bolted down to the bridge deck, and shall be manufactured in accordance with the plans and Section 629 of the MassDOT Standard Specifications.

2. The Contractor shall supply a barrier and anchorage system that was crash tested in accordance with NCHRP 350, TL-3 or MASH, TL-3 and accepted by FHWA. The Contractor shall provide evidence of FHWA acceptance.

G. Portable Breakaway Barricades Type III

1. Portable Breakaway Barricades shall conform to the plans and the following requirements:

a. Portable breakaway barricades shall comply with the latest version of the MUTCD.

b. Reflectorized sheeting conforming to M9.30.0. Type VI. Pipe shall be Polyvinyl Chloride (PVC) pressure rated SDR 21 or SDR 26 ASTM D2241. Fittings may be PVC ASTM D2665 or Acrylonitrile Butadiene Styrene (ABS) ASTM D2661 (Drainage Waste and Vent).

c. The alternating 6 inch wide reflectorized diagonal stripe shall be orange and white and shall slope downward at 45º toward the end by which the traffic is to pass. Barricades that block the passage of traffic or designate the end of the traveled way shall have alternating vertical orange and white stripes on the rails.

H. Temporary Impact Attenuators

1. Only those Temporary Impact Attenuators previously approved for the purpose intended and listed on the Qualified Construction Materials List may be used.

2. The temporary impact attenuator shall be designed to fit within reasonably close tolerance of the dimensions given on the plans or in the special provisions for a given location.

3. The Contractor shall provide a design for temporary impact attenuator at the design speed shown on the plans or other speed designated by the Engineer.

I. Truck-Mounted Attenuator

1. Only those truck mounted attenuators previously approved for the purpose intended and listed on the Qualified Construction Materials List may be used. Since most approvals are conditional, any associated issues including but not limited to anticipated conditions, model, variations, modifications, proper installation of truck-mounted units and tow-vehicle specifications shall be resolved to the

satisfaction of the Engineer before use in the field. The submitted information shall include estimated displacement characteristics for a variety of impacts (assumptions regarding both impacting vehicle weight and speed) so that appropriate temporary traffic control set-ups can be undertaken in the field.

2. The flashing arrow board shall conform to the requirements of Section 2.4, Subsection D.

J. Temporary Fence

1. The type of temporary Chain link fence shall be Contractor's option with approval from the Owner.

2. The Contractor shall submit the type of temporary chain link fence to the Owner for approval prior to placing at the construction area. Following types are acceptable:

a. New materials or previously used salvaged chain link fencing in good condition.

b. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with steel base plates, or inserting in precast concrete blocks.

c. Fabric: Woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.

d. Gates:

i. Provide personnel and vehicle gates of the quantity and size required for functional access to site.

ii. Fabricate of same material as used for fencing.

3. Fence fabric shall be fastened to posts by means of No. 6 gauge zinc coated wire clips. No post tops are required.

PART 3 - EXECUTION

3.1. PORTABLE CHANGEABLE MESSAGE SIGN

A. The changeable message units shall be available for use one week prior to and throughout the duration of the project and be positioned in accordance with the traffic management plans approved by the Owner and/or Engineer for each phase of construction and/or at the direction of the Owner and/or Engineer.

The signs shall be visible from a minimum distance of 900 feet with a viewing angle of no less than 30 degrees. The Contractor shall take appropriate measures as needed within the roadway layout to provide the required minimum sight distance. The Contractor shall be responsible for the maintenance of each device and appurtenance. If the unit is found to be defective in any way it shall be replaced immediately at the Contractor's expense.

3.2. TRAFFIC CONTROL DEVICES

A. Temporary Safety Signing

1. Signs which are damaged or are missing from their locations shall be replaced by the Contractor without additional compensation.

2. All signs shall be maintained in a satisfactory manner including the removal of dirt or road film that causes a reduction in sign retroreflectivity.

3. All signs shall be mounted in compliance with the requirements of the MUTCD.

4. All signs not consistent with the use of the roadway shall be removed, completely covered, or turned away from traffic each day. In no case shall signs or their portable supports be left in the traveled way when the traffic management set-up has been removed.

5. Rollup signs shall only be used for single work shift setups.

B. Temporary Pavement Markings

1. The Contractor shall install all necessary temporary pavement markings prior to opening the roadway to traffic following the completion of each day's operations. The Contractor shall make all necessary arrangements for this work beforehand so that it may be properly coordinated with construction operations. Temporary pavement markers shall be installed in accordance with the requirements of the MUTCD.

C. Arrow Board

1. The arrow board shall be deployed as shown on the approved Traffic Management Plan or as directed. The unit shall be properly maintained throughout its use on the project.

D. Reflectorized Drums

1. Reflectorized drums are to be used as channeling devices in roadway

work zones. The first five drums used for any taper or as designated on the Traffic Management Plan shall be equipped with flashing lights.

E. Temporary Barrier

1. The Temporary Barrier shall be installed where needed to provide protection of work zone and as directed by the Owner and/or Engineer in accordance with these provisions.

2. Each run of temporary barrier units shall be fastened together to form a continuous chain.

3. Temporary impact attenuators with delineation shall be installed at ends of barriers within 30 feet of the travelled way. The Contractor shall not leave a barrier leading-end unprotected.

4. Delineators shall be installed in conformance with manufacturer's recommendations on the barriers at their termini; at 20-foot intervals on tangent sections; and 10 foot intervals on curved sections depending on radius as determined by the Owner and/or Engineer.

5. Delineators mounted on top of barriers separating opposing traffic shall have two sided amber reflectors delineating the left edge. Side mounted delineators shall have amber delineating the left edge, white delineating the right edge and have red as the back color. If mounted on the sides they shall be 6 inches below the top and on the side of traffic. Delineators shall be mounted at angles that provide maximum reflectorization.

6. Temporary Barriers shall be removed from existing locations, transported, and reset as needed in accordance with above requirements, as directed by the Owner and/or Engineer.

F. Temporary Restrained Barrier

1. The Contractor shall ensure that where the restrained barrier is to be pinned to the roadway, the pin holes are filled with a sand mortar mix upon removal of the barrier. If the barrier is to be restrained by setting it into the roadway in a planed slot, the roadway surface shall be restored by appropriate full depth HMA or Cement Concrete roadway reconstruction.

2. The Contractor shall ensure that the restrained barrier is required or directed by the Owner and/or Engineer to be bolted to the bridge deck, the deck reinforcement will not be damaged during the installation of the proposed barrier anchor bolts. Any damage to the deck reinforcement, which occurs during the course of the

Contractor's operations, shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

3. Impact or percussion drills are allowed if no distress occurs to the existing concrete. Their use is subject to the approval of the Owner and/or Engineer.

4. If core drilling, the holes may be cored using either a carbide or diamond bit. The diameter of the cored holes shall be in accordance with the recommendations of the resin manufacturer. If a diamond bit is used to core the holes in the proposed deck, a sandblast, high-pressure water blast, or other mechanical means must be used to properly roughen the inner surface of the holes. The type of abrasive surface roughening used shall be approved by the Owner and/or Engineer.

5. On the concrete deck all holes shall be blown clear of any debris prior to placement of resin. The Contractor shall have the approval of the Engineer signifying that the holes are clean prior to placing the resin adhesive. The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the adhesive material prior to the placement of the bolts. The Contractor shall not place adhesive material when the existing concrete temperature is below 40°F. Any excessive resin adhesive around the hole after placement of the bolt shall be struck off smooth while the resin adhesive is still workable.

6. The anchor bolt holes shall be repaired as needed by methods acceptable to the Engineer at no additional cost to Owner. Damage to the concrete-to-remain shall be repaired to a condition equal to or better than that prior to the beginning of these operations, at no additional cost to the Owner.

7. High strength bolts shall be installed through pockets formed in the barriers and bonded in holes drilled in either the existing or proposed concrete deck. The bolts shall be suitably coated to facilitate removal from the mating threads of the cured resin adhesive once the barriers are no longer needed. The process of removing the bolts shall cause no distress to the proposed deck concrete.

8. The bolt embedment length and resin adhesive shall be adequate to develop a minimum of 36 Kips of tension in the bolts. The embedment length shall not be less than 6½" in concrete and shall not extend below the bottom of the proposed deck.

9. Where the condition of the existing deck is unsuitable due to deterioration or insufficient embedment depth, bolts extending through the deck and fastened to an appropriately sized steel member which will provide the required pull strength may be used.

10. The details of the proposed bolted anchorage system and all installation and removal procedures shall be in accordance with the recommendations of the manufacturer, and shall be submitted to the Engineer for approval.

11. Field tests shall be performed to verify the effectiveness of the anchorage detail including the drilled hole diameter, embedment length, and the resin adhesive capacity. Two test bolts in both the existing concrete and the new concrete shall be installed and tested by the Contractor for pullout as required by the system manufacturer. If the desired strength is not achieved, the Contractor shall adjust the hole size, embedment length, bolt size, and/or adhesive material to meet this test requirement. Retesting as required by the Engineer shall be performed by the Contractor, at no additional cost to the Owner.

12. All testing shall be performed by the Contractor and is incidental to the work under this item. The method of applying the tension test load to the bolts shall be in accordance with ASTM E488. The testing equipment used and the locations and details of the test bolts shall be submitted to the Engineer for approval. The Contractor shall perform this test as soon as possible in order to eliminate delays in construction due to the approval process. Bolts shall not be ordered until the embedment lengths have been approved.

13. The delineators shall be single units, with yellow or white lenses on both sides, placed 6" below the top and on the traffic side of the median barrier at 20' on center. The delineators shall be the type designed expressly for this type of attachment and may be made entirely of plastic.

14. Temporary impact attenuators with delineation shall be installed at ends of barriers within 30 feet of approaching traffic. The Contractor shall not leave a barrier leading end unprotected.

15. Temporary Barriers on Bridge shall be removed from existing locations and reset in accordance with above requirements, as directed by the Engineer.

G. Portable Breakaway Barricades Type III

1. The Contractor shall furnish, set up, move and remove Portable Breakaway Barricades Type III as required or directed by the Engineer. Portable Breakaway Barricades Type III shall be maintained in a good and serviceable condition throughout the project and shall be moved from place to place as required during construction and as directed by the Owner and/or Engineer.

H. Temporary Impact Attenuators

1. Excavation for temporary attenuator foundations and anchorage shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with compacted gravel borrow.

2. The temporary impact attenuator shall be installed in accordance with the manufacturers' specifications and recommendations. Copies of these specifications and recommendations shall be provided to the Owner and/or Engineer.

3. Temporary Impact Attenuators damaged by traffic shall be replaced by the Contractor within 24 hours or as directed by the Owner and/or Engineer.

4. Temporary Impact Attenuators Removed and Reset consists of removing temporary impact attenuators furnished above, relocating and re-installing it at new locations in accordance with the specifications and recommendations of the manufacturer.

I. Truck-Mounted Attenuator

1. The truck-mounted attenuator shall be utilized as shown on the plans or as directed by the Owner and/or Engineer, at the proper orientation and height above the paved surface.

2. A damaged truck-mounted attenuator shall not be used. Any repairs to the attenuator shall be accompanied by a statement from the product manufacturer certifying the repairs that were performed. Any work that becomes delayed due to the lack of a properly functioning truck-mounted attenuator will not constitute justification for an extension of time.

J. Pavement Marking Removal

1. The Existing pavement markings shall be removed to the fullest extent possible by an approved method. Pavement marking removal methods shall not cause damage to the pavement or cause drastic change in texture, which could be construed as delineation at night, and shall be approved by the Engineer. It is not permissible to paint over existing markings with black paint in lieu of removal. Approved methods include but are not limited to:

    a. High pressure air.

    b. High pressure water (cold weather use not permitted)

c. Sand blasting,

d. Mechanical devices such as grinders, sanders, scrapers, scarifiers and wire brushes.

2. Painting over a pavement marking line by use of asphaltic liquids or paints will not be permitted.

3. Conflicting pavement markings shall be removed before any change is made in the traffic pattern.

4. Material deposited on the pavement as a result of removing markings shall be removed as the work progresses. Accumulations of sand or other material, which might interfere with drainage or could constitute a hazard to traffic, will not be permitted.

5. Any damage to the pavement or surfacing caused by pavement marking removal shall be satisfactorily repaired by the Contractor at no additional cost to the Owner.

6. Where the removal operation is being performed near a lane occupied by traffic, a vacuum attachment operating concurrently with the removal operation must be in use. All residue shall be removed immediately from the surface being treated.

7. Existing raised pavement markers shall be removed by a method approved by the Engineer. Any damage to the pavement or surfacing caused by pavement marking removal shall be repaired at no additional cost by methods acceptable to the Engineer. Voids in the pavement shall be filled with like materials with adhesive bonding to the substrate.

8. Following completion of construction, permanent pavement markings shall be installed to replace pre-construction makings to comply with MUTCD.

K. Temporary Fence

1. The Contractor shall install and maintain temporary construction fences at the location as directed by the Owner and/or Engineer.

2. Gates shall be fabricated using welded construction or heavy pressed steel or malleable corner fitting securely riveted. Gates shall be properly braced and diagonally trussed to eliminate any possible sagging. Hinges shall be of sufficient strength and design to permit easy and trouble free operation. All single swing gates shall be equipped with two H.O. hinges and one yoke latch per gate. All double swing gates shall be equipped with a positive type latching

device with padlock fitting.

3. Installation of temporary fencing shall not deter or hinder access to existing or proposed fire hydrants. Maintain 3 feet diameter clear space around fire hydrants. Where fire hydrant is blocked by fencing, provide access gate markings with black paint in lieu of removal.

4. The Contractor shall replace fence due to construction accidents, vandalism and/or any other manner by the Contractor at no additional cost to the Owner.

END OF SECTION 01850

DIVISION 2

SITE WORK

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SECTION 02050

DEMOLITION, MODIFICATION, AND ABANDONMENT

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall furnish all plant, labor, tools, equipment, materials, and supplies as required for utility and structure removal, demolition, modification, and/or abandonment as specified.

B. The Work of this Section shall include demolition of, roadway and sidewalk; removal or abandonment in place of existing water mains, drains, sewers, and appurtenance structures; and demolition.

1.2 DESCRIPTION

A. The work of this Section includes, but is not limited to, the following:

1. Obtaining all necessary permits, providing necessary notifications, and complying with all local, state, and federal laws regarding safety and demolition.

2. Stockpiling, removal, and legal disposal or recycling of demolished materials. Salvage value accrues to the Contractor.

3. The protection of areas outside the limits of work including paved roadways.

4. The protection of utilities which are scheduled to remain.

5. The control of dust.

B. Refer to the Drawings for additional requirements for demolition.

1.3 RELATED DOCUMENTS

A. Section 02200 – EARTHWORK

B. Section 02576 – PAVING, SIDEWALK AND CURBING

1.4 SUBMITTALS

A. The Contractor shall submit the following items:

1. A utility demolition plan which has been fully coordinated with the Owner, that describes the locations, cutting, capping, removal, and

disposal of existing utility services, and the maintenance and protection of temporary and permanent services.

2. Disposal receipts from the recycling site or solid waste disposal facility at the completion of the project.

1.5 REPAIR OF DAMAGE

A. Any damage to existing facilities to remain, as caused by the Contractor's operations shall be repaired at no additional cost to the Owner.

B. Damaged items that are to remain in place shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of work of this Contract.

1.6 PROTECTION OF EXISTING WORK

A. Before beginning any cutting, trenching or demolition work, the Contractor shall carefully review the work sequence and examine the Drawings and Specifications to determine the extent of the Work. The Contractor shall take all necessary precautions to prevent damage to existing facilities, which are to remain in place, and be responsible for any damage that is caused by the operations. Existing facilities so damaged shall be repaired or replaced to their undamaged condition at no additional cost to the Owner.

B. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the Contractor shall consult with the Owner prior to the placement of such equipment or material.

1.7 JOB CONDITIONS

A. The Owner assumes no responsibility for actual condition of the facilities to be removed, abandoned or modified. The Contractor shall visit the site; inspect all facilities to get familiarized with all existing conditions and utilities.

B. The Owner may occupy portions of the utilities, structures, properties or other facilities immediately adjacent to demolition area. Conduct demolition, modification and abandonment so Owner's operations will not be disrupted. Provide not less than 24 hour notice to Owner of activities that will affect Owner's operations.

C. Traffic: Conduct operations and removal of debris to ensure minimum interference with the normal use of public ways and other adjacent facilities. Do not close or obstruct traffic ways, streets, walks, or other used facilities without the written permission of the Owner and

authorities having jurisdiction. The Contractor shall coordinate with the Owner to provide access, circulation, vehicle parking, and security to the areas that are to remain. Traffic management shall be performed in accordance with Section 01850 – TRAFFIC MANAGEMENT.

D. Protection: Prevent injury to persons and damage to abutting property. Provide adequate shoring and bracing to prevent uncontrolled collapse. Immediately repair damaged property to its condition before being damaged. Take effective measures to prevent windblown dust. Do not create ice hazards by water spraying in cold weather.

E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer.

F. Storage or sale of removed items or materials on-site will not be permitted.

G. Utilities: Maintain service to all properties connected to portions of work in this Contract. All above and below grade utilities, other than those scheduled to be removed, abandoned or demolished, shall be supported and protected in accordance with this section.

1.8 QUALITY ASSURANCE

A. Comply with Section 01400 - QUALITY ASSURANCE.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during demolition by methods and with materials so as not to void existing warranties.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Comply with material and installation requirements specified in individual specification sections.

2.2 MATERIALS OWNERSHIP

A. Coordinate with Engineer and Owner, who will make final determination as to whether an item is to be salvaged or removed. Except for items or materials indicated or determined to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall

become Contractor's property and shall be removed from Project site.

2.3 REPAIR MATERIALS

A. Use repair materials identical to existing materials. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. Use materials whose installed performance equal or surpasses that of existing materials.

PART 3 – EXECUTION

3.1 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled. Disposal shall be at a recycling facility to the extent possible.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Items so designated are existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

E. Abandon: Items so designated are existing facilities that are not located within the alignment of proposed work that shall be permanently abandoned in place.

3.2 DEMOLITION AND ABANDONMENT PROCEDURES

A. Disposal of all materials shall be performed in compliance with applicable local, state, and federal codes and requirements. Provide labor, equipment, and materials to perform work as specified and indicated.

B. The Contractor shall flush all pipe and structures to be removed or abandoned to remove solids, wastewater, and other objectionable material prior to commencing demolition, modification, or abandonment.

C. Existing pipe and structures shall be removed where designated on the drawings or where necessary to install new pipe or structures. When existing pipe is removed, the Contractor shall plug all resulting abandoned connections whether or not shown. Where removed piping is exposed, the remaining piping shall be fitted with a removable cap or plug, or bulk headed. Where existing pipe is to be abandoned, the Contractor shall cut back the abandoned pipe for a distance of 5 feet from any connecting structures to remain. Pipes to be abandoned in structures to be abandoned may be capped, plugged or bulk headed from inside the structure. All holes at the existing

structures shall be repaired.

D. Where existing structures such as catch basins, drain manholes, and sewer manholes are to be abandoned in place, the Contractor shall remove the frames, grates, covers, and shall remove the top section as required to cut the structures down a minimum of 2 feet below final grade. The Contractor shall check that all pipe penetrations and any other holes have been capped, plugged or bulkheaded, and shall fill abandoned manholes with flowable fill or, alternatively, shall put a minimum of four, 2-inch diameter drainage holes in the invert of each structure then backfill the structure with compacted sand borrow. Backfill around the structure to existing grade in accordance with Section 02200 – EARTHWORK

E. Permanent plugs shall be constructed of Class B concrete, brick and mortar, or other material approved by the engineer. Brick shall be installed into the pipe to a distance equal to the diameter of the pipe being plugged.

F. Fill excavations with solid fill resulting from earth removal operations and/or with select borrow material in accordance with Section 02200 – EARTHWORK. Final grade to be restored in kind unless otherwise noted.

G. Exercise precautions for fire prevention. Make fire extinguishers approved for Class A, B and C fires available at all times in areas where performing demolition or abandonment work with burning torches. Do not burn demolition debris on site.

3.3 REHABILITATION/MODIFICATION PROCEDURES

A. Certain areas of existing piping, conduits, and the like will be affected by work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by his construction activities.

B. When new piping is installed in existing manholes, catch basins or other structures, the Contractor shall accurately position core-drilled openings in the concrete as shown or otherwise required. Openings shall be of sufficient size to permit a final alignment of pipelines and fittings without deflection of any part and to allow adequate space for satisfactory installation of a flexible connector to ensure water tightness around openings so formed.

C. When new piping is to be connected to existing piping, the existing piping shall be cut square and ends properly prepared for the connection shown. Any damage to the lining and coating of the existing piping shall be repaired by the Contractor.

3.4 DISPOSAL OF REMOVED/DEMOLISHED MATERIALS

A. The Contractor shall prepare and transport all demolition debris, materials, refuse, and abandoned equipment to an approved disposal site as part of the work under this section. All costs associated with the proper performance of

this work shall be borne solely by the Contractor at no additional cost to the Owner.

B. Recyclable demolition debris, such as pavement, concrete, and metal items, shall be disposed of at recycling facilities as much as possible. The Contractor shall provide the Engineer with weight slips for all materials disposed of at a recycling facility.

C. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site. Demolition material shall not be reused as fill. Removal of demolition debris shall be conducted to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the Owner. Alternate routes shall be provided around closed or obstructed traffic ways.

D. Burning: Do not burn demolished materials.

3.5 REPAIR OF DAMAGE

A. Any damage to existing facilities to remain, as caused by the Contractor's operations shall be repaired at no additional cost to the Owner. Damaged items shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of work of this Contract.

END OF SECTION 02050

SECTION 02052

TREE PROTECTION AND TRIMMING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction. It also covers tree pruning when necessary in the vicinity of the site Work.

1.2 RELATED SECTIONS

A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:

1. Section 02901 – Miscellaneous Work and Cleanup

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of engineers and owners, and other information specified.

C. Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

1.4 QUALITY ASSURANCE

A. Tree Service Qualifications: An experienced tree service firm to be consulted as necessary.

B. Arborist Qualifications: An arborist certified by the International Society of Arboricultural or licensed in the jurisdiction where Project is located, to be consulted as necessary.

C. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance--Standard Practices," unless more stringent requirements are indicated.

D. Preinstallation Conference: Conduct conference at Project site prior to start of work.

1. Before starting tree pruning protection and trimming, meet with representatives of authorities having jurisdiction, Owner, Engineer, consultants, and other concerned entities. Review tree pruning protection and trimming procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Drainage Fill: Selected 2 1/2 inch crushed stone, and with not more than 10 percent passing a 3/4-inch sieve.

B. Topsoil: Fertile, friable, surface soil, containing natural loam and complying with ASTM D 5268. Provide topsoil that is free of stones larger than 1 inch in any dimension and free of other extraneous or toxic matter harmful to plant growth. Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes.

C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers, as manufactured by US Fabrics, model # US 120NW or approved equal.

PART 3 – EXECUTION

3.1 PREPARATION

A. Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.

B. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.

C. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

1. Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and relocate them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.

2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.3 REGRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by qualified arborist, unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

C. Moderate Fill: Where existing grade is more than 6 inches, but less than 12 inches, below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:

1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.

2. Place filter fabric with edges overlapping 6 inches minimum.

3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

A. Prune remaining trees affected by temporary and new construction as indicated on the plans.

B. Prune remaining trees, if any, to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by qualified arborist.

C. Pruning Standards: Prune trees according to ANSI A300.

D. Cut branches with sharp pruning instruments; do not break or chop.

3.5 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.

B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.

1. Provide new trees of the same size and species as those being replaced; plant and maintain as specified.

2. Provide new trees of 6-inch caliper size and of a species selected by Engineer when trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced.

C. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches (on center). Backfill holes with an equal mix of augered soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted.

B. Disposal: Remove excess excavated material, displaced trees, roots, stumps and excess chips from Owner's property.

END OF SECTION 02050

SECTION 02076

ASBESTOS-CEMENT (TRANSITE) PIPE REMOVAL

PART 1 - GENERAL

1.01 CONTRACT REFERENCES

A. Drawings and General Provisions of Contract, including General and Supplemental Conditions and DIVISION 1 Specification Sections, apply to this Section.

B. Examine all other sections of the specifications for requirements therein affecting the work of this Section.

1.02 DESCRIPTION OF WORK

A. This section covers the furnishing of all labor, materials, facilities, equipment, services, employee training and testing, permits and agreements necessary to perform the work required for the removal, transportation and disposal of asbestos-cement piping. The Contractor shall perform all work in accordance with these specifications, U.S. Environmental Protection Agency (U.S. EPA) and OSHA regulations, NIOSH recommendations, Massachusetts Department of Environmental Protection (MassDEP) and Department of Labor Standards (DLS) regulations, local statutes, local ordinances, local codes and any other applicable federal, state and local government regulations and guidelines. Whenever there is a conflict or overlap of the above referenced requirements, the strongest provisions are applicable as determined by the Owner's Representative. Deviations from this specification must be approved in writing by the Owner's Representative prior to the Contractor continuing work.

B. The Contractor shall furnish all labor, material, supervision, construction tools, staging, rigging and other equipment necessary to perform the work described below.

C. Provide appropriate worker training, respiratory protection and medical examination.

D. Provide access, support and protection to all authorized visitors and inspectors.

E. Filing of all required notifications and permits and payment of all required associated costs and fees.

F. Abatement activities including removal and disposal of Asbestos Containing Material (ACM), recordkeeping, security, etc.

G. The Contractor shall be responsible for the complete removal and disposal of all identified asbestos-containing/contaminated materials located at the site as specified herein and on the plans. This shall include, but shall not be limited to the disposal of asbestos-cement (AC) pipe and impacted soils as required to complete the installation of replacement piping as shown on the drawings and filling the existing sewer main (AC Pipe) with controlled density fill.

H. The Contractor's Asbestos Competent Person (CP) shall be responsible for coordinating daily asbestos activities with the Engineer's Resident Project Representative (RPR), Asbestos Monitor (AM), Licensed Site Professional (LSP), Licensed Asbestos Contractor (AC), Transporter (T) and Disposal Facility (DF). The Asbestos Documentation Checklist shown at the end of this section shall be completed and submitted to the city by the CP on a daily basis throughout the entire project

I. Provide specific training on asbestos cement pipe removal to all workers, which at a minimum should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent. Provide MA licensed asbestos workers for any cutting or pipe breaking operations, or any work that has the potential to cause asbestos to become friable during handling. Document all training prior to work by submitting certificates of attendance or copies of licenses.

J. Provide a written Asbestos Work Plan (AWP) that addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared and stamped by a MA Asbestos Project Designer.

K. Provide a written Soil Management Plan (SMP) that addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

L. Provide all asbestos work in accordance with applicable regulations, specifications and guidance documents including Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated May 2015.

M. The contractor shall verify that all non-regulated materials leaving the site do not contain asbestos as described in Section 02080 SOIL AND WASTE MANAGEMENT. This shall include at a minimum, visual screening of all soil for presumed asbestos containing material.

N. Furnish all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing and disposing of Asbestos-Containing-Material resulting from unforeseen conditions.

O. Provide secure, fenced and locked asbestos storage area in accordance with Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated June 2011, 310 CMR 7.00 and 310 CMR 19.00.

1.03 SCHEDULING

A. The Contractor shall prepare an abatement schedule for submittal to the Owner at the Pre-Construction Conference.

B. The Contractor shall update the abatement schedule on a weekly basis.

1.04 PERIOD OF PERFORMANCE

A. The Contractor shall complete all work of this Section including completion of all punch list items within the period indicated in the Bid Form and contract documents.

1.05 AUTHORITY TO STOP WORK

A. If the Owner or the Owner's Representative presents a written stop asbestos removal order, the Contractor shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the Owner or the Owner's Representative. A stop asbestos removal order may be issued at any time the Owner or the Owner's Representative determines abatement conditions / activities are not within specification requirements or are not in compliance with applicable regulations. Work stoppage shall continue until conditions have been corrected to the satisfaction of the Owner or the Owner's Representative.

B. Stop asbestos removal orders may be issued for, but may not be limited to the following:

1. If the Contractor disregards the authority of the Owner’s Representative;
2. If the Contractor disregards laws or regulations of any public body having jurisdiction; or
3. If the Contractor’s work presents a risk to a building, building occupants, the general public, other contractors, owner representatives or the environment.

C. The absence of a stop work order issued by the Owner or the Owner's Representative shall not in any way be construed as an approval or acceptance of the Contractor’s work.

1.06 RELATED SECTIONS

A. Carefully examine the Contract Documents for requirements that affect the work of this section.

B. Related Sections

02080 – SOIL AND WASTE MANAGEMENT

02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND WASTE

1.07 DEFINITIONS

All terms not defined herein shall have the meaning given in the applicable publications and regulations.

A. Abatement: Procedures to control the release of asbestos fibers from ACM; includes removal, encapsulation, and enclosure of ACM.

B. ACM: Asbestos-containing materials.

C. Adequately Wet: Sufficiently mixed or penetrated with liquid to prevent the release of particulate. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

D. Amended Water: Water containing a wetting agent or surfactant that has been added to increase the ability of the water to penetrate ACM.

E. Asbestos: Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered.

F. Asbestos-Cement (AC) Piping: AC pipe has been widely used for water and sewer mains and occasionally used as electrical conduits, drainage pipe, and vent pipes.

G. Asbestos-Containing Building Material (ACBM): Any building material containing more than one percent by weight of any asbestos of any type or mixture.

H. Asbestos Containing Material (ACM): Any material containing equal to or greater than 1% asbestos based on analysis via polarized light microscopy (PLM) is considered ACM.

I. Asbestos Contaminated Material: any material which has become contaminated (surficially or in the materials matrix or composition) with one or more asbestos fibers.

J. Asbestos Documentation Checklist (ADC): A checklist that must be submitted daily that documents asbestos (i.e. soil, pipe, etc) removal activities and regulatory compliance during the project. The Contractor's Asbestos Competent Person (CP) shall be responsible for completing the ADC, then obtaining review and verification by the Engineer's Resident Project Representative (RPR), The CP is responsible for coordinating other activities as needed by the Asbestos Monitor (AM), Licensed Asbestos Contractor (AC), Transporter (T), Disposal Facility (DF), and Licensed Site Professional (LSP). The following defines specific responsibilities for the completion of each task in the ADC:

1. Competent Person – General Contactor's representative that identifies existing asbestos hazards in the workplace and selects the appropriate control strategy to minimize asbestos exposure, and has the authority to take prompt corrective measures. Oversees all removal of asbestos, including removal of

intact asbestos pipe without breakage or cutting, and coordinates RPR, AM, AC, T, DF and LSP activities. Ensures all contract and specification asbestos regulatory requirements are met and documents by completing the ADC. Ensures proper personal protective equipment is worn by all workers. Collects daily asbestos air samples to document acceptable asbestos exposure levels for OSHA worker exposure. Visually inspects all soil leaving the site to verify there is no presumed asbestos containing materials present in clean soils, and notifies the city immediately if there are any variances from the specification or regulations.

2. Licensed Asbestos Contractor – General Contractor's subcontractor that performs asbestos removal in contained or glove bag work areas if pipe is damaged or friable, not intact, deteriorated, crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix (e.g., saw cutting and/or tapping). Works with CP to ensure all asbestos stored on the site is wrapped, labeled and stored in a fenced/locked/secured area. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Provides summary documentation to the CP for inclusion in the ADC, to ensure work is performed in accordance with the Specifications and regulatory requirements. Notifies the city immediately if there are any variances from the specification or regulations during site visits.

3. Asbestos Monitor – City's representative that performs air monitoring and/or visual inspections of contained and/or glove bag work areas to ensure area meets DOS clearance criteria. Provides summary documentation of test results to CP for inclusion in the ADC for contained work areas. Ensures proper personal protective equipment is worn by workers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations during site visits. Observes contractors work activities at the start of the project to ensure compliance with the specifications, then periodic unannounced site visits as determined by the City of Waltham to document ongoing compliance.

4. Engineer's Resident Project Representative – City's representative that verifies all contract and specification asbestos regulatory requirements are met by reviewing, verifying and signing the ADC. Ensures proper personal protective equipment is worn by workers. Visually inspects all soil leaving the site to verify there is no presumed asbestos containing material present in clean soils. Notifies the city immediately if there are any variances from the specification or regulations.

5. Licensed Site Professional – General Contractor's subcontractor that oversees activities necessary to transport and dispose of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are permitted and meet

minimal city requirements. Reviews all Waste Shipment Records for accuracy and coordinates city signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations.

6. Transporter - General Contractor's subcontractor that transports and disposes of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are licensed and meet minimal city requirements. Reviews all Waste Shipment Records (WSR) for accuracy and verifies city signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations.

7. Disposal Facility - General Contractor's licensed disposal site for asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides completed WSR to the CP for inclusion in the ADC to ensure proper asbestos disposal. Notifies the city immediately if there are any variances from the specification or regulations.

K. Asbestos Work Plan (AWP): The written AWP addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared by a MA Asbestos Project Designer.

L. Authorized Visitors: Any visitor authorized by the Owner or any representative of a regulatory agency or other agency having jurisdiction over the project.

M. Clean: Visually free of dust, dirt, debris and any foreign material.

N. Clean Room: An uncontaminated room that is a part of the worker decontamination unit and in which worker's street clothes and uncontaminated protective equipment can be stored.

O. Competent Person: In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy to minimize asbestos exposure, who has the authority to take prompt corrective measures, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work, who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

P. Critical Barrier: One or more layers of plastic sealed over all openings into a work area or other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Q. Decontamination Area/Unit: An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

R. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component.

S. Employee Exposure: The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

T. Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

U. Glove bag: Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled; which is placed with an air-tight seal around an asbestos covering and which permits asbestos material contained by the bag to be removed without releasing asbestos fibers into the atmosphere.

V. HEPA Filter: High-Efficiency Particulate Air (HEPA) An air filter capable of trapping and retaining at least 99.97 percent of all monodispersed particles sized 0.3 micron in diameter or larger.

W. HEPA Vacuum: Vacuum equipment with HEPA filter system for filtering the exhaust air from the unit.

X. Intact: The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

Y. Negative Initial Exposure Assessment: A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL's.

Z. NESHAP: National Emission Standards for Hazardous Air Pollutants (Title 40, Part 61).

AA. Non-Friable Asbestos-Containing Building Materials: Materials which contain asbestos bound by a matrix which cannot, when dry, be crumbled, pulverized, or reduced to powder by hand pressure.

BB. Presumed Asbestos Containing Material: Material presumed to contain asbestos unless proven otherwise by laboratory analysis.

CC. Project Designer: A person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C Sec. 763.90(g) and is certified in accordance with 453 CMR 6.00.

DD. Project Monitor: An individual who is certified by applicable state agencies to observe abatement activities performed by contractors, to represent the Owner to ensure work is completed according to specifications and in compliance with statutes and regulations, and to perform air monitoring to determine final clearance.

EE. Regulated Area: An established area within which airborne concentration of asbestos fibers exceeds or can reasonably be expected to exceed the permissible exposure limit.

FF. Removal: All procedures necessary to remove and dispose of ACM from the designated areas in accordance with the contract documents and all applicable regulatory requirements.

GG. Soil Management Plan (SMP): The written SMP addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

HH. Specific Training: Course titled Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent that is approved by the MA Department of Environmental Protection for training contact hours.

II. Unforeseen Condition: Asbestos encountered during pipe removal activities that is not identified in the specification or plans.

JJ. Waste Generator: Any owner or operator whose act or process produces asbestos-containing waste material.

KK. Waste Shipment Record: The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

1.08 CODES, REGULATIONS, AND STANDARDS

A. General Applicability

1. All work under this contract shall be performed in strict accordance with all applicable Federal, State, and Local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.

2. The most recent edition of any relevant regulation, standard, document, code or policy statement shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.

3. Copies of all standards, regulations, codes and other applicable documents, including this specification shall be available at the work site.

B. Contractor Responsibility

1. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to all aspects of the abatement project. The Contractor is responsible for providing and maintaining training, accreditation, medical exams, medical records, and personal protective equipment as required by applicable Federal, State and Local regulations. The Contractor shall hold the Owner and Owner's Representative harmless for any failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of the Contractor, Contractor's employees, or subcontractors of the Contractor.

C. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only. The publications listed below are not intended to be a comprehensive list of all regulations applicable to this work.

1. Environmental Protection Agency (EPA):

National Emission Standards for Hazardous Air Pollutants (NESHAP) Title 40, Part 61).

A Guide to Respiratory Protection for the Asbestos Abatement Industry.

2. Occupational Safety and Health Administration (OSHA):

Asbestos Construction Standard 29 CFR Part 1926.1101

Asbestos General Industry Standard 29 CFR 1910.1001

Respiratory Protection, 29 CFR 1910.134

Hazardous Waste Operation 29 CFR 1910.120

3. U.S. Department of Transportation

49 CFR 100 - 185, Transportation

4. National Institute for Occupational Safety and Health (NIOSH):

"Respiratory Protection A Guide for the Employee."

5. American National Standards Institute (ANSI):

   Z86.1-1973 - Commodity Specification for Air

   Z9.2 - HEPA Filter Specifications

   Z88.2-1980-Respiratory Protective Equipment

6. Massachusetts Division of Labor Standards (DLS):

   The Removal, Containment or Encapsulation of Asbestos (453 CMR 6), including all clarifications, policy statements, etc.

7. Massachusetts Department of Environmental Protection:

   310 CMR 7.00, 7.09, 7.15 and all related amendments and policy statements

   Massachusetts Department of Environmental Protection Asbestos Cement Pipe Guidance Document dated May 2015

1.09 PERSONNEL QUALIFICATIONS

A. All personnel of the Contractor or any approved subcontractors involved with asbestos abatement work (including removal of asbestos-cement pipe and soils contaminated with asbestos containing materials) shall meet the following minimum qualifications:

   1. Medical examination within the past year in accordance with OSHA 1926.1101 with a physician's written opinion that the worker has no condition that would preclude him/her from working with asbestos or wearing a respirator.

B. The Contractor shall employ a Competent Person to oversee all aspects of ACM removal. In the event that a previously identified competent person is not on site when ACM is encountered, the Contractor shall immediately stop work and adequately wet any exposed ACM. The Contractor shall not resume work requiring ACM removal until a previously identified competent person is on site to oversee removal and has been authorized by the Owner.

C. There shall be a sufficient number of trained and qualified workers, foremen and superintendents to accomplish the work within the required schedule. No untrained nor fully qualified and pre-approved person shall be employed to speed up completion of the abatement work.

D. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9). Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by an EPA approved trainer meeting the requirements of EPA 40 CFR 763 Appendix

C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site. At a minimum, this should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent.

E. Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. The physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion that the person has been evaluated for working in a heat stress environment while wearing personal protective equipment (including a negative pressure respirator) and is able to perform the work.

1.10 SITE SECURITY

A. Regulated area access is to be restricted to authorized trained/accredited and protected personnel. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel.

1.11 EMERGENCY PRECAUTIONS

A. A site specific Emergency Action Plan shall be submitted by the Contractor prior to the pre-construction meeting and shall be reviewed by the Owner’s Representative. The Plan shall meet the requirements of 29 CFR 1926.35.

1.12 RESPIRATORY PROTECTION PROGRAM

A. The Contractor shall develop and implement a Respiratory Protection Program (RPP) which complies with the January 8, 1998 OSHA requirements, 29 CFR 1926.1101 and 29 CFR 1910.132 and 134. All respirators used must be approved for asbestos abatement activities by the proper regulatory authority.

B. Minimum respiratory protection required shall conform to current OSHA and Massachusetts DOS regulations including 29 CFR 1926.1101 and 453 CMR 6.00.

1.13 SUBMITTALS

A. Submittals shall be in accordance with Specification Section 01300 - SUBMITTALS.

B. The following submittals shall be submitted to the Owner's Representative at the Pre-construction meeting. Submittals shall be submitted to and accepted in writing by the Owner's Representative prior to the Contractor receiving approval to begin work.

1. Certificates of training and documentation of medical examination including a physician’s determination that the employee is able to wear a respirator and documentation of current successful respirator fit test (29 CFR 1926.1101 Appendix C) of all personnel assigned to the project, including Competent Person.

2. Certification of compliance with OSHA requirements including but not limited to medical surveillance, record keeping and personnel exposure monitoring.

3. Respiratory Protection Program. Include site specific exposure assessment for respirator selection.

4. A written project schedule. The schedule shall be date specific and include all phases of the project.

5. Comprehensive safety manual that addresses a site specific Emergency Action Plan, Fall Protection Plan, Equipment Hazards, Trenching Safety Plan and Hazard Communication Plan.

6. Proposed waste disposal site and waste transporter. Include name, address, telephone number and operating permits, etc.

7. Material safety data sheets (MSDS) for all materials and products to be used by the Contractor on this project.

8. Listing of Competent Persons and qualifications. For all workers, submit certificates of attendance or copies of licenses, which at a minimum should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent.

9. Submit an Asbestos Work Plan (AWP) that addresses all specification and regulatory requirements related to asbestos. The AWP must be prepared by a MA Asbestos Project Designer.

10. Submit a Soil Management Plan (SMP) that addresses all specification and regulatory requirements related to asbestos storage, transport and disposal. The SMP must be prepared by a MA Licensed Site Professional.

C. During Abatement

1. Results of personnel exposure monitoring.

2. Project schedule.

3. Contractor shall submit competed ADCs to the city on a daily basis.

D. Post Abatement Submittals

1. Disposal receipts and Waste Shipment Record (within timeframes regulated by EPA and DLS) signed by the Owner prior to leaving the site then by the landfill operator demonstrating that the ACM removed from the project has been packaged, transported and disposed of properly.

2. Provide the owner with copies of on-site job logs, notifications, permits, accident reports, personnel exposure air monitoring results, waivers of lien.

3. Copies of any notices of non-compliance issued by governmental authorities.

4. Field notes documenting visual inspections of soils for asbestos.

PART 2 - MATERIALS AND EQUIPMENT

2.01 MATERIALS

A. Deliver all materials in original packages, containers or bundles bearing the name of the manufacturer.

B. Damaged, deteriorating or contaminated products or equipment shall not be used on this project, and shall be removed from the work site.

C. Polyethylene sheeting shall be at least 6-mil thickness, shall be fire retardant and shall meet all applicable Standards for temporary construction barriers.

D. Duct tape or other waterproof tape, furring strips, staples, nails, screws, or other materials shall be available to secure polyethylene sheeting

E. Disposable bags, poly sheeting used to wrap asbestos-cement pipe and/or disposal drums shall be of 6-mil polyethylene, on which labels are applied, as required by EPA, OSHA and DOT regulations.

F. Asbestos warning signs that are posted at all approaches and/or entrances to work areas shall conform to OSHA 29 CFR 1926.1101. Warning signs shall be posted in English as well as all other applicable languages if persons who cannot read English are present.

G. All fire extinguishers required for the project shall be ABC class type, properly pressurized and in good working condition.

H. Adequately stocked first aid kits shall be on-site.

I. Surfactant (wetting agent) shall be a 50/50 mixture of polyoxyethylene ether and polyoxyethylene ester, or equivalent, mixed in a proportion of 1 fluid ounce to 5 gallons of water or as specified by manufacturer. An “equivalent surfactant” shall be understood to mean a material with a surface tension of 29 dynes/cm as tested in its properly mixed concentration, using ASTM method D1331-56- (“Surface and Interfacial Tension of Solutions of Surface Active Agents”).

2.02 TOOLS AND EQUIPMENT

A. Transportation Equipment: Transportation equipment, as required, shall be suitable for loading, temporary storage, transport, and unloading of contaminated waste without exposure to persons or property. The equipment shall be secured at all times and access limited to authorized personnel only. Open-top dumpsters used for transport of asbestos waste shall be secured within a fenced compound with a locking gate.

B. Vacuum Equipment: All vacuum equipment utilized in the work area shall be equipped with HEPA filtration systems, 99.97% efficient to 0.3 microns particulate size. Deliver all vacuums to the site with clean waste containers and new HEPA filters installed. Vacuum wands, brushes, hoses, and other accessories shall be delivered to the site new or, if previously used, shall be delivered to the site in airtight disposal bags.

C. The Contractor shall provide approved respirators and protective clothing to all Contractor personnel. The Contractor shall also provide approved protective clothing to representatives of the Owner, and to representatives of the State or other governmental entity who may inspect the job site.

D. Protective clothing requirements must include, but may not be limited to:

1. One-time use, disposable, full-body coveralls made of Tyvek® fabric or approved equal.
2. Hard Hats
3. Eye protection
4. Gloves
5. Respiratory protective equipment in accordance with OSHA 29 CFR 1926.1101 and 29 CFR 1910.134. Respirators shall be NIOSH approved for protection against asbestos exposure.
6. Other as appropriate for site conditions

E. The Contractor shall have sufficient equipment to mix and spray wetting agents.

F. The Contractor shall have a sufficient quantity of, ladders, platforms, hand tools, and materials to conduct the abatement project in an efficient and workmanlike manner. All equipment shall be used according to OSHA Safety and Health Standards for the Construction Industry (29 CFR Part 1926).

G. All electrical cord and connections within all work areas shall be protected with ground-fault circuit interrupters (GFCI). All temporary electrical power shall be in accordance with OSHA Electrical Code for Wet Environment.

PART 3 – EXECUTION

3.01 INSPECTION AND PREPARATION

A. Notify Owner's Representative prior to the start of the work and request inspection to document compliance with these specifications.

B. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101. Provide Fall Protection Training and OSHA approved fall protection for all work performed at a height of 6-feet or more above floor/ground level.

C. Provide boots, booties, hard hats, goggles, gloves, protective clothing, respirators and any other appropriate personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project.

D. The Competent Person shall ensure that each time workers enter the regulated area, they observe and follow all required procedures and wear appropriate personal protective equipment.

E. The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for regulated areas at 29 CFR 1926.1101 (e) are met. No person within a regulated area shall be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator (if applicable).

F. Provide all personnel throughout the abatement process with the specified protective clothing and gear. Ensure that all personnel entering and leaving the workspace follow procedures described below:

1. Entering from the outside: Don two protective suits over street clothes and clean protective equipment.

2. Exiting from the work area: Dispose of all protective clothing into labeled plastic bags for disposal as asbestos waste. Remove respirator and wash and wipe thoroughly to decontaminate the respirator.

G. A three-chamber decontamination unit shall be constructed adjacent to the work area if the AC pipe is broken or cut within a negative pressure work area. Otherwise, the workers shall be provided and use a hand and face washing decontamination area prior to exiting the demarcated area.

H. Post written procedures in the workplace and train all personnel on the procedures for the evacuation of the injured and the handling of potential fires. Provide aid to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination

during evacuations and fire procedures. Exceptions to normal, routine exiting procedures shall be made for emergencies such as, but not limited to, serious personal injury and fires.

I. The Contractor shall instruct all employees and workers in the proper care of their personally issued respiratory protection equipment (if applicable), including daily maintenance, sanitizing procedures, etc.

J. All respiratory protection equipment (if applicable) shall be inspected by Contractor's personnel at the beginning of each work period, including breaks and lunch periods.

3.02 GENERAL AC PIPE PROCEDURES

A. Non-friable asbestos materials contain more than one percent asbestos by weight and cannot be crumbled, pulverized, or reduced to powder by hand pressure when dry. Non-friable asbestos material such as asbestos concrete pipe typically have asbestos fibers that are bound or locked into the product matrix, so that the fibers are not readily released unless subject to significant abrasion. A variety of pipe disturbance activities minimize release of asbestos from non-friable materials including:

1. Pipe snapping
2. Placing wet burlap over piping during breakage
3. Applying foam over break area
4. Wet methods
5. Local ventilation equipped shrouds with High Efficiency Particulate Air (HEPA) filtration

B. Use of these methods shall be identified in the asbestos plan, then verified with worker air sampling at the start of the project to ensure non-friable asbestos is adequately controlled.

C. The Contractor shall be responsible for taking whatever steps are necessary to prevent a release to the environment and additional contamination of the areas beneath the AC pipe.

D. Construct negative pressure enclosures and install air filtration units, as applicable.

E. Dust and airborne fiber release shall be minimized by the use of amended water. The Contractor shall prevent visible dust emissions during, abatement, cleaning and all other activities.

F. Expose the asbestos cement pipe without disturbing the AC pipe.

G. Excavate no closer than 6 inches of the pipe. Carefully uncover the remainder of the pipe by hand or with a shovel.

H. An assessment should then be made to determine if the pipe is damaged, cracked or broken.

3.02 INTACT AND NOT DETERIORATED AC PIPE REMOVAL PROCEDURE

A. Utilize the following procedures if the pipe is not damaged (intact and not deteriorated)

B. Place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination.

C. Adequately wet the asbestos cement pipe with amended water using surfactant or liquid soap before and during removal to avoid creating airborne dust.

D. Remove the asbestos cement pipe to the nearest coupling. (bell or compression fitting)

E. Slide the pipe apart at the joints (no saw cutting) or use other methods that do not cause the pipe to become friable or release asbestos fibers.

F. In the event of breakage of asbestos pipe during removal which results in pieces contacting soil, remove all debris and soil located adjacent to and beneath the debris as well as six inches of soil from beneath and surrounding the debris. All resultant debris and soils shall be properly handled, packaged and disposed of as friable, regulated asbestos waste.

G. The Owner's Representative and the Owner shall be notified immediately in the event of breakage.

H. Wrap the wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label in accordance with OSHA requirements. This can be done in the trench or adjacent to the trench.

3.03 DAMAGED REMOVAL PROCEDURE

A. Utilize the following procedures if the pipe is damaged (not intact, deteriorated, or when saw cutting and/or tapping is necessary)

B. Place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination.

C. Adequately wet asbestos cement pipe with amended water where cutting or breaking will occur.

D. If AC pipe is found to be friable or will be rendered friable, abatement shall be conducted in containment.

E. Saw cutting of asbestos cement pipe shall only be conducted within a "mini-containment" in accordance with Massachusetts regulations 310 CMR 7.15 and 453 CMR 6.00, unless such activity is conducted using HEPA exhausted, shrouded cutting equipment.

F. Within the containment work area, there shall be a minimum of 4 air changes per hour and a minimum pressure differential of -0.02-inches water column within the work area(s) relative to the adjacent areas (outdoors).

G. In the event of breakage of asbestos pipe during removal which results in pieces contacting soil, then the Contractor shall remove all debris and soil located adjacent to and beneath the debris as well as six inches of soil from beneath and surrounding the debris. All resultant debris and soils shall be properly handled, packaged and disposed of as friable, regulated asbestos waste.

H. The Owner shall be notified immediately in the event of breakage.

I. Wrap wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label. This can be done either in the trench or adjacent to the trench.

3.04 CLEANING AND FINAL DECONTAMINATION

A. After the removal of the AC pipe has been completed and before removal of barriers (as applicable), the entire area shall be thoroughly wet cleaned and/or vacuumed with HEPA filtered vacuum. All plastic barriers, tapes and disposable contaminated equipment shall also be disposed of as asbestos waste. All reusable contaminated equipment such as masks, hard hats, etc., shall be thoroughly decontaminated through wet cleaning or sealed within 6-mil polyethylene bags before removal from the work area.

3.05 MONITORING, TESTING AND INSPECTION

A. The Contractor is responsible for meeting OSHA requirements for his personnel, including but not limited to, monitoring requirements, safety compliance training and record keeping.

B. The Contractor is responsible for personnel (employee) exposure monitoring for airborne asbestos fibers and other contaminates in compliance with OSHA regulations. At a minimum, contractor collects daily asbestos air samples at the start of the project to document acceptable asbestos exposure levels for OSHA worker exposure and to determine the effectiveness of controls. Notify Owners Project Monitor prior to the start of the work and request inspection to document compliance with these specifications.

C. Contractor shall report results within 24 hours of collection in writing to the Owner's industrial hygienist. Employee exposure monitoring results from the previous day shall be posted each day. The Owner's Project Monitor may, at his or her discretion, also conduct exposure monitoring on Contractor personnel and area air monitoring at locations inside and outside of the work area. Provide cooperation and support to the Owner's Project Monitor throughout the abatement process.

D. After a thorough cleaning of the negative pressure regulated work area (as applicable), the Owner's Project Monitor shall determine the workspace is ready for inspection and final testing. The Owners Project Monitor will visually inspect the workspace for the detection of any visible dust or debris. The cleaning procedures shall be repeated until a level of no visible debris is achieved.

E. Following successful visual inspection of the work area and after a sufficient period of time has elapsed to allow complete drying of the work area; the final clearance air sampling will be performed by the Owner's Project Monitor.

F. The final testing within negative pressure regulated work areas (as applicable) shall take place under active agitation of the air in the work space with fans running, leaf blowers operating and any other means found suitable by the Owner's Project Monitor during the final testing. The number of air samples collected within the work area shall be in accordance with the Massachusetts DLS regulation 453 CMR 6.00. If analysis of clearance air samples show fiber levels in excess of 0.010 f/cc using phase contrast microscopy (PCM), then repeat cleaning and re-sampling will be required until regulated clearance criteria are met.

G. If unforeseen asbestos is encountered as discussed in Section 3.06, Owner's Project Monitor will perform perimeter air monitoring to ensure activities do not exceed the DLS level of 0.010 f/cc.

3.06 UNFORESEEN ASBESTOS CONTINGENCY PLAN

A. If unforeseen asbestos is encountered during pipe removal activities not identified in the specification or plans, the Contractor shall immediately stop all asbestos removal and adequately wet any exposed ACM.

B. The Owner shall be notified immediately in the event unforeseen asbestos is encountered to:

1. Determine quantities
2. Implement Project Monitor air sampling
3. Identify regulatory requirements

C. The Contractor shall not resume any asbestos removal activity until authorized to do so by the Owner.

D. Cost for unforeseen asbestos is reimbursed under the allowance item found in Section 01150.

3.07 WASTE DISPOSAL

A. Refer to Section 02080 SOIL AND WASTE MANAGEMENT PLAN and 02095 TRANSPORTATION AND DISPOSAL OF SOIL AND WASTE for additional disposal requirements.

B. It is the responsibility of the Contractor to determine current waste handling, transportation, and disposal regulations and or requirements for each waste stream generated at this site by this work and for each waste disposal facility. The landfill destination must be approved by the Owner. The Contractor must comply fully with these specifications and all U. S. Department of Transportation and EPA requirements as well as the requirements of all states through which the waste is transported and all requirements of the state where disposal occurs.

C. Since individual disposal facilities have different permit conditions and specific characterization data requirements, the Contractor is responsible for final characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final waste characterization is the responsibility of the Contractor, and costs for characterization shall be incorporated into the Contractor's bid price for construction.

B. Manage wrapped asbestos cement pipe, polyethylene sheeting and any other material contaminated with visible asbestos debris as asbestos waste in accordance with 310 CMR 7.15 and 310 CMR 19.061.

C. All asbestos wastes must be handled, packaged, stored, transported, and disposed of as in compliance with all Federal, State, and local regulations and codes.

D. If waste containers are not already so preprinted, warning labels having waterproof print and permanent adhesive shall be affixed to the lid and/or sides of the containers, whether or not these containers are further packaged. Warning labels shall be conspicuous and legible, and conform to the latest OSHA, EPA, DOT asbestos regulatory labeling requirements.

E. Include owner’s name and address on all waste containers.

F. All waste shall be thoroughly wetted when packaged. When a waste bag is full, it shall be securely sealed with tape, and then placed in the designated temporary storage area inside of the work area.

G. All AC pipe shall be double wrapped in 6-mil polyethylene sheeting and labeled as ACM prior to transport.

H. Properly wrapped and labeled asbestos pipe, as well as all other containerized debris, must be placed in a roll-off container(s), or covered trucks, trailers or vans that are lined with 2 layers of 6 mil polyethylene sheeting. The container should be an enclosed leak-tight container and locked having proper labels and DOT placards as required. If open top roll-off containers are used, they must be properly sealed, labeled and secured inside a locked fenced area to prevent access by unauthorized personnel and covered to prevent water accumulation.

I. Contractor shall insure that transport vehicles do not leak water or other material while being loaded, being transported or while on site partially loaded. If water is observed leaking from any transport or storage container, contractor shall immediately stop work, unload the container (including dumpsters and semi-trailers) find and correct the source of the leak, and place waste material back into the container. This process will be repeated each time any water is observed leaking from a storage or transport vehicle that contains asbestos waste. Contractor shall also take all steps necessary, as determined by the Owner's Project Monitor, to decontaminate the ground or other surfaces that became wet due to water leaking from a container that holds asbestos waste.

J. To comply with the requirement that waste disposal to a permitted landfill be documented, remove waste containers from work areas only under the direction of Owner’s representative, and complete appropriate documentation for each load of waste removed from the site. ACM waste shall not be transported until the owner has inspected said waste and signed off on Asbestos Waste Shipment Record (WSR).

K. Accurately measure and record on the Asbestos disposal checklist the volume of each container or load of waste removed from the site.

L. Provide legal transportation of the waste to the disposal landfill, and complete or obtain all required licenses, manifests, dump slips, or other forms. Copies of all forms or licenses, and the signed original of the WSR for each waste load, shall be given to Owner’s Representative.

M. Waste may be transported to and temporarily stored at a pre-approved off-site storage area owned by Asbestos Contractor, but it must ultimately be disposed of at the specified landfill before final payments are approved.

N. The Contractor will document actual disposal of the waste at the designated landfill by completing a WSR and forwarding the original along with the Bill of Lading to the Owner within the time limits specified by EPA NESHAP regulations. Investigate, correct and notify owner immediately in writing if executed WSR is not received from disposal facility. Properly executed WSR is required for final payment of work.

O. Complete WSR must be retained for two years by the owner, municipality and contractor. Indefinite retainage of WSR is recommended to address any long term disposal site issues.

3.08 GENERAL APPLICABILITY OF CODES, REGULATIONS, LAWS AND STANDARDS:

A. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, laws and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

3.09 CONTRACTOR RESPONSIBILITY

A. The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling and disposal of asbestos contaminated materials, and protection of workers and visitors to the site, and persons occupying areas adjacent to the site.

3.10 ASBESTOS DOCUMENTATION CHECKLIST

A. The following checklist must be submitted daily that documents asbestos (i.e. soil, pipe, etc) removal activities and regulatory compliance during the project. The Contractor's Asbestos Competent Person (CP) shall be responsible for completing the ADC, then obtaining review and verification by the Engineer's Resident Project Representative (RPR), The CP is responsible for coordinating other activities as needed by the Asbestos Monitor (AM), Licensed Asbestos Contractor (AC), Transporter (T), Disposal Facility (DF), and Licensed Site Professional (LSP). The following defines specific responsibilities for the completion of each task in the ADC:

1. Competent Person – General Contactor's representative that identifies existing asbestos hazards in the workplace and selects the appropriate control strategy to minimize asbestos exposure, and has the authority to take prompt corrective measures. Oversees all removal of asbestos, including removal of intact asbestos pipe without breakage or cutting, and coordinates RPR, AM, AC, T, DF and LSP activities. Ensures all contract and specification asbestos regulatory requirements are met and documents by completing the ADC. Ensures proper personal protective equipment is worn by all workers. Collects daily asbestos air samples to document acceptable asbestos exposure levels for OSHA worker exposure. Visually inspects all soil leaving the site to verify there is no presumed asbestos containing materials present in clean soils, and notifies the city immediately if there are any variances from the specification or regulations.

2. Licensed Asbestos Contractor – General Contractor's subcontractor that performs asbestos removal in contained or glove bag work areas if pipe is damaged or friable, that is not intact, deteriorated, crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix e.g. saw cutting and/or tapping. Works with CP to ensure all asbestos stored on the site is wrapped, labeled and stored in a fenced/locked/secured area. Visually inspects clean soil to verify there is no

presumed asbestos containing materials present in clean soils during site visits. Provides summary documentation to the CP for inclusion in the ADC, to ensure work is performed in accordance with the Specifications and regulatory requirements. Notifies the city immediately if there are any variances from the specification or regulations during site visits.

3. Asbestos Monitor – City's representative that performs air monitoring and/or visual inspections of contained and/or glove bag work areas to ensure area meets DOS clearance criteria. Provides summary documentation of test results to CP for inclusion in the ADC for contained work areas. Ensures proper personal protective equipment is worn by workers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations during site visits. Observes contractors work activities at the start of the project to ensure compliance with the specifications, then periodic unannounced site visits as determined by the City of Waltham to document ongoing compliance.

4. Engineer's Resident Project Representative – City's representative that verifies all contract and specification asbestos regulatory requirements are met by reviewing, verifying and signing the ADC. Ensures proper personal protective equipment is worn by workers. . Visually inspects all soil leaving the site to verify there is no presumed asbestos containing material present in clean soils. Notifies the city immediately if there are any variances from the specification or regulations.

5. Licensed Site Professional – General Contractor's subcontractor that oversees activities necessary to transport and dispose of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are permitted and meet minimal city requirements. Reviews all Waste Shipment Records for accuracy and coordinates city signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations.

6. Transporter - General Contractor's subcontractor that transports and disposes of asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides summary documentation to the CP for inclusion in the ADC to ensure transporters and disposal facility are licensed and meet minimal city requirements. Reviews all Waste Shipment Records (WSR) for accuracy and verifies city signature of shipping papers. Visually inspects clean soil to verify there is no presumed asbestos containing materials present in clean soils during site visits. Notifies the city immediately if there are any variances from the specification or regulations.

7. Disposal Facility - General Contractor’s licensed disposal site for asbestos and contaminated soil in accordance with the Specifications, Soil Management Plan and regulatory requirements. Provides completed WSR to the CP for inclusion in the ADC to ensure proper asbestos disposal. Notifies the city immediately if there are any variances from the specification or regulations.

Asbestos Documentation Checklist
(This form is only required if asbestos is encountered. Attach additional documentation as necessary [e.g., test results, waste shipment records, etc.])

Project Name_____Date:_____

Mandatory Signatures:

Completed by Contractor Asbestos Competent Person (CP)) - Print Name and Signature

_____

Verified by Engineer's Resident Project Representative (RPR - Print Name and Signature

_____

Complete as Applicable:

Quantity of Asbestos Pipe Removed in Linear Feet _____

Quantity of Asbestos Pipe Removed under Containment in Linear Feet _____

Station Locations of Asbestos Pipe Removed _____

Quantity of Asbestos Pipe Shipped Off-Site in Linear Feet _____

Quantity of Asbestos Pipe Shipped Off-Site in Cubic Yards _____

Quantity of Asbestos Contaminated Soil Removed in Cubic Yards _____

Asbestos Contaminated Soil Removal Time in Hours_____

Disposal Site and Address_____

Transporter Name and Address_____

Summary of Asbestos Testing Results_____

Asbestos Contractor_____

Asbestos Monitoring Firm_____

Soil Management Plan Consultant _____

Check off and verify all that apply for daily asbestos compliance activities:

YES	NO	NA	Compliance Activity
			1. Does the DEP asbestos regulatory notification cover the start/stop date, type and quantity of removed asbestos?
			2. Do all workers removing asbestos pipe have 8-hour DEP approved asbestos pipe removal training and was an Asbestos Competent Person present?
			3. Do workers that wear respirators or are licensed asbestos workers have medical exams?
			4. Were all asbestos pipes removed intact in non-friable state?
			5. Was plastic placed under all asbestos during pipe separation?
			6. Were wet methods used during all asbestos disturbances?
			7. Was a High Efficiency Particulate Air (HEPA) filtered ventilation shroud used during uncontained pipe sawing?
			8. Were containment methods (i.e. glove bag or negative enclosure) used during non-intact breakage or cutting of asbestos?
			9. Was City contacted immediately if breakage or cutting of asbestos pipe resulted in friable asbestos material?
			10. Did a MA Licensed Asbestos Monitor perform clearance testing or visual inspection if breakage or cutting of asbestos pipe was necessary?
			11. Was worker air sampling performed for OSHA compliance?
			12. Did a MA Licensed Asbestos Contractor perform asbestos work under containment if breakage or cutting of asbestos pipe was necessary?
			13. Were soils visually inspected for presumed asbestos containing material, other than soil and pipe scheduled for removal, prior to removal from the site?
			14. Was all asbestos disposal work performed in accordance with the Soil Management Plan and disposed of at a city approved facility?
			15. Was the stored asbestos wrapped in 2 layers plastic, labeled and stored in a locked/fenced/secure location?
			16. Was all asbestos shipped off site accompanied by a properly executed Waste Shipment Record with the City's signature?
			17. Was all asbestos shipped off site labeled with the owner's name and address?
			18. Was proper personal protective equipment worn during asbestos work including respirators, clothing, gloves and boots?
			19. Did workers decontaminate in a washing facility after asbestos disturbance?
			20. Provide in the space below, any additional comments or variances to the preceding items referencing appropriate item number:

END OF SECTION 02076

SECTION 02140

DEWATERING AND DRAINAGE

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Design, furnish, install, test, 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. The temporary dewatering system as specified in these specifications shall be the minimum system required for controlling groundwater, regardless of source. The installed system shall be capable of lowering and maintaining the groundwater to at least 2-feet below the bottom of the excavation and until the required utilities are installed. Within these limits, the Contractor shall be responsible for the design of the entire temporary dewatering system and shall make whatever modifications and additions to the system as may be required for the system to fulfill its requirements.

C. Collect and properly dispose of all discharge water from dewatering and drainage systems in accordance with local requirements and permits.

D. Repair any damage caused by dewatering and drainage system operations.

E. Remove temporary dewatering and drainage systems when no longer needed, and restore all disturbed areas.

1.2 RELATED WORK

A. Earthwork included in Section 02200.

B. Environmental Protection Measures included in Section 01110.

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. 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 the excavation dewatered and restored to proper conditions prior to reinstalling the pipe and conduit.

D. Excavations for manholes and structures shall be maintained in-the-dry for the duration of the structure installation. In no event shall water be allowed to enter an excavation and rise to cause unbalanced pressure on foundations and 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.

G. If conventional dewatering methods are not adequate to ensure dry and stable conditions, the Contractor shall be required to use special dewatering techniques as necessary to complete the work.

H. Special dewatering techniques may consist of one or two-stage well point systems, deep wells, or educator and ejector type systems. The contractor shall utilize a system which provides proper construction conditions and prevents settlement at time of installation and upon backfilling.

I. In areas requiring special dewatering, the Contractor shall lower the groundwater level to a minimum of 2 feet below the bottom of the excavation grade prior to any installation and maintain that groundwater level until the excavation has been backfilled. The groundwater levels shall be monitored by the Contractor's on-site representative to ensure conformance with the requirements of these specifications. Construction will not be allowed until the Engineer and the Owner are satisfied that the above provisions are met.

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. Sanitary sewer systems or private on-site septic systems shall not be used to dispose of drainage.

END OF SECTION 02140

SECTION 02160

TEMPORARY EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Design, furnish and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.

2. Common types of excavation support system include, but are not limited to: singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.

3. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.

4. Construction of the temporary excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the Owner.

5. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.

1.2 RELATED SECTIONS

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 02140 – Dewatering and Drainage

2. Section 02200 – Earthwork

1.3 SUBMITTALS

A. Shop Drawing: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Submit the following qualifications four (4) weeks prior to the construction:

a. Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.4 D.

b. Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.4 E.

c. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.4 F, if a tieback system is utilized.

d. Qualifications of Contractor's temporary excavation support system installation supervisor as specified in Paragraph 1.4 G.

2. Submit a temporary excavation support plan stamped and signed by a Massachusetts Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. 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 the following items as a minimum:

a. Proposed temporary excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.

b. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.

c. Requirements of dewatering during the construction, per Section 02140.

d. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.

e. List of equipment used for installing the excavation support systems.

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.

4. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:

a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.

b. Type of the temporary excavation support system.

c. Elevations of top and bottom of the excavation support systems left in place.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.

C. All welding shall be performed in accordance with AWS D1.1.

D. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in Massachusetts and having the following qualifications:

1. Not less than ten (10) years experience in the design of specific temporary excavation support systems to be used.

2. Completed not less than five (5) successful temporary excavation support system projects of equal type, size, and complexity within the last five (5) years.

E. Temporary Excavation Support System Installer's Qualifications:

1. Not less than three (3) years experience in the installation of similar types and equal complexity as the proposed system.

2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.

F. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.

3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.

4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.

G. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:

1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.

2. Completed at least five (5) successful temporary excavation support systems of similar type and equal complexity as the proposed system.

1.5 DESIGN CRITERIA

A. Design of temporary excavation support systems shall meet the following minimum requirements:

1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, and other surcharge loads.

2. Design a bracing system to provide sufficient reaction to maintain stability.

3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.

4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation.

5. Design temporary excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.

6. Maximum width of pipe trench excavation shall be as indicated on the drawings.

7. Do not cast permanent structure walls directly against excavation support walls.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

1.7 PROJECT/SITE CONDITIONS

A. Subsurface Conditions: Refer to the Contract Document for available information.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.

B. Steel Sheet Piling: ASTM A328, continuous interlocking Z-type. Steel sheet shall be ASTM A572 Grade 60.

C. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.

D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.

E. Raker Ties: ASTM A615 Grade 60.

F. Cement Grout Materials and Admixtures for Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.

G. Concrete: Refer to Section 03300.

H. Tamping tools adapted for backfilling voids after removal of the excavation support system.

I. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.

B. Install excavation support systems in accordance with the temporary excavation support plan.

C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.

D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.

E. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.

G. Install and survey geotechnical instrumentation in accordance with the temporary excavation support plan. Notify the Engineer immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at no additional cost to the Owner.

H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In event of the measured movements approaching or exceeding the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan) as required.

I. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at no additional cost to Owner.

3.2 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS

A. Criteria for “threshold” and “limiting” movements of wall elements of excavation support system have been established as follows:

1. “Threshold” Horizontal Movement:

   Dx = No greater than 1.25 inch where no buildings are present within 25 ft. of support system

   Dx = No greater than 0.5 inch where buildings are present within 25 ft. of support system.

   Where
   Dx = measured horizontal wall movement at any level.

2. “Limiting” Horizontal Movement:

   Dx = No greater than 2.0 inches where no buildings are present within 25 ft. of support system

   Dx = No greater than 0.75 inch where buildings are present within 25 ft. of support system.

B. The Contractor shall notify the Engineer and shall take immediate steps to control further movement by revising his procedures, providing supplemental bracing or other measures (working 24 hours per day or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:

1. Field measurements indicate that any of the “threshold” movement criteria are reached or exceeded.

2. Field measurements or observations indicate that significant or sustained wall movements are occurring (total movement may be less than the “Limiting” movement criteria).

3. Movements of adjacent structures, utilities or other facilities are detected.

C. If “Limiting” movements are being approached or reached, the Engineer, based on his judgment and review of the movement monitoring data, may require the Contractor to temporarily terminate the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Owner.

D. Horizontal or vertical movement of any point on adjacent structures shall not exceed 0.5 inches. The Contractor shall establish and monitor survey points on the adjacent structures. The Contractor shall take all necessary measures to prevent greater settlements, at no additional cost to the Owner.

E. These criteria are intended to establish a minimum basis for the Contractor's design and procedures and in no way relieve the Contractor of his sole responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.

F. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.

G. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.

H. Implement Construction Contingency Plan under direction of the temporary excavation support system designer, installation supervisor and the Engineer.

3.3 REMOVAL OF EARTH RETENTION SYSTEM

A. Sheeting shall not be left in place unless otherwise indicated or approved in writing by the Engineer.

B. When indicated or approved by the Engineer, remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.

C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.

D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.

E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.

F. Submit as-built information, prior to backfilling.

3.4 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 02160

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; miscellaneous earth excavation; temporary excavation support; the removal, hauling and stockpiling of suitable excavated material for subsequent 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 the site of unsuitable material; compaction; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

B. Related Sections includes the following:

1. Dewatering is included in Section 02140.

2. Temporary Excavation Support is included in Section 02160.

3. Rock Excavation is included in Section 02212.

4. Pavement Repair and Resurfacing is included in Section 02576.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Backfill Materials: If requested by the Engineer, the Contractor shall pay for and 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 gradation requirements specified.

C. If requested by the Engineer, submit a controlled density fill (CDF) mix design showing the proportions and gradations of all materials.

D. If requested by the Engineer, submit a moisture-density curve indicating the maximum dry-density and optimum moisture content as determined by ASTM D1557 for each proposed source of backfill for review by the Engineer.

E. Submit the qualifications of the 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 in the State of Massachusetts.

F. 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:

1. Detailed sequence of work.

2. General description of construction methods.

3. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

4. Details of dust control measures.

5. Proposed locations of stockpiled excavation and/or backfill materials.

6. Proposed surplus excavated material off-site disposal areas and required permits.

1.3 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 exploratory excavation, unauthorized excavation, additional excavation, or rock excavation.

B. Exploratory Excavation, also referred to as test pits, shall consist of the removal of materials for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work. Exploratory excavation shall be performed as shown on the plans and as directed by the Engineer. Exploratory excavation shall be paid for under the unit cost pay item. Exploratory excavation not directed or approved by the Engineer shall be at the Contractor’s expense.

C. 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.

D. 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.

3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.

E. Rock Excavation:

1. Determination of rock excavation classification will be made by the Engineer as specified in Section 02212 – Rock Excavation.

1.4 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.

C. The Contractor shall satisfy all dewatering requirements specified in Section 02140 – Dewatering and Drainage, before performing trench excavations.

1.5 TEMPORARY EARTH SUPPORT

A. The Contractor shall furnish, place and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations and to prevent danger to persons or damage to pavements, facilities, utilities, or structures, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic as directed and required in accordance with Section 2160 - Temporary Excavation Support Systems.

PART 2 – PRODUCTS

2.1 BACKFILL MATERIALS

A. Common Fill. Common fill (structural fill, gravel borrow, or backfill) 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	Percent Passing
1/2 in.	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be 6 inches largest dimension

B. Select Fill:

1. Sub-base material shall be new processed gravel conforming to the Massachusetts Highway Department Standard Specifications, Section M1.03.1 “Processed Gravel for Sub-Base”.

2. Screened Gravel. Screened gravel shall consist of hard, durable, particles of proper size and gradation, free from sand, loam, clay, excess fines and deleterious materials. The size of the particles shall be uniformly graded gravel such that not less than 95 percent of the particles will pass a 1/2-in sieve, 40 to 70 percent will pass the 3/8-in sieve, and not more than 5 percent will pass a No. 4 sieve.

3. Crushed stone shall conform to the Massachusetts Highway Department Standard Specifications, Section M2.01.4 “Crushed Stone”. Crushed stone shall be used as ordered by the Engineer.

4. ¾-inch Crushed Stone: Durable, clean angular rock fragments obtained by breaking and crushing rock material. ¾-inch Crushed Stone shall conform to the Massachusetts Highway Department Standard Specifications, Section M2.01.4 “Crushed Stone”.

5. Sand: Sand shall conform to MassHighway Specification M4.02.02.

C. Topsoil: Friable loam, typical of fertile local topsoil; free from pure clay, weeds, noxious weed seeds, sod, clods and stones larger than 1 inch, toxic substances, litter, or other deleterious material; having a mildly alkaline to medium acid pH between 6.0 and 7.5. Soluble salts shall not exceed 4 milli-mhos per centimeter.

Soil Texture: 20 to 40% fines (silt and clay fraction passing the 200 sieve) and 60 to 80% Sand and gravel. The maximum particle size shall be 1-inch.

Organic Content: 5 to 10%

Additives: As required by soil analysis of Topsoil for lawn areas.

D. Controlled Density Fill (CDF) or “Flowable Fill”: Controlled density fill shall consist of a flowable, self-consolidating, rigid setting, low density mixture meeting performance standards as specified in Massachusetts Highway Department 1995 Standard Specifications for Highway and Bridges, Type 1E. CDF is to be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10 to 12 inches. It shall be flowable, require no vibration and after it has been placed can be excavatable by hand tool and/or small machines. The ingredients shall comply with the following:

Portland Cement – AASHTO M 85
Fly Ash – AASHTO M 295 Class F
Sand – M4.02.02 (Massachusetts Highway Specification)

Controlled Denisty Fill shall be used as ordered by the Engineer and as shown of the Drawings to as backfill for trenches within the State Highway Layout.

2.2 DUST CONTROL

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

PART 3 – EXECUTION

3.1 EXCAVATION

A. 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.

B. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

C. 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.

D. 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 and depth shall be a practical minimum, as needed for proper execution for the work, and shall be performed in accordance with the Typical Trench Detail as shown on the Drawings.

E. 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.

F. 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.

G. 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.

H. Where pipe is to be laid in screened gravel, 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.

I. 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.

J. 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.

K. 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.

L. Excavate trenches with approximately vertical sides for entire depth of trench.

3.2 STOCKPILING OF SURPLUS EXCAVATED MATERIALS

A. 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.

B. Stockpiling of materials shall be included in the pay items for excavating and no allowances shall be made for any stripping and stockpiling requirements.

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.

3.3 PROTECTION OF EXISTING STRUCTURES

A. 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 therefore, to at least as good condition as that in which they were found immediately before the work was begun. Contractor shall hand dig around existing utilities.

B. 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.

C. 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.

D. 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.

E. 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 effect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

F. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.

G. 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.

3.4 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. 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.

B. 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.

C. 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.

3.5 EXCAVATION SUPPORT SYSTEM

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. 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.

E. 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.

F. 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.

G. 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.

3.6 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. Screened gravel shall be placed by hand shovel in 6-inch thick lifts up to the springline of the pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled.

B. Where the pipes are laid in streets, the remainder of the trench up to a depth of 12-inches below the bottom of the specified permanent paving shall be backfilled

with gravel borrow material in layers not to exceed 6-inches and thoroughly compacted. The sub-base layer shall be 12-inches of processed gravel thoroughly compacted.

C. 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 12-inches over the pipe.

D. 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 shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

E. 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.

F. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

G. 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.

H. 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.

I. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

J. Exploratory excavation 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.

3.7 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
Pavement sub-base	95%
General fill below pavement sub-base	92%

B. Moisture Control:

1. Fill that is too wet for proper compaction shall be 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. 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. In-place density tests will be made by a geotechnical engineer selected by the Engineer or the Contractor's independent testing laboratory at the Contractor’s expense.

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.

D. 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 sub-base: Every 100 lin. ft. per lift.

   b. Trenches in areas without structures or roadways: Every 250 lin. ft. per alternate lift.

   c. Paved Roadways: Every 100 lin. ft. per lift.

   d. Paved Areas: 2,000 sq. ft. per lift.

   e. Under Structure: 1,000 sq. ft. per lift.

   f. Around Structures: 1,500 sq. ft. per lift.

   g. Embankment Fills: 5,000 sq. ft. 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 [382 cubic meter] of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

E. Compaction Methodology:

1. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

2. Backfilling operations shall be such that material is compacted in 6 inch lifts, including the trench around the barrel of the pipe. Compaction of each lift up to a minimum of 12-inches above the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken as to not place excessive pressure on the new pipe.

3. Vibratory mechanical compaction is the preferred method for compaction. Should jetting be proposed by the Contractor, its viability to achieve the required degree of compaction shall be proven on a test section of trench, prior to allowing its use on a widespread basis. Compaction testing shall be used to determine the effectiveness of the jetting operation. Jetting shall be accomplished using a rigid pipe, long enough to reach deep into the trench. Large volumes of water under high pressure equivalent to that available from a fire hydrant, are necessary for jetting. The Contractor is made aware that municipal water will not be available due to limited supply. The Contractor shall provide water for jetting operations at his own expense. Jetting locations shall be frequent enough to achieve required compaction.

4. 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.

5. In backfilling trenches, each layer of backfill material shall be moistened 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 of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

3.8 FINE GRADING

A. Before surface or sub-base 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 material or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of 1/2-inch above or below the finished subgrade will be allowed provided that this 1/2-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 not accessible to a roller shall be thoroughly compacted by other mechanical methods.

B. Construction Tolerances:

1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.

2. Grade cut and fill areas to plus or minus 0.20 foot of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

3.9 DUST CONTROL

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application.

B. Calcium chloride shall be uniformly applied at a rate of 1-1/2 pounds per square yard or at any other rate as directed by the Engineer. Application shall be by means of a mechanical spreader, or other approved method. The number and frequency of applications shall be determined by the Engineer.

3.10 PLACING TOPSOIL

A. Scarify compacted subgrade to a 2-inch depth to bond topsoil to subsoil. Place topsoil to a minimum depth of 4 inches for areas disturbed by Contractor's construction operations and as shown on the Drawings. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading.

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 one cubic yard 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 one 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 Subcontractor shall be conducted in accordance with 527 CMR 13.00. The Contractor will procure the proper blasting permit from the City of Waltham,, as appropriate, 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 and 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 02200.

B. Environmental Protection is included in Section 01110 and Section 02020.

1.4 SUBMITTALS

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. Fees for inspection shall be paid directly to the Waltham Fire Department, telephone number 781-314-3710. 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. Typical of materials classified as 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 preblasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the preblast 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.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Gravel borrow shall be as specified in Section 02200.

PART 3 – EXECUTION

3.1 BLASTING

A. Blasting shall only be permitted if accepted by the Waltham Fire Department.

B. All blasting operations, including transportation, handling, storage and protection of detonators and explosives shall comply with the requirements of the Department of Labor, Occupational Safety and Health Administration provisions, as well as those of State and local regulations. In the case of conflict of regulations, the most stringent regulations shall apply.

C. Pre-blast condition survey: Prior to the start of earth/rock excavation or blasting work, the Contractor shall engage an independent professional engineer, experiences in performing Pre-blast Surveys, to conduct a pre-blast condition survey of all existing structures and conditions on the site, adjacent to the site, or in the vicinity of the site. This survey shall extend to such structures or conditions as may be affected by the contractor's construction operations. As a minimum, condition surveys shall be performed on structures within 300' of anticipated blasting areas.

The Contractor shall also:

1. Coordinate activities, issue notices, obtain clearance and provide whatever photographic and secretarial assistance is necessary to accomplish the survey.

2. Give seven days notice in writing, to the owner of the property concerned, and tenants of the property. Advise in notice the dates on which surveys are to be made so that they may have representatives present during the examination. Provide copies of all notices to the Engineer.

3. The survey shall consist of a description of the interior and exterior conditions of the various structures examined. Descriptions shall locate any cracks, damage, or other defects existing and shall include such information so as to make it possible to determine the effect, if any, of the construction operations on the defect. Where significant cracks, damage, or other defects exist, or for defects too complicated to describe in words, photographs, shall be taken and made part of the record.

4. The Contractor's record of the pre-blast survey shall consist of written documentation and photographs of the condition identified, or a good quality videotape survey with appropriate audio description of conditions and defects. Prior to the start of the work, one copy of the Contractor's record of condition survey shall be submitted to the Engineer for information and retention.

5. The Contractor shall make an examination similar to the preconstruction survey of any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed and give notice to all interested parties so that they may be present during the final examination. Record of the final examination shall be distributed the same as the original preconstruction survey.

6. 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.

7. Pre-blast survey records shall be maintained for a period of not less than three years following final completion and acceptance of the Work.

D. Indemnity: Notwithstanding full compliance with specifications, as well as the blasting plan, and successful limitation to maximum peak particle velocity and airblast overpressure noted below, the Contractor shall be solely responsible for any damage, direct or indirect, arising from blasting and shall hold the Owner and Engineer harmless from any costs of defense, arising from such damage, real or alleged. The Owner and Engineer shall be additionally named insured on any insurance policy covering blasting carried by the Contractor, and this requirement shall also be enforced on any subcontractor.

E. Qualifications:

1. Persons responsible for blasting shall be licensed blasters in the Commonwealth of Massachusetts and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques.

2. Blast monitoring shall be conducted by an independent, qualified professional engineer or seismologist, trained in the use of a seismograph, and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

F. Codes, Permits, and Regulations:

1. The Contractor shall comply with all applicable laws, rules, ordinances, and

regulations of the Federal Government, the Commonwealth of Massachusetts, and the City of Waltham, governing the transportation, storage, handling, and use of explosives. All labor, materials, equipment, and services for the blasting operations shall comply with such requirements and shall be provided without additional cost to the Owner.

2. The Contractor shall obtain and pay for all permits and licenses required to complete the work of this section, including permit(s) to transport explosives.

3. In case of conflict between regulations or between regulation and Specifications, the Contractor shall comply with the strictest applicable codes, regulations, or specifications.

4. All blasting shall be in accordance with 527 CMR 13.00.

G. Safety Procedures

1. Clearing the Danger Area Before Blasting: No blasting shall be permitted until the Contractor removes all personnel from the danger area to safety. A loud, audible, warning system, devised and implemented by the Contractor, shall be sounded before each blast. The Contractor shall familiarize all personnel on the project, Owner, Police Officers, and Engineer with the implemented system. The danger area shall be patrolled before each blast to make certain that it has been completely cleared, and guards shall be stationed to prevent entry until the area has been cleared by the blaster following the blast.

2. Explosives shall be stored, handles, and employed in accordance with federal, state, and local regulations.

3. No explosives, caps, detonators, or fuses shall be stored on the site during non-working hours.

4. Blasting mats shall be used to cover the top and vertical face of all blasts in order to minimize the possibility of excessive throw of rock. Any damaged mats shall be replaced with mats in good condition before blasting continues.

5. The Contractor shall be responsible for determining all safety requirements unique to blasting operations at these particular sites so as not to endanger life, property, utility service, any existing or new construction, or any property adjacent to the site.

6. No requirement of, or omission to require, any precautions under this Contract shall be deemed to limit or impair any responsibility or obligations assumed by the Contractor under or in connection with this contract; and the Contractor shall at all times maintain protection to safeguard the public and all persons engaged in the work, and shall take precautions as will

accomplish such end, without undue interference to the public. The Contractor shall be responsible for and pay for any damage to adjacent roadways or structures resulting from work executed under this Section.

H. General Blasting Procedures

1. The time during which explosives may be used is restricted to Monday through Thursday between the hours of 9:00 AM and 2:00 PM (prevailing time) allowing ample time for cleanup. The use of explosives is not permitted on Friday, weekends (Saturday or Sunday), holidays, on the eve of a holiday nor between the hours of 2:00 PM and 9:00 AM. In order to minimize traffic disruptions, the Contractor shall schedule blasting such that any two successive blasts detonated anywhere on the project are separated by at least 2 hours.

2. 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 feet and maximum spacing of 18 inches on center. Use sufficient explosive to shatter rock for future excavation. Complete shattering before any pipe or fitting is placed within 50 feet of rock to be shattered.

3. Immediately after blasting, the Contractor shall provide equipment to the site to clear the pavement of blasted rock. The Contractor shall also use a mechanical sweeper and water spray to control dust and small stones.

4. The Contractor shall advise the Owner and Engineer at least two working days in advance of the dates on which he proposes to perform blasting operations, giving the approximate hour, for the Engineer's approval. The Contractor will be responsible for obtaining the permits and police/fire officials required to close local streets or observe during periods of blasting. The Contractor shall notify the Owner and Engineer by noon of the day prior to any day he plans not to blast where the weekly schedule shows a day of blasting. This does not include changes due to weather or unexpected equipment breakdowns.

5. Blast hole diameter shall be no greater than 3 inches.

6. No free flowing, pourable or pumpable explosives shall be used. All explosives shall be in cartridges or other semi-rigid container.

I. 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.

B. Rock and boulders may be crushed and screened for reuse in the Work, provided that the resultant materials meet the requirements for gravel borrow, processed gravel, or crushed stone as specified in Section 02200.

C. Unused rock and boulders shall be removed and disposed of off-site.

END OF SECTION 02212

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SECTION 02440

PIPELINE CLEANING AND INSPECTION

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Clean and inspect the pipelines indicated on the Drawings or as directed by the ENGINEER in a manner that is compliant with the guidelines set forth within this section. This Work includes furnishing all equipment and labor required to perform the services described herein.

1.2 QUALITY ASSURANCE

A. Refer to Section 01400 – QUALITY ASSURANCE, for qualification requirements.

1.3 REFERENCES:

A. The following standard is referenced as part of this specification:

The National Association of Sewer Service Companies (NASSCO) Recommended Specifications for Sewer Collection System Rehabilitation (Current Edition).

1.4 SUBMITTALS

A. Submit detailed television inspection reports as specified herein. Submit inspection reports and DVD video record for review and approval by ENGINEER weekly, minimum.

B. DVD shall provide a visual and audio record of conditions encountered in the pipeline and shall have an associated database that can be searched, sorted, stored, and transferred with all associated software at no additional cost. Database shall be compatible with Microsoft Excel or Access software.

C. Upon substantial completion of the Work submit one complete set of DVDs of TV inspection Work.

D. Refer to Section 01300 – SUBMITTALS, for required documentation to be submitted.

PART 2 – PRODUCTS

2.1 CLEANING EQUIPMENT

A. Pipe cleaning equipment shall consist of high velocity jet equipment as defined in the section SEWER LINE CLEANING of NASSCO (current version).

B. High velocity jet equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size and length lines indicated on the Drawings. Equipment shall also include a high velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

C. Self-propelled robotic cutters used to remove pipe obstruction and re-instate lateral connections shall be self-propelled with various types of cutting and grinding heads. The robot shall also have the ability to spray water on cutting heads and on the lens. The cutter shall be manned by an operator in a climate controlled studio inside of a specially outfitted cutting truck with room for an operator and an observer. The cutting truck shall provide electricity, compressed air and water in support of the self-propelled robot.

2.2 TELEVISION EQUIPMENT

A. TV inspection equipment shall meet the standard set under TELEVISION INSPECTION, MAIN SEWERS of NASSCO (current version).

B. Television equipment shall include television camera, television monitor, cables, power source, lights, and other equipment. The television camera shall be specifically designed and constructed for operation in connection with sewer inspection.

C. Lighting for the camera shall be suitable to allow a clear picture, with minimal reflective glare, for the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor and other component of the video system shall be capable of producing a minimum 400 line resolution color video picture. Picture quality and definition shall be to the satisfaction of the ENGINEER.

D. The camera shall have a remote controlled, pan and tilt type lens and lighting system capable of turning perpendicular to the direction of flow and rotating 360 degrees while inside the pipe. The camera shall be able to view a minimum service connection length of 4 feet in order to determine whether the connection is active or inactive.

E. The remote reading footage counter shall be accurate to one (1) foot over the length of the particular section being inspected.

PART 3 – EXECUTION

3.1 ACCESS TO WORK

A. Certain conditions may prevent the CONTRACTOR from completing portions of the work contained herein. Upon discovery of such conditions, the CONTRACTOR shall immediately notify the ENGINEER who will in turn notify the OWNER and attempt to arrive at a resolution. The ENGINEER will then direct the CONTRACTOR to

either return to the location once the condition is remedied or will remove the subject pipe from the project. These decisions will be made at the ENGINEER's sole discretion and no additional cost will be incurred for eliminating, re-scheduling or returning to areas of the work as long as the CONTRACTOR is working on other areas of the project. These conditions include but are not limited to the following:

1. Paved over or otherwise buried manholes.
2. Obstructions in the pipe
3. High flow conditions
4. Need for police detail or traffic control measures

3.2 PIPE CLEANING

A. The CONTRACTOR shall use high velocity jet as described in the most recent version of NASSCO Standard Specifications.

B. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be disposed of in accordance with all applicable regulations and in a method acceptable to the OWNER. Pipe cleaning shall be performed in advance of pipe television inspection.

C. The CONTRACTOR shall be responsible for the legal removal, transportation and disposal of all debris removed from the pipelines during the cleaning operation including any costs incurred. The OWNER shall allow disposal of sewer/drain pipeline matter in the OWNER's sewer/drain system as appropriate.

D. Light cleaning shall be conducted at a minimum to permit the passage of the closed circuit television camera. Acceptance by the ENGINEER of the cleaning results will be based on the results of television inspection. If the results are unsatisfactory, the CONTRACTOR shall repeat the cleaning until accepted by the ENGINEER at no additional cost to the OWNER.

E. The CONTRACTOR shall coordinate water use with the OWNER. CONTRACTOR shall be responsible for providing, installing and using all equipment needed to obtain water from hydrants in accordance with the OWNER's requirements.

3.3 HEAVY SEWER CLEANING

A. The Contractor shall remove all obstructions in the sewer. All debris shall be removed from the sewer, including any debris that may have been washed up into any service connections (does not include known pre-existing conditions in service connections), drop connections or the bench wall of the manholes. This includes all grease, rocks, debris, fine roots, sticks, etc. that will reduce the hydraulic capacity of the sewer and limit future maintenance access of remote equipment. This work will include an unlimited number of passes by high velocity hydro-cleaning equipment. A mechanical/hydraulic Spinner Nozzle, chain cutters, and other special nozzles may be used where necessary at no additional cost to the Owner.

B. The Contractor shall be responsible for any damage to the sewer or any service connection.

C. The Contractor shall immediately notify the Owner and Engineer if he believes that this level of cleaning will cause a sewer collapse due to the existing deterioration of the host pipe. The Owner and Engineer will determine whether to continue or stop work.

3.4 LATERAL CUTS

A. The Contractor shall cut/grind the protruding service connection by using a remote grinding/cutting device capable of removing, concrete, vitrified clay, PVC and other types of pipe material. The Contractor shall use remote CCTV equipment to monitor the progress of the work and ensure that the service connection is not damaged.

B. A protruding break-in service connection shall be cut/ground flush to the main sewer pipe without scouring or damaging the main sewer or service connection. All cuttings must be screened, collected, and removed from the sewer for proper disposal.

C. A final survey television inspection shall be conducted by the Contractor and shall slowly pan the entire circumference of the trimmed connection to verify the quality of the work.

D. The Contractor shall immediately notify the Owner and Engineer if he believes that the pipe is not structurally sound. The Engineer or Owner shall determine, if the work should continue to be performed.

E. If other than typical lateral materials are encountered, the Contractor shall notify the Engineer and Owner.

3.5 DEBRIS RECORDS

A. The Contractor shall keep records of types of debris removed from each segment of pipe and provide these records to the Engineer and Owner in the format requested by the Engineer or Owner.

3.6 PIPE INSPECTION

A. Pipe shall be visually inspected by means of closed-circuit television. The television camera used for the inspection shall be one specifically designed and constructed for such inspection.

B. DVD Recordings: Electronic video equipment shall display and record during the entire inspection at a minimum the following data for each pipeline reach video recorded.

1. Date recorded
2. Footage counter
3. Voice over narration noting any significant observations made during the inspection work, including the following:
    a. Length, size and type of pipe.
    b. Location of offsets and misalignments of any part.
    c. Location and type of defect in pipe such as cracks, holes, etc.
    d. Protruding service connections.

e. Root intrusion.
f. Visible infiltration/inflow sources estimated in gallons per minute (GPM).
g. Type and depth of debris in pipe.
h. Sluggish flow or wastewater backing up into manhole.
i. Overall condition of pipe section (from manhole to manhole).

4. Pipeline reach identification (street location, MH to MH)

C. DVD and Television Logs: The CONTRACTOR shall prepare individual log sheets of each line section inspected, recording, at a minimum, the following information in tabular and graphic format, and submit duplicate copies electronically to ENGINEER at regular intervals not exceeding weekly intervals:

1. Project identification
2. List of Subcontractors at the site.
3. Count of personnel at the site, by job classification.
4. List of major equipment utilized on site.
5. Numbered pages including an index sheet listing the pipeline segments, street name and corresponding page of the report they are located.
6. Tabular and graphic display observation made during the inspection work as listed herein.
7. Pipeline reach identification (street location, MH to MH)

D. The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper identification of the pipeline's condition. In no case will the television camera be pulled at a speed greater than 20 feet per minute. Manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the pipeline conditions may be used to move the camera through the line.

E. If, during the inspection operation the television camera will not pass through the entire pipeline section, the CONTRACTOR shall reset his equipment in a manner so that the inspection can be performed from the opposite manhole.

F. Flow control shall be in accordance with Section 02538 – TEMPORARY BY-PASS PUMPING.

G. Standing water within a sagging pipe shall be removed so that the pipe can be adequately television inspected. A minimum of 80% of the pipe shall be visible before television inspection. A minimum of one attempt using standard cleaning equipment shall be made to clear lines surcharged due to line sages. The CONTRACTOR shall maintain a list of line segments that are significantly surcharged and provide this list to the ENGINEER daily.

H. Television inspection shall be performed in advance of all testing and rehabilitation activities.

I. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other device approved by the ENGINEER. The measurements recorded in the log shall be zeroed at the point the camera lens begins the pipeline penetration of the upstream manhole, unless specific permission is given by the

ENGINEER to do otherwise. Footage shall be shown on the video data view at all times and will be zeroed at the beginning of each run.

END OF SECTION 02440

SECTION 02441

ROOT TREATMENT AND REMOVAL

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Remove roots from the sewer and drain pipelines indicated in Appendix A or as directed by ENGINEER in a manner that is compliant with the guidelines set forth within this section. This Work includes furnishing all equipment, material and labor required to perform the services described herein.

1.2 REFERENCES:

A. The following standard is referenced as part of this specification:

The National Association of Sewer Service Companies (NASSCO) Recommended Specifications for Sewer Collection System Rehabilitation (Current Edition).

1.3 DESCRIPTION

A. Mechanical root removal shall be performed as described in Item 2, Root Removal, of NASSCO's section entitled SEWER LINE CLEANING.

B. Chemical root treatment will not be allowed.

C. The CONTRACTOR may propose alternative processes and/or products for review and approval by the ENGINEER.

1.4 SUBMITTALS

A. Prior to beginning the Work, submit six (6) sets of the following:

1. Qualifications of the firm/personnel who will perform the Work.

2. Description of system proposed for handling existing flows, if necessary, during the procedures to be carried out.

3. Description of the system, methods, process, and equipment proposed to perform root treatment and removal.

4. Submittals of MSDS, product labels, and other submittals as described in relevant NASSCO specifications.

5. Manufacturer's warranty

B. Submit detailed television inspection reports to the ENGINEER as specified herein prior to initiating any rehabilitation Work.

1. Submit inspection reports and DVD video record for review and approval by ENGINEER weekly, minimum.

2. DVD shall provide a visual and audio record of conditions encountered in the pipeline and shall have an associated database that can be searched, sorted, stored, and transferred with all associated software at no additional cost. Database shall be compatible with Microsoft Excel or Access software.

3. Upon substantial completion of the Work submit one complete set of DVDs of TV inspection Work.

4. A tabulation showing the locations and quantities of the Work shall also be submitted with pay requisitions.

C. Refer to Section 01300 – SUBMITTALS, for required documentation to be submitted.

1.5 QUALITY ASSURANCE

A. Refer to Section 01400 – QUALITY ASSURANCE, for qualification requirements.

B. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the specified services. Supervisory personnel shall have at least three (3) years of experience in providing the specified services and shall be present at the jobsite DURING all work as specified herein.

PART 2 – PRODUCTS

2.1 ROOT REMOVAL EQUIPMENT

A. Mechanical root removal shall be by rodding machines, bucket machines, and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners. See section 02440 for additional cleaning equipment requirements.

PART 3 – EXECUTION

3.1 ACCESS TO WORK

A. Certain conditions may prevent the CONTRACTOR from completing portions of the work contained herein. Upon discovery of such conditions, the CONTRACTOR shall immediately notify the ENGINEER who will in turn notify the OWNER and attempt to arrive at a resolution. The ENGINEER will then direct the CONTRACTOR to either return to the location once the condition is remedied or will remove the subject pipe from the project. These decisions will be made at the ENGINEER's sole discretion and no additional cost will be incurred for eliminating, re-scheduling or returning to areas of the work as long as the CONTRACTOR is working on other areas of the project. These conditions include but are not limited to the following:

1. Paved over or otherwise buried manholes
2. Obstructions in the pipe
3. High flow conditions
4. Need for police detail or traffic control measures

B. MECHANICAL ROOT REMOVAL PROCESS

1. Roots penetrating into sewer or drain pipes shall be removed through mechanical means in sections indicated in the Contract Drawings or where determined to be necessary by the Engineer.

2. The Contractor shall capture and remove all roots from the line.

C. PROPERTY DAMAGE CAUSED BY THE CONTRACTOR

1. Should the Contractor or his employees cause any damage to public or private property, the Contractor will be required to make repairs immediately. The Owner may, however, elect to make repairs or replacements of damaged property and deduct the cost of such from moneys due or to become due the Contractor under this contract with the Owner. The Contractor shall not be responsible for any damages caused by sewer or drain stoppages.

D. POST REMOVAL INSPECTION

1. CCTV shall be performed to determine if root removal process was effective. The ENGINEER shall determine if the level of removal is sufficient. The CONTRACTOR shall return if necessary to preform additional root removal if the ENGINEER'S review shows initial root removal efforts were insufficient.

END OF SECTION 02440

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SECTION 02538

TEMPORARY BY-PASS SEWAGE PUMPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Furnish, install, field test, and operate temporary by-pass pumping systems for the purpose of diverting sewage flow around work areas for the duration of the project. The pumping system shall protect against surcharging of the existing sewer system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather flows. Provide all labor, tools, materials, and equipment necessary to by-pass flow around the work areas.

B. The design, installation, and operation of temporary by-pass pumping systems shall be the Contractor’s responsibility. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. By-passing operations shall be continuously monitored by the Contractor, regardless of duration or timing of by-passing. By-passing should be coordinated with low-flow times, to the extent feasible. Restore normal service to entire system at the end of normal working hours every day or post an attendant on-site. No unattended by-pass pumping will be allowed.

D. Maintain temporary by-pass pumping systems so that they are completely functional throughout the required period of service.

E. Provide all maintenance including manufacturer recommended preventative maintenance and on-call repair services. Contractor shall provide repair services and/or replacement equipment 24 hours per day, 7 days per week within 4 hours of being notified.

F. The Contractor shall not allow sewage flow to discharge to any salt or fresh water body by means of overflow, by-pass pumping, or any other method that may contaminate these water areas.

A. Except as specifically permitted, the installation of the by-pass pipelines is prohibited in all saltmarsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulders of the roads. When the by-pass pipeline crosses local streets and private driveways, the Contactor must place the by-pass pipelines in a portable hose ramp, or place temporary bituminous pavement, cold patch, or other approved material

to form a ramp on each side of the pipe to the satisfaction of the Engineer or by depressing the pipe as directed by the Engineer.

G. The ramp shall be high load bearing capacity. Upon completion of the by-pass pumping operations, the Contractor shall remove all piping, restore all property to pre-construction condition, and restore all pavement. The Contractor is responsible for obtaining any approvals from the Owner for placement of the temporary pipeline within public ways.

H. Related Sections: The following sections contain requirements that relate to this Section:

1. Section 02435 – Manhole Rehabilitation
2. Section 02440 – Pipeline Cleaning and Inspection
3. Section 02764 – Cured-In-Place Pipe (CIPP)
4. Section 02765 – Sewer Lateral Sealing

1.3 SUBMITTALS

A. Submit the following in accordance with the Conditions of Contract and Division 1 Specification Sections and as specified herein:

1. A detailed description of the proposed pumping systems, project approach, and requirements here within:

2. A detailed description of each proposed temporary by-pass pumping system including pumps, pump drives, piping, hoses, valves, fittings, controls, wiring, and other ancillary accessories required to provide a complete operating system.

3. Complete list of system components to be provided.

4. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.

5. Performance data for each type of equipment that will show compliance with specification requirements stated herein.

6. Detailed plans and sections showing the proposed pumping system layout. Plan shall include but not limited to the following:

   a. Staging area and access requirements for all pumps.
   b. Number, size, material, location, and method of installation of suction piping.
   c. Number, size, material, location, and method of installation of discharge piping.
   d. Sewer plugging method and types of plugs.

e. Pump size, capacity, number of units, fuel tank capacity, fuel consumption requirements, and method of refueling.

7. Emergency response plan describing the intended means of handling but not limited to the following:

a. Break or failure of by-pass piping.
b. Failure of by-pass pump.
c. Overflows.
d. Backup into dwelling or onto private property.
e. Operations during inclement weather including snow storms.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 - Quality Assurance and as specified.

C. The by-pass pumping system shall be standard equipment and totally suited for the application as detailed herein. The equipment to be furnished shall be satisfactory and safely designed, in accordance with the design parameters as detailed in these contract documents. It shall be constructed for continuous, automatic operation, for extended periods of time.

D. All items shall be designed and constructed in full accordance with all applicable state and local codes and regulations. Labor, materials, and costs required to meet state codes shall be the responsibility of the Contractor and the professional by-pass pumping company.

1.5 FLOW DATA

A. The project area consists of active sanitary sewers; therefore, flows and flow data are variable depending on location and conditions. It is the responsibility of the Contractor to maintain flows in accordance with this specification under all flow conditions and, therefore, the Contractor is encouraged to visit the project locations prior to Work to visually inspect flow conditions.

PART 2 - MATERIALS

2.1 PUMPING EQUIPMENT

A. Each temporary by-pass pumping system shall be complete including pumps, drives, piping, piping headers, valves, flow meter, controls, and appurtenances as required for a complete system.

B. The pumps, drives, and controls shall be designed and built for 24-hour continuous service at any and all points within the required range of operation, without overheating, without cavitation, and without excessive vibration or strain. All parts shall be so designed and proportioned as to have the strength, stability, and stiffness

and be constructed to meet the specified requirements. Methods shall be provided for inspection, repairs, and adjustment.

C. All equipment shall be suitable for outdoor operation under adverse weather conditions. Provide protection from freezing as required to maintain system operation.

D. Each pump shall be able to pass typical municipal sewage.

E. Pumps shall be provided with noise protective acoustically-silenced enclosures that meet all local, MA DEP, and Local construction noise requirements and as a minimum: 80 dBA at seven feet; 65 dBA at thirty feet; 60 dBA at nearest residence; and less than 10 dBA raised above background levels; and no pure tone condition. Contractor shall be responsible for all materials, labor, and equipment to show compliance with the above requirements.

2.2 ADDITIONAL EQUIPMENT

A. Provide all required suction and discharge pipe and fittings, discharge manifold pipe and fittings, shutoff valves, check valves, flow meter, pressure regulating valves, insulation, freeze protection, and all required accessories.

B. All pipe and fittings shall be steel with flanged or quick connect coupling connections, or high density polyethylene pipe with fused joints or approved equal. Joints shall be Victaulic or equal. Suction piping shall be rated for 25-in Hg vacuum. Discharge piping, fittings, connections, valves, and other discharge piping accessories shall be rated for a minimum working pressure of 150 psi.

C. Lay flat hose shall be extra heavy duty, highly abrasive resistant and fitted with gasketed couplings. Hose shall be rated for a minimum working pressure of 150 psi.

D. Aluminum “irrigation” type piping or glued PVC pipe will not be allowed.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor must provide for 100% redundancy (two pumps shall be provided AT THE SITE for every one pump required) if flow cannot be returned to the sewer at any time if pumping system failure occurs. Redundant pump shall include suction and discharge piping.

B. The Contractor shall adequately handle all flow, even instantaneous peak flows, without damage or overflow. The Contractor shall make himself aware of potential large instantaneous flow contributors connected to the sewer.

C. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance or Work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

D. The by-pass pumping system shall not require excavation to reduce the suction lift without approval of the Engineer. Pumps may not be benched down to make the suction lift unless approved by the Engineer.

E. The Contractor shall exercise caution and comply with OSHA requirements when working in the presence of gases, combustible or oxygen-deficient atmospheres, and confined spaces.

3.2 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610 - Delivery, Storage, and Handling and as specified herein. Ship equipment, materials and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

B. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

C. Deliver spare parts at same time as pertaining equipment.

D. Store and safeguard equipment, material, and spare parts.

3.3 INSTALLATION

A. Install pumping units on a firm level surface.

B. Equipment failing to meet specific conditions shall be removed and replaced at no additional cost to the Owner.

3.4 FIELD TEST AND QUALITY CONTROL

A. The piping system must provide adequate water tightness. The Engineer may require the Contractor to perform a leakage test with clean water if in the Engineer’s sole opinion the piping system appears as though it may leak.

B. Any such testing shall be to the Engineer’s satisfaction and shall be at the Contractor’s expense.

C. In the event that a unit fails to pass a test, make all modifications required to place the unit in proper working order.

D. In the event that a unit fails a test a second time, remove the unit and replace with a satisfactory one, at no cost to the Owner.

E. The Contractor shall provide all necessary instrumentation, equipment, devices, and appurtenances, as well as temporary wiring or piping, required to perform field tests.

3.5 SYSTEM OPERATION

A. The by-pass pumping operations must be attended at all times. Unattended by-pass will not be allowed. If by-pass pumping must continue past working hours an attendant must be present at all times.

B. Perform all required maintenance on the equipment to maintain the system integrity and capacity as specified.

C. Provide clean-up and disposal of contaminated material and reporting for all product spills.

D. At the completion of the period of service, disconnect all temporary piping and remove all system components from the site. Restore the work site to its original condition

3.6 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION 02538

SECTION 02570

SEWERS AND MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for the proposed sewer pipelines and associated items.

B. The work includes furnishing and installing sewer pipes, fittings, manholes, and other structures and appurtenances required and in accordance with the Drawings and Specifications.

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. List of materials proposed and manufacturers' specifications and installation instructions.

B. Shop drawings for all material and structures prior to ordering materials, including pipe materials, connections, fittings and valves, and component construction, features, configuration, and dimensions.

1.4 INSPECTION

A. The supplier is responsible for the provisions and all test requirements specified in ASTM D2241 for PVC pressure rated sewer pipe. In addition, all PVC pipe may be inspected at the plant for compliance with these specifications by an independent testing laboratory selected and paid for by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections.

B. Inspection of the pipe may also be made after delivery. The Contractor shall furnish all labor to assist the Engineer in inspecting the pipe. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though pipe samples may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the site at once.

C. Imperfections in materials may be repaired, subject to approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval.

1.5 DELIVERY, STORAGE & HANDLING

A. All materials shall be adequately protected from damage during transit. Pipes shall not be dropped.

B. All pipe and other appurtenances shall be inspected before placement in the work and any found to be defective from any cause, including damage caused by handling, and determined by the Engineer to be unrepairable, shall be replaced at no cost to the Owner.

C. Storage and handling of pipes, manholes and other sewer system appurtenances shall be in accordance with the manufacturer's recommendations, subject to the approval of the Engineer.

D. Only nylon-protected slings shall be used for handling the pipe. No hooks or bare cables will be permitted.

E. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.

PART 2 - PRODUCTS

2.1 POLYVINYLCHLORIDE (PVC) PIPE

A. Gravity Pipe and Fittings: Gravity pipe shall be SDR 35 PVC with rubber rings and shall meet the requirements of ASTM D3034.

B. Joints: Rubber rings shall conform to ASTM F477 and joints shall be design tested to the requirements of ASTM D3139. Rubber rings capable of withstanding a pH of 9.5, and shall be petroleum resistant. Rubber rings shall provide a tight seal that protects the line from shock and vibration, and compensates for expansion and contraction of pipe lengths.

C. Gasketed joints shall meet the requirements of ASTM D3212.

D. Insulation: Extruded closed-cell rigid formed polystyrene, equal to "Styrofoam: HI-60" by Dow Chemical. Size is 2-inch thick by 4 feet wide.

E. Detectable Underground Warning Tape: Warning tape shall be labelled "Caution: Buried Sewer Line Below" colored according to the APWA standards. The warning tape shall be made from 5-mil, triple layer lamination of aluminum foil core encosed in 100% virgin polyethelene. The tapes shall withstand temperatures from -40 degrees F to 150 degrees F.

E. Building Services and Fittings:

1. Size of services as indicated on the Drawings.
2. Provide wye fitting on main line pipe. Extend services to property line or as otherwise indicated on drawings.
3. Provide clean outs as shown and detailed on drawings.

2.2 MANHOLES

A. Precast Units:

1. Structure: Four foot (4') and five foot (5') minimum inside diameter precast units (4,000 psi minimum compressive strength) with eccentric cone section tapering to twenty-four inch (24") diameter (minimum), or flat top as required, and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Flat tops shall be used where manholes are less than eight feet (8') deep. Manhole wall thickness shall be 5 inches, minimum.

2. Precast Unit Joint Seals: Butyl joint sealant conforming to ASTM C990. Joint seal shall fill 80% of the joint cavity.

3. The date of manufacture, trademark and name of the manufacturer shall be clearly marked on the inside of each precast section.

B. Masonry:

1. Brick for construction of inverts and for minor grade adjustments shall be Grade SS conforming to ASTM C32. Red clay sewer brick shall be used and the inverts shall be smoothly rounded to the direction of flow. Grade MS shall be used for manhole structures and applications other than inverts and shelves.

2. Mortar shall be composed of one part Type II Portland cement (ASTM C150), two parts sand (ASTM C144), well graded with no grain larger than will pass a Number 8 sieve, and 20 percent hydrated lime conforming to ASTM C207 Type S.

3. Cement shall be Type I or II Portland cement conforming to ASTM C150, Standard Specification for Portland cement. Where masonry is exposed to salt water, Type II shall be used.

4. Hydrated lime shall be Type S conforming to ASTM D207.

5. Sand for masonry mortar shall conform to the gradation requirements of ASTM C144.

C. Manhole Frame and Cover: Provide heavy duty cast iron frame and cover, with the word "SEWER" embossed on cover. Letter size shall be two inches. Frame shall have a clear opening dimension of 24 inches and the frame shall be 6 inches deep. Frame and cover set shall be 26" Manhole Frame and Cover as manufactured by EJ, or equal.

D. Pipe Connections: Flexible sleeve or rubber gaskets shall be fastened with stainless steel clamps and shall be Lock-Joint, Kor-N-Seal, or approved equal.

E. Dampproofing Bitumastic Coating: The entire exterior surface of all manholes shall be coated with two coats of an approved bitumastic material using cutback asphalt, AASHTO M81 or M82, Asphalt emulsion AASHTO M140 or approved equal, at 5 gallons per 100 square feet minimum per coat to produce a dry film thickness of 0.07 inches (7 mils) per coat. Touch up in the field prior to backfilling as required by ENGINEER.

F. Drop Manholes Riser Support Bracket: 10 gauge, type 304, No. 3 finish stainless steel.

G. Rungs: Manhole rungs shall be steel reinforced copolymer polypropylene plastic. Rungs shall be 14 inches wide. Copolymer polypropylene shall be Type II, grade 16906 meeting ASTM specifications D2146. Steel reinforcing shall be 3/8-inch diameter, grade 60 conforming to ASTM Specification A615 and shall be continuous throughout the rung. The portion of the legs to be embedded in the precast section shall have fins and be tapered to ensure a secure bond. Manhole rungs shall be spaced 12 inches apart.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILLING

A. The type of materials to be used in bedding and backfilling and the method of placement shall conform to the requirements of Section 02200– Earthwork, and the details shown on the Drawings.

3.2 PIPE INSTALLATION

A. All sewer piping shall be laid accurately to the lines and grades shown in the Drawings and in conformance with pipe manufacturer's recommended procedures.

B. Laying Pipe: Each length of pipe shall be laid with firm, full and even bearing throughout its entire length, in a prepared trench. Pipe shall be laid with bells upgrade unless otherwise approved by the Engineer.

Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. The interior of the pipe and the jointing seal shall be free from sand, dirt and

trash. Extreme care shall be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly lubricated and assembled.

No length of pipe shall be laid until the proceeding lengths of pipe have been thoroughly embedded in place, to prevent movement or disturbance of the pipe alignment.

Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.

C. Pipe Extension: Where an existing pipe is to be extended, the same type of pipe shall be used, unless otherwise approved by the Engineer.

D. Full Lengths of Pipe: Only full lengths of pipe shall be used in the installation except that partial lengths of pipe may be used at the entrance to structures, and to accommodate the required locations of service connection fittings.

E. Pipe Entrances to Structures: All pipes entering structures shall be cut flush with the inside face of the structure, and the cut ends of the pipe surface within the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede or affect the hydraulic characteristics or the sewage flow. The method of cutting and finishing shall be subject to the approval of the Engineer.

F. Protection During Construction: The Contractor shall protect the installation at all times during construction, and movement of construction equipment. Vehicles and loads over and adjacent to any pipe shall be performed at the Contractor's risk and in accordance with all applicable federal, state and local safety regulations.

At all times when pipe laying is not in progress, all open ends of pipes shall be closed by approved temporary water-tight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been properly dewatered and all danger of water entering the pipe eliminated. The Contractor is responsible for proper dewatering to ensure a stable pipe foundation. Proper dewatering to two feet (minimum) below the pipe invert to ensure joining of the pipe in a dry condition.

G. Water Pipe – Sewer Pipe Separation: When a sewer pipe crosses above or below a water pipe, the following procedures shall be utilized. The Contractor shall comply with these following procedures.

1. Relation to Water Mains

a. Horizontal Separation: Whenever possible sewers shall be laid at a minimum at least ten feet (10'), horizontally from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet to a water main, if:

i. It is laid in a separate trench, or if

ii. It is laid in the same trench with the water mains located at one side on a bench of undistributed earth, and if

iii. In either case the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.

b. Vertical Separation: Whenever sewers must cross under water, sewer is at least eighteen inches (18") below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of ten feet (10') on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

c. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement lined ductile iron pipe or other equivalent based on water tightness and structural soundness. Both pipes shall be pressure tested by an approved method to assure water tightness or both pipes shall be encased in concrete.

3.3 PVC PIPE JOINTS

A. All joints shall be made watertight.

B. Pipe shall be jointed in strict accordance with the pipe manufacturer's instruction. Jointing of all pipes shall be done entirely in the trench.

C. PVC Pipe

1. Lubricant for jointing of PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the supplied by the pipe manufacturer.

2. PVC pipe shall be pushed home by hand or with use of a bar and block. The use of power equipment, such as a backhoe bucket, shall only be used at the direction of the manufacturer.

3. The position of the gasket shall be checked to insure the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint.

4. Field-cut pipe ends shall be cut square and the pipe surface beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

3.4 MANHOLES

A. General Requirements: All manholes shall be built in accordance with the Details and in the locations shown on the Drawings. Structures shall be constructed of precast concrete or brick masonry as depicted in the drawings. Personnel experienced and skilled in this work shall install all masonry, and any person not deemed to be such by the Engineer shall be removed and replaced by a person so qualified. Manholes shall be constructed as soon as the pipe laying reaches the location of the manhole. Should the Contractor continue laying pipe without making provisions for completion of the manhole, the Engineer shall have the authority to stop the pipe laying operations until the manhole is completed. The Contractor shall accurately locate each manhole and set accurate templates to conform to the required line and grade. Any manhole that is incorrectly located or oriented improperly shall be removed and rebuilt in its proper location, alignment and orientation at no additional cost to the Owner.

B. Foundations: The excavation shall be dewatered to provide a dry condition while placing bedding material and setting the base.

D. Inverts: Brick invert channels shall be constructed in all manholes to provide a smooth channel for sewage flow through the structure, and shall correspond in shape to the lower half of the pipe and extended vertically to the pipe crown. At changes in directions, the inverts shall be laid out in curves of the longest possible radii tangent to the centerline of the sewer pipes at the manhole side. Shelves shall be constructed to the elevation of the highest pipe crown and sloped to drain toward the flow channel at one inch per foot (1”/foot).

Special care shall be taken in laying brick inverts. Joints shall not exceed three-sixteenth inch in thickness and each brick shall be carefully laid in full cement mortar joint on bottom, side and end in one operation. No grouting or working in of mortar after laying of the brick will be permitted. Bricks forming the shaped inverts in manholes shall be laid on edge.

Invert channels shall be built for future extensions where shown on the Drawings and where directed by the Engineer.

E. Precast Manholes: Precast manholes shall be installed only after Shop Drawings have been approved. The top grade of the precast concrete cone section shall be set sufficiently below finished grade to permit a maximum of five and a minimum of two courses of eight inch brick to be used as risers to adjust the grade of the manhole frame. Manhole frames shall be set on a grout pad to make a watertight fit.

3.5 CONNECTIONS TO EXISTING FACILITIES

A. General Requirements: The Contractor shall make all required connections of the proposed sewer into existing sewer system, where and as shown on the Drawings and as required by the Engineer.

B. Compliance with Requirements of Owner of Facility: Connections into existing sewer facilities shall be performed in accordance with the requirements of the Owner

of the facility. The Contractor shall comply with all such requirements, including securing of all required permits, paying the costs thereof, and providing twenty-four (24) hour notice prior to beginning the work.

3.6 PIPE CONNECTIONS TO NEW STRUCTURES

A. Pipe connections for precast structures may be accomplished by the method described below. The Contractor shall make sure that the outside diameter of the pipe is compatible with the particular pipe connection used.

1. KOR-N-SEAL (or approved equal) neoprene boot cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

2. LOCK-JOINT (or approved equal) rubber-like flexible sleeve cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

B. Sewer manholes shall be constructed with interior drop connections when the proposed invert of the connection is at least two feet nine inches (2'-9") above the manhole invert. Drop connections for differences of less than two feet nine inches (2'-9") shall also be provided if approved by the Engineer.

C. Each manhole pipe connection shall begin with a five-foot (5') stub prior to laying a full section of pipe. Pipe stubs for future connections shall be installed in the locations shown on the drawings and the stub ends shall be sealed with a watertight plug.

3.7 PRESSURE TESTING OF SEWER GRAVITY MAIN

A. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall install suitable bulkheads as required, dewater and test the sewer for leakage.

B. Unless otherwise approved, the section shall be tested using low pressure air test procedures. If circumstances permit, the Engineer may allow testing by infiltration or exfiltration in lieu of air testing.

C. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psi. The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. The two tables are reproduced on the following pages.

D. The pipeline shall be made as nearly watertight as practicable, and leakage tests and measurements shall be made after the pipeline has been backfilled. Where the

groundwater level is more than 1 ft. above the top of the pipe at its upper end, the Contractor, with the authorization of the Engineer, conduct either infiltration tests or low pressure air test. Where the groundwater level is less than 1 ft. above the top of the pipe at its upper end, the Contractor, with the authorization of the Engineer, shall conduct either exfiltration tests or low pressure air tests. At the time of the test, the Contractor shall determine the groundwater elevation from observation wells, excavations or other means, all subject to review by the Engineer.

E. For making the low pressure air tests, the Contractor shall use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low pressure air. The equipment shall be provided with an air regulatory valve or air safety so set that the internal air pressure in the pipeline cannot exceed 8 psig.

F. The leakage test using low pressure air shall be made on each manhole-to-manhole section of pipeline after placement of the backfill. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

G. All air used shall pass through a single control panel.

H. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig. greater than the maximum pressure exerted by the groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed 8 psig. When the maximum pressure exerted by the groundwater is greater than 4 psig., the Contractor shall conduct only an infiltration test. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig. (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:

Pipe diameter in inches	Minutes
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	9.0
21	10.0
24	11.5
27	13.0

I. For making the infiltration and exfiltration tests, the Contractor shall furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests on sections of acceptable length.

J. For making the infiltration tests, under drains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable.

K. Upon completion of a section of the sewer, the Contractor shall dewater it and conduct a satisfactory test to measure the infiltration for at least 24 hours. The amount of infiltration, including manholes, tees, and connections, shall not exceed 200 gal. per inch diameter per mile of sewer per 24 hours.

L. For making the exfiltration tests, the sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 ft. above the top of the sewer at its upper end. Where conditions between manholes, may result in test pressures which would cause leakage at the stoppers in branches, provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure. The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level 2 ft. above the top of the pipe.

M. Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified. The sewers, including, but not limited to mainlines, services, chimneys, and fittings, shall be tested before any connections are made to buildings. The Contractor shall construct weirs or other means of measurements as may be required. Suitable bulkheads shall be installed, as required, to permit the test of the sewer.

N. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.

O. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedures for any reason, acceptable modifications in the procedures shall be made as required, but in any event, the Contractor shall be responsible for the ultimate tightness of the line within the above test requirements.

3.8 MANHOLE LEAKAGE TESTS

A. Leakage tests shall be made by the Contractor, and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below.

B. Vacuum Test: The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from are shown as follows.

Minimum Test Times for Various Manhole Diameters

	Diameter (Inches)		
Depth (Feet)	48	60	72

		Times (Seconds)	
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. Water Exfiltration Test: After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.

1. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the Contractor, so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as directed by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as directed by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure

the Engineer that the water table is below the bottom of the manhole throughout the test.

3. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.9 CLEANING AND REPAIR

A. The Contractor shall clean the entire sewer system of all debris and obstructions. This shall include, removal of all formwork from structures, concrete and mortar droppings, construction debris and dirt. The system shall be thoroughly flushed clean and the Contractor shall furnish all necessary hose, pumps, pipe and other equipment that may be required for this purpose. No debris shall be flushed into existing sewers, storm drains or streams. All work of cleaning and repair shall be performed at no additional cost to the Owner.

3.10 DEFLECTION TESTING

A. Allowable Deflection Test

1. Pipe deflection measured not less than ninety days (90) after the backfill has been completed as specified shall not exceed five (5.0) percent. 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.

2. Deflection shall be measured with a rigid mandrel (Go/No-Go) device cylindrical in shape and constructed with a minimum of nine or ten evenly spaced arms or prongs. Drawings of the mandrel with complete dimensions shall be submitted to the Engineer for each diameter of pipe to be tested. The mandrel shall be hand pulled by the Contractor through all sewer lines.

3. Any section of sewer not passing the mandrel shall be uncovered at the Contractor’s expense and the bedding and backfill replaced to prevent excessive deflection. Repaired pipe shall be retested.

3.11 FINAL INSPECTION

A. Upon Completion of the work, and before final acceptance by the Engineer, the entire sewer system shall be subjected to a final inspection in the presence of the Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, leakage tests and other requirements have been met.

END OF SECTION 02570

SECTION 02576

PAVEMENT, SIDEWALK AND CURBING

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. This section includes the removal and replacement of existing bituminous pavement and sub-base; installation of trench pavement; removal and replacement of curb and gutter (as required); installation of bituminous berm; removal and resetting of curbing (as required); raising and adjusting castings and valve boxes; and installation of pavement markings.

1.2 RELATED WORK

A. Earthwork specifications are included in Section 02200.

B. Appendix F of the specifications – MassDOT Details.

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, Highway Department (MassDOT), shall apply to materials 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 time 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 and top (wearing) 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:

1. 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. Base Course: ¼-inch, plus no minus

2. Top Course: ¼-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, unless approved by the Engineer.

3. Apply prime and tack coats when ambient temperature is above 50°F and when temperature has not been below 35°F 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 structures along pipeline route.

1.7 GUARANTEE

A. All pavement placed in 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 Owner, including the cost of Traffic Police. Settlement in excess of one (1) inch shall be considered significant, and shall be repaired.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Bituminous concrete shall conform to Class I Bituminous Concrete Pavement, Type I-1, of Section 460 of the Massachusetts Highway Department Standard Specifications.

C. Binder Course and Modified Top Course shall conform to the Massachusetts Highway Department Standard Specifications, Section M3.11.00, Class I, bituminous concrete.

D. Tack coat shall be emulsified asphalt, grade RS-1 and conform to the Massachusetts Highway Department Standard Specifications, Section M3.03.0.

E. Cutback asphalt shall conform to the Massachusetts Highway Department Standard Specifications, Section M3.02.0.

F. Sub-base material shall be new processed gravel conforming to the Massachusetts Highway Department Standard Specifications, Section M1.03.1 “Processed Gravel for Sub-Base”.

G. Pavement markings shall conform to the Massachusetts Highway Department Standard Specifications, Section M7.01.03 - White Thermoplastic Reflectorized Pavement Markings and M7.01.04 - Yellow Thermoplastic Reflectorized Pavement Markings.

PART 3 – EXECUTION

3.1 GENERAL

A. Materials for pavement shall be mixed, delivered, placed, compacted, and tested in accordance with the referenced specification, Sections M3.11 and 460 and as specified herein.

B. Whenever the sub-base becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

C. 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.

D. Pavement Construction Period. No pavement shall be constructed during the period from November 15 to April 15 without approval in writing from the Engineer.

3.2 PREPARATION

A. Protection of existing Roadways:

1. Prior to pavement installation, 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 Sub-base:

a. Pavement sub-base material shall be as specified in Section 02200, and as shown on the Drawings.

b. The sub-base to be placed under pavement shall be a minimum of 12-inches thick after compaction. Sub-base shall be evenly spread and thoroughly compacted in accordance with the Contract Documents. The sub-base shall be spread in layers not more than 8 - 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 sub-base preparation, including dynamic compaction, for full width before placing surfacing materials.

2. Subgrade:

a. Prepare subgrade in accordance with Section 02200.

b. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials.

c. Stabilize subgrades in accordance with Section 02200 so that loaded construction vehicles do not cause rutting or displacement when depositing materials.

3.3 INSTALLATION

A. General

1. Pavement depths shall be as shown on Drawings or as specified herein.

2. Place bituminous concrete mixture on prepared surface, spread, and strike-off. Spread mixture at minimum temperature of 225 ˚F (107 ˚C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness. Protect all adjacent construction from staining with mix or damage by mechanical equipment. Clean, repair, or replace any construction stained or damaged at no additional cost to the Owner.

B. Trench pavement:

1. In all areas, a layer of hot-mix asphalt pavement shall be placed wherever existing pavement has been removed or disturbed plus a cut back area of 12 inches as soon as practical after backfilling is completed. All pavement edges shall be square and straight. Irregular, jagged edges will not be allowed.

2. The pavement sub-base shall be excavated, graded, and compacted to a depth of 12-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 sub-base surface is dry.

4. The pavement shall consists of a hot mixed binder course and hot mixed Type I modified top course placed and compacted to a total thickness as specified on the design Drawings 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. All pavement edges shall be painted with cutback asphalt, and all surfaces with tack coat, to insure a satisfactory bond between old and new pavement. Tack coat and cutback asphalt shall be applied immediately prior to placement of overlay pavement.

6. The trench pavement shall meet existing pavement at the same grade without overlapping or feathered edges.

C. Pavement Placement

1. Unless otherwise permitted by the Engineer for particular conditions, only machine methods of placing shall be used. Methods other than machine

methods may be used, at no additional cost to the Owner. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture true to line, grade, width, and crown. The mixtures shall be placed and compacted only at such times as to permit proper inspection and checking by the Engineer.

2. After the paving mixtures have been properly spread, initial and immediate compaction shall be obtained by the use of steel rollers having a weight of not less than 240 pounds per inch width tread. Begin rolling when mixture will bear roller weight without excessive displacement. Compact mixture with hot tampers or vibrating plate compactors in areas inaccessible to rollers. Accomplish breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material. Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

3. Final rolling of the pavement shall be performed by a steel wheel roller weighing not less than 285 pounds per inch width of tread at a mix temperature and time sufficient to allow for final smoothing of the surface and thorough compaction. Continue rolling until roller marks are eliminated and course has attained maximum density.

4. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to match surrounding surface density and smoothness.

5. Immediately after placement of new pavement, make joints between existing and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other section of bituminous concrete course. Clean contact surfaces and apply tack coat. All joints between the existing and new pavements shall be keyed on an angle (4' x 10') or as approved by the Owner, and shall be sealed with bitumen RS-1 and sanded.

6. The Contractor shall furnish and install paving to provide transition or aprons for driveways and walkways impacted by new pavement installation.

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 trench pavement. 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.

2. Glass spheres (beads) used to reflectorize paint shall conform to Massachusetts Highway Department (MHD) specifications Glass Beads M7.01.07.

H. 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.

I. Sidewalk and Driveway Replacement:

1. Gravel shoulders:

a. Gravel shoulders shall be restored to a condition at least equal to that existing immediately before the work was started.

2. Bituminous concrete sidewalks and driveways:

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 or driveway shall be a minimum of 3 inches compacted inches thick, laid in two equal courses.

d. Sidewalk cross slopes can not 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. General:

a. Valve boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grades.

J. Berms and Curbing

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 MassDOT Type A machine laid and conform to the grade of the roadways. Berms shall be placed in accordance with MHD Specification 470.20.

3. The underlying pavement shall be broom cleaned and tacked prior to placement.

4. The bituminous berm will be placed in one lift and will be compacted by a smooth steel wheel roller of a type and weight acceptable to the Engineer. Any portions of the completed berm that are not satisfactorily compacted, show signs of cracking or distortion, do not conform to the required lines, grades, or cross section, and that cannot be satisfactorily repaired, shall be removed and replaced at no additional cost to the Owner.

3.4 PROTECTION

A. Protect replacement work with barricades or other devices as approved by Engineer so that no damage occurs as a result of subsequent construction operations.

1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

2. Repair damages or other irregularities to satisfaction of Engineer, at no additional cost to the Owner, before final acceptance by the Engineer.

END OF SECTION 02576

SECTION 02616

DUCTILE IRON PIPE AND FITTINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, equipment, labor and incidentals; provide for the installation and testing; of all ductile-iron pipe and fittings, as indicated and specified.

1.2 RELATED WORK

A. Earthwork specifications are included in Section 02200.

B. Water service connection specifications are included in Section 02725.

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Submit shop drawings or descriptive literature, or both, showing dimensions, joint and other details for each type and class of pipe, fitting and restraint system to be furnished for the project. All materials furnished under the Contract shall be manufactured only in accordance with the Specifications. Submittals shall include material information, dimensions, pipe class information, weights, coating and lining system data.

2. Submit manufacturer's Certificates of Compliance with these Specifications and certification that the ductile iron pipe and fittings have been manufactured and tested in accordance with AWWA/ANSI specifications.

3. Submit the vendor's name, address and contact phone number for all materials to be furnished under the contract.

4. Submit a detailed description of the proposed testing, flushing and disinfection procedures to be used for this project. This description shall contain the name of the person responsible for testing, flushing and disinfection work equipment and chemicals to be used; and method of measuring flow during flushing procedures. Submit the name of the laboratory to be used for analysis. Review of this description shall not be construed as an approval of any methods to be used; the Contractor shall be fully responsible for achieving the specified test results.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Inspect and test at foundry according to applicable standard specifications.

C. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at their own expense.

D. Visually inspect and hammer test before installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610.

1.6 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.

B. American Water Works Association (AWWA)

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pressure Pipe and Fittings

2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings for Water

4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

5. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges

6. AWWA C150 - Thickness Design of Ductile-Iron Pipe

7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids

8. AWWA C153 - Ductile-Iron Compact Fittings, 3-in through 16-in for Water and Other Liquids

9. AWWA C219 – Standard for Bolted, Sleeve-Type Couplings for Plain-End Pipe

10. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances

11. AWWA C651 - Disinfecting Water Mains

A. American National Standards Institute (ANSI)

1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings

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. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push-on type, restrained joint, or mechanical joint, as required.

B. Ductile iron pipe shall conform to the latest edition of AWWA C150 and C151, Class 52 and shall have push-on joints.

C. Gaskets shall meet the material requirements of ANSI/AWWA C111 for mechanical joint gaskets. Pipe shall be manufactured in the United States.

D. Fittings shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be manufactured in the United States. Fittings shall be made of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends.

1. Hydrant tees shall have a rotatable mechanical joint gland on the 6-inch plain end branch to provide positive valve restraint, unless otherwise allowed by the Engineer.

2. Caps and plugs, installed in all new work as indicated on the drawings, shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to a future connection.

3. All nuts and bolts shall be shall be of a type equal to ductile iron or KOR-10 steel T-bolts and nuts or equal.

E. All pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. All pipe and fittings shall be

cement-mortar lined and seal coated in accordance with AWWA C104, latest edition. Cement mortar lining shall be double thickness.

F. Joints for pipe and fittings shall be push-on or mechanical joints conforming to AWWA C111, latest edition.

G. Restraint joints shall be furnished for thrust restraint for installation on all fittings and valves, where indicated on the drawings, or where required by the Engineer. Series 1100 Megalug as manufactured by EBAA Iron, or approved equal.

H. Restraints for push-on joints shall be Stargrip Series 3100P as manufactured by Star Pipe Products, Series 1700 as manufactured by EBAA Iron, or approved equal.

I. Couplings shall be provided with AWWA approved plain, Grade 27, rubber gaskets and track-head bolts with nuts. Coupling shall be Smith Blair Style 441 or Dresser, Style 153, 360 or an approved equal.

J. Polyethylene pipe encasement shall conform to requirements of AWWA C105, latest edition. Virgin polyethylene shall conform to ANSI/ASTM D1248. Minimum nominal thickness shall be 8 mils.

K. Insulation shall be 2-inch thick polyisocyanurate foam with a density of 2.0 lbs/cf^3. A 30-mils thick bitumen adhesive shall be used as a vapor and moisture barrier for direct burial applications.

2.2 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 – EXECUTION

3.1 HANDLING PIPE

A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling, and installation. Joint ends of pipe shall be kept especially clean.

B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.

C. Only nylon-protected slings shall be used for handling the pipe. No hooks, chains or bare cables will be permitted.

D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight and ozone producing electric motors.

3.2 LAYING DUCTILE IRON PIPE AND FITTINGS

A. The Contractor will be responsible for transporting materials to the job site as needed. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. The engineer shall examine all pipes and fittings prior to installation. Any pipe or fittings found defective shall not be installed and immediately removed from the site. Any damage to pipe linings or coatings may be repaired as directed by the Engineer, or removed from the site. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein. Any materials damaged during loading, transporting or unloading shall be replaced at the Contractor's expense.

B. Jointing of ductile iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. All pipe and fittings shall be thoroughly cleaned before laying; shall be kept clean until they are used in the work; and when installed, shall conform to the lines and grades required. Special care is required in cleaning the ends of the pipe; wipe the outside of the spigot end with a clean rag prior to applying lubricant; brush clean the inside of the bell end, paying special attention to the rubber joint area, prior to installing the gasket and lubricant; and check inside the pipe for overall cleanliness.

C. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, latest edition, except as otherwise provided herein. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to insure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected common fill along the sides of the pipe forming a cradle under the pipe. Tamping shall continue until the fill is 1-foot over the top of the pipe. Pipe installation in rock shall be constructed as shown on the drawings. (See Detail Sheet/Drawings). A 5-foot minimum cover shall be maintained over the top of the pipe. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his/her own expense.

D. All pipe shall be sound and clean before laying. During pipe installation, care should be taken to protect the open end of the pipe. When installation is not in progress,

including lunch time, the open ends of the pipe shall be closed with watertight plugs or other approved means. Good alignment shall be preserved during installation. Fittings, in addition to those shown on the Drawings, shall be provided, when required, for crossing utilities which are encountered during trench excavation. Solid sleeves shall be used only where approved by the Engineer.

E. When pipe cutting is required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall remain undamaged.

F. The Contractor shall have on hand at the start of the job, the following additional bends for each size of pipe to be installed: two 1/32 bends, two 1/16 bends and two 1/8 bends. These bends shall be replaced each time job conditions require their use.

G. Existing Utilities. To the extent possible, the Contractor shall maintain a minimum 10 ft. lateral separation between the new water mains and existing sanitary sewers, unless otherwise directed by the Engineer.

H. When crossing an existing sanitary sewer, the water main is preferred to cross above the sewer. The Contractor shall maintain an 18-inch clearance between the bottom of the water main and crown of the sanitary sewer. At crossing, the center of a full length of water pipe shall be located above the sewer so that both joints will be located as far from the sewer as possible. The engineer may direct this full length of main to be concrete encased when the 18-inch clearance is not possible, or when the water main is placed below the sanitary sewer.

I. The Contractor shall maintain a minimum clearance between the new water main and all other existing utilities of at least 12 inches.

J. New water mains shall pass under all existing utilities, except sewers unless otherwise noted on the Drawings or directed by the Engineer.

K. Ductile iron pipe installed within 5 feet of gas lines shall be fully encased with polyethylene material. Polyethylene shall be 8-millimeters thick and comply with AWWA C105, latest edition.

L. Ductile iron pipe shall be wrapped in polyethylene encasement where pipe depth is at or below normal groundwater level.

M. Water pipe, to be installed with less than 5-foot cover or where shown on the drawings, shall be wrapped with an insulating foam jacket suitable for direct burial applications.

3.3 PUSH-ON JOINTS

A. Push-on joints shall be made in accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end. The plain end of the pipe being installed shall be aligned and inserted into the bell end of the pipe previously installed. It can then be pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

3.4 MECHANICAL JOINTS

A. Mechanical joints shall be made in accordance with Appendix A of AWWA C111 and the manufacturer's instructions. Wire brush surfaces to be in contact with the gasket and thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Check that the gasket has been seated in fitting before placing flange against gasket. With bolts inserted and nuts finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint with a torque wrench. Bolts shall all be tightened to the specified torque. When using pneumatic or electric impact wrenches to make up fittings, complete tightening using a torque wrench to the specified torque. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3.5 RESTRAINED JOINTS

A. Mechanical joint restraints shall be installed in full accordance with the manufacturer’s instructions. All bolt heads on Megalug restraints shall be tightened sufficiently so that they shear off to indicate the proper tightening torque was achieved.

B. Push-on joint restraints shall be installed in full accordance with the manufacturer’s instructions where directed by the Engineer.

3.6 SLEEVE TYPE COUPLINGS

A. Couplings shall be installed where shown. Couplings shall not be assembled until adjoining push-on joints have been assembled. Clean pipe ends for a distance of 8 inches. Mark each end six inches from the end. Use soapy water as gasket lubricant. Slip follower and gasket over each pipe to the 6-inch marks. Place the middle ring on the pipe end until centered over joint. Insert other pipe end into middle ring and bring to the proper position in relationship to the pipe installation. Press gaskets and followers into middle ring flares. Check gaskets have been seated into middle ring flares correctly. With bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts sequentially with a torque wrench to the specified torque as per manufacturer’s recommendation. After installation, apply a heavy bitumastic coating to bolts and nuts.

3.7 CONNECTIONS TO WATER MAIN

A. The Contractor shall make all connections to the existing mains as indicated in the Contract Documents.

B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing water mains shall be planned so as to interfere with the operation of the existing facilities for the shortest possible time.

C. The Contractor shall have all preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.

D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the requirements of the Owner.

E. Under no circumstances shall any customer be without water for a period of more than 4 hours without prior written approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install a temporary water service at no additional cost to the Owner.

F. The Owner does not guarantee a tight shut-off for existing local community water valves. The Contractor shall not submit a claim for damages due to delays in dewatering pipelines caused by water leaking through an existing closed valve, or having to dewater the excavation while making the connection. It is the Contractor's responsibility to provide the means to dewater the excavation while making the connection.

3.8 TESTING AND DISINFECTION

A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to lining and coatings.

B. The Contractor shall submit a plan on the method of testing and chlorinating the mains for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company, which will perform the work. Testing of the water main shall not begin until the Engineer has approved the Contractor's plan. All testing shall be done in the presence of the Engineer.

C. Testing of Water Main:

1. The Contractor, in accordance with ANSI/AWWA C600 specifications or latest revision thereof, will make all pressure and leakage tests to determine that the ductile iron pipe is structurally safe and free of excess leakage. The Contractor shall furnish all the equipment, materials and labor required for

testing. The Contractor shall furnish, at his own expense, all the water needed for all water main testing.

2. Testing shall be done in sections of the main not to exceed a 1,000-foot maximum length. Valves shall be placed in the off position at the ends of the sections to be tested. The Contractor shall provide means to prevent water from entering other parts of the pipeline not subject to testing at all times. Contractor will ensure that air release valves and other venting devices are properly installed and placed in open position when filling pipe with water. Hydrant laterals shall be in the open position during pressure testing.

3. After all entrapped air has been removed from the section; fill the main to the normal static pressure. The Contractor is allowed to let the main rest for up to 48 hours with static pressure. Using a special pressure pump, the Contractor shall raise the pressure to 200 pounds per square inch. The pump will then be shut off and separated from the test section by a globe valve. A fluid filled pressure gage, with a maximum reading of 250 psi, shall have been placed beyond the globe valve. The test section will then be monitored for a 2-hour period

4. This pressure shall be maintained, within 5 psi, for a minimum of 2 hours during which time the line checked for leaks by the Engineer. Based on an average test pressure of 200 psi, the measured rate of water leakage shall not exceed the following rates in the section under test:

$$L = \frac{12.25SD}{133{,}200}$$

Where: L = Allowable leakage, gallons per hour
S = Length of pipe section tested, feet
D = Nominal pipe diameter, inches

5. Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair same at his expense. Pipe shall be flushed and chlorinated when leakage does not exceed above standard. Approval does not absolve the Contractor from his responsibility if leaks develop within the new main or water services (to curb box) later within the warranty period.

6. A 24-hr notice to the City is required for all pressure tests.

D. Chlorinating and Flushing:

1. The Contractor, in accordance with the latest edition of ANSI/AWWA 651 Standard for Disinfecting Water Mains, shall chlorinate and flush the new water main. Chlorinated water to be flushed from the pipeline shall be de-chlorinated as shown on detail drawings or as approved by the Engineer. It

shall then be discharged to the nearest storm drain. Chlorinated water shall not be discharged to any natural water body.

2. Disinfection of new mains, including all chlorination, chlorination residual measurements, collection of samples, and certification shall be conducted by a third party testing agency approved by the DPW.

3. Prior to chlorination, the Contractor shall properly flush the water mains. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 2.5 feet per second, which is approximately 400 GPM in an 8-inch diameter main, 600 GPM in a 10-inch main, 900 GPM in a 12-inch main and 1,600 GPM in a 16-inch main. Flushing of the water main, at the above rates, for approximately 20-minutes per 1,000-foot section, will allow for three volume changes. This is a sufficient period of time for successfully cleaning the water main.

4. The Contractor shall chlorinate the water main until the main contains a solution containing 25 mg/L available chlorine. The valves shall then be closed and the chlorinated water allowed to sit in the mains for 24 hours. The main will then be checked to assure the chlorine residual shall be at least 10 mg/L. If less than 10 mg/L is measured, the Contractor shall flush and re-chlorinate the mains at no cost to the Owner. All valves and hydrants shall be operated to insure their proper disinfection. Valves shall be operated to prevent super chlorinated water from entering the existing distribution system. The Contractor shall then flush the mains until clear, clean water is being discharged.

5. Twenty-four hours after the main has been flushed of chlorinated water, bacteriological samples (total coliforms and heterotrophic plate count) shall be taken. Water samples shall be taken from corporation stops along the length of the water main as designated by the Engineer. A minimum of two (2) samples shall be taken on each street, or two per 1,000 feet of pipe, whichever is greater. Each sample shall be taken in duplicate, in sterile bottles and sent to a State approved private laboratory for analysis. The Contractor shall perform all necessary work including delivery of samples to a certified laboratory, and shall include the cost for sampling and analysis in his bid price. After an additional 24 hours, the same water shall be sampled and tested again. The results of the tests on these two samples will determine the acceptance of the work and allow these new mains to be connected to the City's system. The failure of any sample to pass the laboratory tests shall require the Contractor to reflush and re-chlorinate the mains and resample and test the water until acceptable results are obtained, all at no additional cost to the Owner. Two consecutive passing tests (at 24 hours and 48 hours after flushing) are required for acceptance.

6. If, during construction, trench water has entered the main, or if in the opinion of the Owner's Engineer, excessive quantities of dirt or debris have entered

the main, bacteriological samples shall be taken at 200-foot intervals and shall be identified as to location. Additional sample taps shall be installed and removed at the Contractor's expense.

6. Contractor shall note that work under this Contract shall not be considered complete until the satisfactory installation and testing of the water mains have been completed.

END OF SECTION 02616

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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 Discharge

3. Section 02212 – Rock Excavation

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 C139-05 Concrete Masonry units for Construction of Catch Basins and Manholes.

4. ASTM C270-08a Mortar for Unit Masonry

5. ASTM C443-05a Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

6. ASTM C478-08 Precast Reinforced Concrete Manhole Sections.

PART 2 - PRODUCTS

2.1 PE DRAIN PIPE MATERIALS

A. High Density Polyethylene (HDPE) Pipe. The pipe shall conform to MassDOT Section M5.03.10. Pipe shall be smooth interior wall and corrugated exterior wall, and be water-tight. Pipe shall be minimum 12-inch diameter. Ends shall be bell-and-spigot unless approved by the DPW for the specific application. Pipe shall comply with the requirements for test methods, dimensions and markings found in AASHTO Designations M252 and M294. Pipe shall support an HS-20 live load with a maximum deflection of 5% of the minimum pipe diameter. Pipe and fittings shall be made from virgin polyethylene compounds which conform to the applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D3350. Nominal sizes of 12- to 60-inch shall be either AASHTO Type 'S' or Type 'D.'

2.2 REINFORCED CONCRETE DRAIN PIPE (RCP) MATERIALS

A. Reinforced Concrete Pipe: Pipe and flared ends shall conform to the AASHTO M170 for Standard Strength Reinforced Concrete Culvert Pipe for class III Pipe, Wall B. or ASTM C76 for Reinforced Concrete Culvert and Storm Drain Pipe. All pipe 24 inches in diameter or smaller shall be of the bell and spigot type. Pipes larger than 24 inches in diameter shall be tongue and groove or bell and spigot. A preformed flexible plastic sealing compound of Butyl Mastic Rope Sealer ” 1" size, "EZ Stick" as manufactured by Concrete Products supply or an approved equal shall be used for sealing water-tight joints.

2.3 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: Four foot (4’) and five foot (5’) minimum inside diameter precast units (4,000 psi minimum compressive strength) with eccentric cone section tapering to twenty-four inch (24”) diameter (minimum), or flat top as required, and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Flat tops shall be used where

manholes are less than eight feet (8') deep. Manhole wall thickness shall be 5 inches, minimum.

1. The date of manufacture, trademark and name of the manufacturer shall be clearly marked on the inside of each precast section.

2. Precast Unit Joint Seals: Butyl joint sealant conforming to ASTM C990. Joint seal shall fill 80% of the joint cavity.

3. Type II cement.

4. Reinforcing Steel: ASTM A185, 0.12 sq. in./linear ft. and 0.12 sq. in. (both ways) base bottom.

5. Joints sealed with rubber gaskets conforming to ASTM C443.

C. Concrete Masonry Units: Concrete masonry units shall be made from hydraulic cement, water, and suitable mineral aggregates, and conform to ASTM C139.

D. Mortar shall be composed of one part Type II Portland cement (ASTM C150), two parts sand (ASTM C144), well graded with no grain larger than will pass a Number 8 sieve, and 20 percent hydrated lime conforming to ASTM C207 Type S.

E. Steps: Forged 6061B, T6 aluminum or Copolymer Polypropylene Plastic with 1/2 inch Grade 50 steel reinforcement.

F. PVC Structures: ASTM D1784, ASTM D2122 and ASTM D2564.

G. Pipe Connectors: Provide a hydraulic cement, no shrink grout, which shall be made watertight with the drainage pipe.

2.4 CAST IRON FRAME AND COVER

Frame and Cover: Provide heavy duty cast iron frame and cover, with the word "DRAIN" embossed on cover. Letter size shall be two inches. Frame shall have a clear opening dimension of 24 inches and the frame shall be 6 inches deep. Frame and cover set shall be 26" Manhole Frame and Cover as manufactured by EJ, or equal.

2.5 CAST IRON FRAME AND GRATE

A. Frame and Grate: Manufactured by EJ or equal

2.6 MASONRY MATERIAL

A. Concrete Masonry Units: ASTM C139.

B. Brick: ASTM C32, Grade MS or ASTM C62, Grade SW.

C. Mortar: ASTM C270, Type 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.

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 gravel.

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.

E. For CMU manholes, place masonry plumb, true to line, with level and accurately spaced courses, and each course breaking joint with course below. Make joints uniform in thickness with average thickness of any 3 consecutive joints 3/8 to 1/2 inch. Remove mortar splashed or smeared on finished surfaces with stiff bristle brushes as work progresses.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction testing will be performed in accordance with Section 02200.

C. If tests indicate Work does not meet specified requirements, remove work, replace and retest at no cost to the Owner.

3.7 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

3.8 FINAL INSPECTION

A. Upon Completion of the work, and before final acceptance by the Engineer, the entire drainage system shall be subjected to a final inspection in the presence of the Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, leakage tests and other requirements have been met.

END OF SECTION 02721

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SECTION 02725

WATER SERVICE CONNECTIONS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The work covered under this Section of the Specification includes furnishing all plant, labor, equipment and incidentals required in tapping (regardless of size) and performing all operations necessary to provide new water services from the new water main to the property line, including corporation stops, curb stops and boxes, as shown on the Drawings or as directed by the Engineer. In general, a service shall be brought to each developed parcel of property along the water main route. Trench excavation and backfilling shall be done in accordance with all of the applicable sections of these Specifications.

B. Corporation cocks shall be installed for connecting all service to the new water mains. The Contractor shall keep a record of the locations of all corporation cocks installed and shall indicate on the record those corporation cocks that have not been connected to service piping. A copy of this record shall be given to the Engineer at the completion of the work. Copper tubing, curb stops and necessary adapters shall be used to make connections between new corporation cocks and new and existing service piping. The Contractor shall be responsible for the removal and/or installation of curb stops in the locations directed by the Engineer.

C. All existing services shall be maintained until the new service connections have been fully installed, chlorinated and tested to the satisfaction of the Engineer. All service connections shall then be made to the mains as specified below. The Contractor shall connect each existing house service to the new service connections provided after the completed installation has been accepted by the Engineer. All abandoned services shall have ends crimped.

D. All service fittings, corporations and curb stops shall be provided with no lead meeting the current NSF requirements.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: Submit manufacturer's technical product data and installation instructions for materials and products.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing

B. American Water Works Association (AWWA)

1. AWWA C800 - Underground Service Line Valves and Fittings.

C. 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. All water service plumbing material shall be “lead free” in accordance with Section 1417 of the Safe Drinking Water Act and Section 9 of NSF Standard 61.

2.2 SERVICES

A. Unless otherwise specified, all pipe for services shall be type “K” copper tubing.

2.3 CORPORATIONS, CURB STOPS AND SADDLES

A. The corporation stops shall meet the most recent revision of the AWWA standard "Threads for Underground Service Line Fittings" (AWWA C800). Corporation stops shall be Mueller 300 Ball Corporation Valve, Model B-25008N, as manufactured by Mueller Company, The Ford Meter Box Company, or approved equal. Corporations larger than one inch shall be installed with saddles.

B. The curb stops shall meet the most recent revision of the AWWA standard "Threads for Underground Service Line Fittings" (AWWA C800). Curb stops shall be Mueller 300 Ball Curb Valve, Model B-25209N as manufactured by Mueller Company, Ford Meter Box Company, or approved equal. Curb Stops shall open Left.

C. The curb box shall be of the “Erie” type, cast-iron construction. The curb box shall be tar base enamel coated inside and out and shall be equipped with a stainless steel operating extension rod. The lid shall be of extra heavy cast-iron construction with a brass pentagon plug. Curb stop boxes shall be manufactured in North America only.

D. Service saddles (for services larger than one inch) shall be Smith-Blair 313 Double Strap. Bodies shall be ductile iron and straps shall be electrogalvanized carbon steel. Units shall be complete with Buna-N gaskets.

2.4 FITTINGS

A. Unless otherwise approved, only compression type fittings manufactured by Mueller Inc., or equal, shall be used.

B. Adapters required to allow connection to existing services shall be provided.

PART 3 – EXECUTION

3.1 INSTALLATION

A. After successful testing and chlorination, water services shall be installed as a "wet" tap as shown on the Drawings, specified, or directed by the Engineer. Exact locations of services shall be located in the field by the Engineer. All existing services shall be connected to the curb stop installed under this Contract. All services shall be installed to a minimum depth of 5'-0" unless specifically shown or directed otherwise by the Engineer.

B. Corporation cocks. The tapping machine shall be rigidly fastened to the pipe. The length of travel of the tap should be so established that when the stop is inserted and tightened with a 14-in wrench, not more than one to three threads will be exposed on the outside. When a wet tapping machine is used, the corporation cock shall be inserted with the machine while it is still in place. Stops shall be tightened only sufficiently to give watertightness and care must be constantly exercised not to overtighten them.

C. Saddle taps shall only be used for services larger than one inch or when transite (asbestos cement) pipe, PVC pipe, or HDPE pipe is encountered or under the direction of the Engineer.

D. Straight couplings. The Contractor shall install straight couplings to existing water mains of the sizes required in the locations designated by the Engineer in the field. The Contractor shall utilize the manufacturers recommended installation procedures while performing the work. Care shall be taken to ensure a watertight connection.

E. Curb stops will, in most cases, be installed 1.5-ft from the curb line or pavement limit. The Contractor shall install the curb cocks and boxes in a workmanlike manner as described herein and as directed by the Engineer and shall place compacted-screened gravel around and below the cock to permit ready draining of the pipe through the waste opening.

F. The boxes shall be set in a true vertical position and if they are within the limits of the roadway or within limits where the plowing of snow will take place in the winter, the tops of the boxes shall be set about 1/2-in below the top of the finished grade. In locations where these boxes are not likely to be disturbed, the tops shall be set flush with the adjoining ground.

G. Care shall be exercised in the placing and laying of water service tubing to be sure that the pipe does not have kinks or sharp bends and to assure against it being in

contact with sharp stones or ledge which would cause damage to the pipe. Service shall be installed with a minimum 6 inches of sand bedding and 12 inches sand cover.

H. For existing service connections that are less than 1-inch, the change over to the new main shall occur at the new 1-inch tap (1" to 3/4"). If any extensions are required to reach the existing water service, they shall match diameter in kind, except be no less than 1-inch. Water service tubing as specified herein shall be used to make connections between new corporation stops and new curb stops at the property line. If the service connection is greater than 1-inch, the same size water service tubing connection shall be installed. The Contractor shall be responsible for the removal and/or installation of curb stops and boxes in the locations directed by the Engineer.

I. The transfer of water connections from the old services to the new services shall be performed as quickly as possible in order to minimize the time in which water service is disrupted.

A. Unless otherwise specified, all pipes for services shall be 1” P.E. tubing with a 200 psi or greater rating and shall conform to the provisions of ASTM D2737 (latest version).

J. Water service trenches shall be excavated and backfilled in accordance with Section 02200 of this Specification and in conformance to the details. Services to be installed beneath paved roadways may be driven beneath the pavement utilizing a pneumatically driven device such as "Hole Hog", or equal. All copper tubing shall be backfilled with sand by hand to 12” above tubing.

END OF SECTION 02725

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 modern practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, the following:

1. Crossing and relocating existing utilities.

2. Cleaning up.

3. Incidental work.

4. Job pre-construction photographs.

5. Protection and/or removal and reinstallation of existing signs, lampposts, fence posts, fencing and mailboxes.

6. Protection and bracing of utility poles.

7. Raking and re-seeding of grassed areas disturbed during construction and/or dewatering activities, including silt basin/dewatering activity areas. Loam and seed placed on the utility trench area will be paid under restoration of growth item in bid proposal.

PART 2 – 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 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 required prior to work being done, as specified in Section 01046 – Control of Work.

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 Form.

3.2 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.

3.3 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.

3.4 PHOTOGRAPHS OF PROJECT

A. Prior to the excavation in any street or cross country area, the Contractor may document existing conditions using construction photographs. Photographs for this purpose shall be at the Contractor’s expense.

3.5 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 construction 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 new construction.

3.6 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.

3.7 RAKING AND RE-SEEDING

A. Grass and landscaped areas disturbed by the Contractor shall be raked and replenished with loam if required. Place topsoil to a minimum depth of 4 inches for areas disturbed by Contractor's construction operations. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading. Use all available on-site stockpiled topsoil and supplement with off-site topsoil as required.

B. Areas shall be re-seeded as directed by the Engineer. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 0.25% by weight. The seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturer's Certificate of Compliance. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

END OF SECTION 02901

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DIVISION 3

CONCRETE

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CONCRETE REINFORCEMENT

SECTION 03200

PART 1 - GENERAL

1.1 SUMMARY

In general, the Contractor shall supply all labor, materials, equipment, temporary protection, tools and appliances necessary for the proper completion of the work in this section, as required in the specifications and in accordance with good construction practice. The work under this section generally includes the following:

A. Furnish and install reinforcing bars, tie wires and supports as required.

B. Furnish and install welded wire fabric as required.

C. Clean all areas affected by the work.

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 03100 – Concrete Formwork

2. Section 03300 – Cast-in-Place Concrete

1.3 JOB CONDITIONS

A. The Contractor shall be responsible for securing and protecting their equipment, materials and tools (as well as partially completed construction) from wind blow-off and vandalism or abuse.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. American Concrete Institute Standards (ACI) latest edition.

a. 301-89 - Specifications for Structural Concrete for Buildings (Revised 1975), Chapter 5, Reinforcement.

b. 318-99 - Building Code Requirements for Reinforced Concrete.

c. 315-89 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.

2. Concrete Reinforcing Steel (CRSI - WCRSI) Placing Reinforcing Bars latest edition.

B. Allowable Tolerances:

1. Fabrication Tolerances:

a. Sheared Length: plus or minus 1 inch for bends. Stirrups, ties, and spirals: plus or minus 1/2 inch.

2. Placement Tolerances:

a. Concrete cover to form surface: plus or minus 1/4 inch.

b. Minimum spacing between bars: minus 1/4 inch.

c. Top bars in slabs and beams: Members 8 inches deep or less: plus or minus 1/4 inch; members between 8 inches and 2 feet: plus or minus 1 inch; members 2 feet deep or greater: plus or minus 1 inch.

d. Crosswise of members: spaced evenly within 2 inches.

e. Lengthwise of members: plus or minus 1 inch.

f. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

1.5 SUBMITTALS

A. Shop Drawings:

Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports. Indicate bar schedules, stirrup spacing, and diagrams of bent bars.

B. Certificates:

Mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination and contact with the ground.

PART 2 - MATERIALS

2.1 MATERIALS

A. Reinforcing Bars:

1. Deformed billet steel: ASTM A615, Grade 60.

2. Bend test: Meet 90º bend test at 60º F minimum temperature around a 10 bar diameter bend without cracking.

B. Welded Wire Fabric:

1. Size per plans, conform to ASTM A185.

C. Tie Wire:

1. Annealed Steel - Federal Specification QQ-W-461, 16 gage minimum.

D. Bar Supports:

1. Conform to "Bar Support Specifications", CRSI Manual of Standard Practice, Class B - Pregalvanized cold-drawn wire.

2.2 FABRICATION

In accordance with CRSI Manual of Standard Practice.

PART 3 - EXECUTION

3.1 PREPARATION

Remove all mud, oil, loose rust or mill scale and other foreign materials that may reduce bond prior to placing concrete. "Tight" rust or mill scale will be permissible without cleaning or brushing, provided weights and dimensions are not less than the minimum required by referenced specifications.

3.2 INSTALLATION

A. Reinforcing Bar Placement:

1. Conform to CRSI-WCRSI "Placing Reinforcing Steel".

2. Position bars in accordance with above tolerances and secure in place.

B. Welded Wire Fabric Placement:

1. Install in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

2. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of appropriate supports suitable for application.

C. Bar Supports:

1. Provide minimum number of supports as required by ACI 315.

2. Do not use pebbles, pieces of broken stone, brick, or concrete, metal pipe or wood blocks to support reinforcement. Do not use bar supports as support for runways for concrete buggies or similar loads. Do not place bars more than 2 inches beyond the last leg at the end of a run of continuous supports.

D. Concrete Cover:

1. Except as otherwise indicated on the details, provide the following minimum clearance for concrete coverage:

a. Formed surfaces in contact with soil or exposed to weathering: 2 inches for #6 bars or larger; 1-1/2 inches for bars smaller than #6.

E. Reinforcing Adjustment:

1. Move only within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items. Do not move bars beyond allowable tolerance without approval of the Engineer.

2. Do not heat, bend, or cut bars without approval of the Engineer.

F. Splices:

1. Do not splice bars except at locations on the details without approval of the Engineer.

2. Minimum lap distance is as shown on the details and as specified in ACI 318. Tie splices securely with wire to prevent displacement during placing of concrete.

END OF SECTION 03200

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this section, including, but not limited to the following:

1. Cast-in-place concrete.

2. Mix designs or use of bagged manufactured grouts and repair mortars and concrete

3. Application of proprietary bonding agents prior to placement of CIP concrete or repair mortars

4. Reinforcing and placement of same

B. General: Submit in accordance with Condition of Contract and Division 1 – General Requirements Specification Section.

1.2 RELATED WORK:

A. Section 03100, Concrete Formwork

1.3 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.

American Concrete Institute (ACI)

ACI 30l Structural Concrete for Buildings

ACI 302 Recommended Practice for Concrete Floor and Slab Construction

ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Replacing Concrete

ACI 3042R Placing Concrete by Pumping Methods

ACI 305 Recommended Practice for Hot Weather Concreting

ACI 306 Recommended Practice for Cold Weather Concreting

ACI 308 Standard Practice for Curing Concrete

ACI 315 Details and Detailing of Concrete Reinforcement

ACI 318 Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM C31 Making and Curing Concrete Test Specimen.

ASTM C33 Concrete Aggregates

ASTM C39 Compressive Strength of Cylindrical Concrete Specimens

ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C87 Effect of Organic Impurities in Fine Aggregate on Strength of Mortar

ASTM C94 Ready-Mixed Concrete

ASTM C143 Standard Method for Slumps of Portland Cement Concrete

ASTM C150 Portland Cement

ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C260 Air-Entraining Admixtures for Concrete

ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C494 Chemical Admixtures for Concrete

B. Where reference is made to one of the above standards, the revisions in effect at the time of bid opening shall apply.

1.4 SUBMITTALS

A. General: Submit in accordance with Condition of Contract and Division 1 – General Requirements Specification Section.

B. Six sets of shop drawings of the materials specified herein shall be submitted to the Engineer for review.

C. Submit sources of cement and aggregates and their conformance to referenced standards.

D. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

E. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.

F. Water reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.

G. Mid or high range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.

H. Sheet curing material. Product data including catalogue cut technical data and conformity to ASTM standard.

I. Liquid curing compound. Product data including catalogue cut technical data, storage requirements, product life, application rate and conformity to ASTM standards. Identify proposed locations of use.

J. Grout. Catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to specified standards.

K. Submit concrete placing sequence to the Engineer for review and comment.

L. Test Report

1. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio, type and manufacturer of cement.

    a. Standard deviation data for each proposed concrete mix based on statistical records.

    b. Water-cementitious materials ratio curve for concrete mixes based on laboratory test. Give average cylinder strength test results at 28 days for laboratory concrete mix designs. Provide results of 7 and 14 day tests if available.

M. Certifications

1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.

2. Certify that the Contractor is not associated with the independent testing laboratory nor does the Contractor or its officers have a beneficial interest in the laboratory.

N. Qualifications

1. Independent testing laboratory: Name, address, and qualifications. Laboratories affiliated with the Contractor or in which the Contractor or corporate officers have a beneficial interest are not acceptable.

1.5 DELIVERY, STORAGE AND HANDLING

A. Supply labor, materials, and equipment to the Project at such intervals to ensure uninterrupted progress of the work.

B. Deliver, store and handle materials to eliminate contamination, segregation, damage and deformation. Store materials off the ground on wood dunnage of sufficient height to prevent surface water from coming into contact with stored materials. Materials shall be stored in such a way as to be protected from the elements with waterproof coverings, positioned to provide drainage, and be ventilated to avoid condensation.

C. Materials that would be damaged by contact with water or sunlight shall be stored in a closed, protective environment.

D. Do not deliver concrete to the Project until ready for concrete placement with the exception of pre-blended bagged mixes which shall not be opened and prepared until forms and other such supportive construction and work has been readied for placement. General Contractor shall note the mix time limits for either cast-in-place or pre-blended preparations and arrange for delivery accordingly.

1.6 QUALITY ASSURANCE

A. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.

B. Damages and imperfections shall be corrected by the Contractor to the satisfaction of the Engineer at no additional cost to the Owner.

C. All field-testing and inspection services required shall be provided by the Owner. The cost of such work, except as specifically stated otherwise, shall be paid for by

owner. Methods of testing shall comply in detailed with the latest applicable ASTM method.

D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.

E. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, the Contractor shall, at the Contractor's expense, make new acceptance tests of aggregates and establish new design mixes. Such testing and design shall be accomplished with the assistance of a certified independent testing laboratory, retained by the Contractor, acceptable to the Engineer.

PART 2 - PRODUCTS

2.1 CEMENT:

A. The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to ASTM Cl50. The brand name and type of cement proposed for use shall be submitted to the Engineer for approval immediately following award of contract. Only one color of cement, all of the same manufacture, shall be used for the work.

B. When the use of Portland cement Type III is permitted by the Engineer the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

2.2 AGGREGATES:

A. Except as otherwise noted, aggregates shall conform to the requirements of ASTM C33.

B. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33 and the following additional requirements:

Sieve	Retained Percent
#4	0 to 5
#16	25 to 40
#50	70 to 87
#100	93 to 97

Fineness Modulus	2.80 ($\pm$ 0.20)
Organic	Plate 2 maximum
Silt	2.0% maximum
Mortar Strength	100% minimum Compression ratio

Soundness	5% maximum loss, magnesium Sulfate, five cycles

C. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33 and the following additional requirements:

Designated Size (inches)	3	2	1-1/2	1	¾	½	3/8
Fineness Modulus (+ -0.20)	7.95	7.45	7.20	6.95	6.70	6.10	4.50

Organic	Plate 1 maximum
Silt	1.0% maximum
Soundness	5% maximum loss, magnesium Sulfate, five cycles

Grading requirements shall be as listed in ASTM C33, Table 2 for the size number corresponding to the appropriate maximum coarse aggregate size. Limits of Deleterious Substances and Physical Property Requirements shall be as listed in ASTM C33, Table 3 for severe weathering regions. Size numbers for the concrete mixes shall be as shown in Table 03300-1.

TABLE 03300-1

Description	Maximum Coarse Aggregate Size	Size Number (ASTM C33 Table 2)
24-in thick or greater	1-1/2-in	467
Greater than 12-in thick	1-in	57
12-in thick or less	3/4-in	67
Peastone mix	3/8-in	8

2.3 WATER:

A. Water shall be potable. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

2.4 ADMIXTURES

A. Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures.

1. Air entraining agent shall be in accordance with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
    1) Subject to compliance with requirements, products which may be

incorporated in the work include the following:

- "Sika AER" by Sika Corp.
- "MB-VR or MB-AE" by Master Builders
- "Darex AEA" or "Daravair" by W. R. Grace or approved equal.

2. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A, and contain no more than .05% chloride ions. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
    1) Subject to compliance with requirements, products that may be incorporated in the work include the following:
        - "Plastocrete 161" by Sika Chemical Corp.
        - "Pozzolith Normal" by Master Builders
        - "WRDA" by W. R. Grace or approved equal.
3. Superplasticizer agent shall be in accordance with ASTM C494, Type F or Type G and contain no more than 0.05% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time. The treated concrete shall be capable of maintaining plastic state for two hours or longer depending on application. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
    1) Subject to compliance with requirements, products that may be incorporated in the work include the following:
        - "Sikament 300" by Sika Chemical Corp.
        - "Rheobuild" by Master Builders
        - "WRDA 19" or "Duracem" by W. R. Grace or approved equal.

4. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.

5. Prohibited admixtures: Calcium chloride, thiocynanates and admixtures containing more than 0.05% chloride ions are not permitted.

2.5 MIXES

A. Development of mix designs and testing shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.

B. Select properties of ingredients to meet the design strength and materials limits specified in Tables 03300-2 and 03300-3 and to produce concrete having proper placeability, durability, strength, appearance and other required properties. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.

C. The design mix shall be based on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if not available, be developed by laboratory test. Water content of the concrete shall be based on a curve showing the relation between water cementitious ratio and 7 and 28 day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing a average value of at least three test specimens at each age. The curves shall have a range of values sufficient to yield the desired data, including the compressive strength specified, without extrapolation. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratios and net minimum cementitious content as specified in Table 03300-3.

TABLE 03300-2

Design Strength*	Minimum Lab Strength at 7 Days
3000 psi	2100 psi
4000 psi	2800 psi

*Specified compressive strength at 28 days

In no case, however, shall the resulting mix conflict with the limiting values for maximum water content and net minimum cement factor specified in Table 03300-3.

D. The limiting strengths, cement factors and water contents for each mix shall be in accordance with Table 03300-3.

TABLE 03300-3

Minimum 28 Day Design Strength	Net Minimum Cement Factor* Content in (100 lbs/cy)	Maximum Water Content** gals/100 lbs of Cement)	Maximum Water-Cementitious Materials Ratio (by weight)
3000	6.11	6.4	0.58
4000	6.3	5.4	0.45
Pumped Concrete	6.3		0.45

* Minimum. Increase as necessary to meet other requirements. These cement factors apply to "controlled" concrete subject to specific inspection.

** Maximum. Decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates and water in admixture solutions.

E. Compression Test: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the compression strength requirements in conformity with the provisions of ACI 318.

F. Entrained air, as measured by ASTM C231, shall be as shown in Table 03300-4.

TABLE 0033-4

Concrete Placement	Total Air Measured at Discharge From Truck (Percent)
Trowel finished slabs	3.5 maximum
All other concrete	4-6

1. If the air entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal required under Paragraph 1.04.

G. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 03300-5. If plasticizer is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a maximum slump of eight inches.

TABLE 03300-5

Portion of Structure	Slump (inches) Recommended	Range
Pavement and slabs on ground	2	1-3
Plain footings, slabs, beams		
Pads, curbs and sludge tank walls	2-3	1-4
Heavy reinforced foundation		
Walls and footings	3-4	2-5
Thin reinforced wall and columns	4	3-5

H. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

2.6 CONCRETE

A. Concrete conforming to the requirements listed below shall be used where indicated on the drawings. Unless otherwise indicated, concrete fill and concrete used as fill under foundations (mud slab), and elsewhere approved by the Engineer, shall be the 3,000 psi mix.

CONCRETE STRENGTHS

Minimum Comp. Strength at 28 days (psi)	Maximum Water/ Cement Ratio Gallons per bag of cement)*	Cement Factor: 94 lb. bags Per cubic yard minimum**
3000	0.59 (6.9)	5.5
4000	0.48 (5.6)	6.5

* Based on air-entrained concrete. If non-air-entrained concrete is called for, the listed maximum water/cement ratios may be increased slightly, as approved by the Engineer. The water is the total water in the mix, including free water on the aggregate.

** These are minimum amounts; increase as necessary to meet mix requirements

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B. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C94 shall be delivered to the Engineer immediately upon arrival of each load of concrete at the site. The Contractor shall be responsible for the design of the concrete mixtures.

C. Standard compression tests in conformity with the provisions of ACI 318 of all proposed mixes shall be made by the testing laboratory or other satisfactory evidence shall be presented that the design mixes will attain the minimum strengths listed on the design drawings or called for herein, within the limitations of the ACI Code. No concrete shall be delivered to the job site until the Engineer has approved the design mixes.

D. All concrete (unless otherwise directed) shall contain an air-entraining agent. Air entrained concrete shall have an air content by volume, measured at discharge from truck, of 3 to 6 percent for l-l/2-inch aggregate and 4 to 8 percent for 3/4-inch aggregate. The air content shall be the responsibility of the testing laboratory and in accordance with ASTM C23l.

E. All concrete shall contain a mid-range water reducer to minimize cement and water content of the mix, at the specified slump, in accordance with ASTM C494.

F. Slump for all concrete shall be from 3-inch to 4-inch, except for concrete using a superplasticizer, when the maximum slump shall be 8 inches. Any concrete having a slump greater than 4 inches (8 inches with superplasticizer) shall be promptly removed from the site.

G. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixture other than those specified shall be used in concrete without the specific written permission of the Engineer in each case.

H. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.7 GROUT:

A. Non-metallic, non-shrink grout shall be pre-mixed, non metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensation agents, plasticizing and water reducing agents, complying with CRD-C588.

2.8 CURING MATERIALS:

A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal. Liquid membrane-forming curing compound shall comply with the requirements of ASTM C309 Type 1-D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil.

1. Subject to compliance with requirements, products which may be incorporated in the work, include the following:

a. "Masterseal" by Master Builders
b. "Ecocure" by Euclid Chemical Co.
c. "L&M Cure" by L & M Const. Chemical Co. or approved equal.

2. Curing paper shall be a fiber-reinforced laminated Kraft bituminous product, polyethylene firm or white burlap-polyethylene sheeting, all conforming to the requirements of ASTM Cl7l.

2.9 FLOOR HARDENER

A. Floor hardener shall be a colorless aqueous solution containing zinc silicofluoride, magnesium silicofluoride, or sodium silicofluoride. These silicofluoride can be used individually or in combination. Proprietary hardeners may be used if approved by the contracting officer.

PART 3 - EXECUTION

3.1 GENERAL:

A. Under no circumstances shall concrete which has set or partially set before placing be used; and no retempering of concrete or grout will be permitted.

B. The batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer

of his readiness to proceed at least six working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment, cleanliness and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.

C. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:

1. The gradation of aggregate

2. The proportion of fine and coarse aggregate.

3. The percentage of entrained air, within the allowable limits.

D. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Clearly indicate the weight of fine and coarse aggregate, cement and water in each batch, the quantity delivered, the time any wage is added and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix trucks.

3.2 PREPARATION:

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.

B. Earth, concrete, masonry, or other water-permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

C. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping, roughen to a ¼ inch amplitude, and washing off all dirt, scum and laitance. It then shall be moistened prior to placing new concrete.

3.3 MIXING AND TRANSPORTATION:

A. Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C94, except as otherwise specified. Truck mixers, agitators, and non-agitating units shall comply with National Ready-Mix Concrete Association (NRMCA) and Truck Mixer Manufacturers' Bureau (TMMB). Ready-mix plant equipment and facilities shall be certified in accordance with NMRCA QC 3. Site-mixed concrete shall be mixed in accordance with ACI 301. On-site plant shall conform to the NRMCA CPMB 100.

B. No water from the truck system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the jobsite, the slump of the concrete is less than that specified. Water added to bring the slump within the specified range shall not change the total water in the concrete to a point that the approved water-cement ratio is exceeded. The drum shall be turned an additional 30 revolutions, or more, if necessary, until the added water is uniformly mixed into the concrete. Water shall not be added to the batch at any later time.

C. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.

D. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.

E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

F. Concrete shall be discharged within 1-1/2 hours after introduction of the cement to the aggregates, except that when the concrete temperature exceeds 85 degrees F, this time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the truck.

G. Temperature and Mixing Time Control:

   a. In cold weather, maintain the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms as indicated in Table 03300-6.

b. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.

c. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. If necessary, substitute well-crushed ice for all or part of the mixing water.

d. The maximum time interval between the addition of mixing water and/or cement to the batch, and the placing of concrete in the forms shall not exceed the following:

TABLE 03300-6

AIR OR CONCRETE TEMPERATURE (WHICHEVER IS HIGHER)	MAXIMUM TIME
80 degrees F to 90 degrees F	45 minutes
70 degrees F to 79 degrees F	60 minutes
40 degrees F to 69 degrees F	90 minutes

If an approved mid or high range water reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes or other appropriate time such that workability and Contractor's ability to properly place the concrete will not be adversely compromised.

3.4 INSTALLATION/APPLICATION/ERECTION:

A. PLACING:

1. Verify that all formwork completely encloses concrete to be poured and is securely braced prior to concrete placement. Remove ice, excess water, dirt and other foreign materials from form. Confirm that reinforcement and other embedded items are securely in place.

2. No concrete shall be placed by pumping methods without the prior written approval of the Engineer. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304.2R and as approved by the Engineer.

3. Concrete shall be placed in alternate areas, as defined by the construction and control joints indicated on the design drawings. A minimum of 3 days shall elapse between placement of adjacent sections.

4. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Should any segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over l to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet, the Contractor shall obtain the approval of the Engineer for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet in any direction in the forms or on the ground, unless otherwise permitted by the Engineer.

5. Do not place concrete for supported elements until concrete previously placed in the supporting element (column, slabs and/or walls) has reached 70% of its 28 day strength.

6. Unless otherwise noted, the work begun on any day shall be completed in daylight of the same day.

7. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.

8. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined, and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees and shall be such as to prevent segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally more than 5 feet.

9. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.

10. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.

11. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.

12. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each run, and the water and debris shall not be discharged inside the form.

B. CONCRETE PLACING DURING COLD WEATHER:

1. For this Specification, cold weather is defined as a period when for more than three successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight

2. Concrete placed during cold weather shall be batched, delivered, placed, cured and protected to compliance with the recommendations of ACI 306R and the additional requirements of this section.

3. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40oF, or is expected to fall to below 40 degrees F, within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.

4. The temperature of concrete surfaces shall not be permitted to drop below 50 degrees F. for at least 7 days after placement of the concrete.

5. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.

C. CONCRETE PLACING DURING HOT WEATHER:

1. For this Specification, hot weather is defined as any combination of high air temperatures, low relative humidity, and wind velocity which produces a rate of evaporation as estimated in ACI 305R, approaching or exceeding 0.2 pounds per square foot per hour.

2. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

3. During periods of excessively hot weather (90 degrees F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90 degrees F, when ready for placement will not be acceptable, and will be rejected.

4. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

5. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel

6. Temperature will not exceed the ambient air temperature immediately before embedment in concrete.

7. Wet form, particularly metal deck, before placing concrete.

8. Keep permanent temperature record showing date and outside temperature for concreting operations. Thermometer reading shall be taken at start of work in morning, at noon, and again late in afternoon., Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to Owner.

D. COMPACTING

1. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the

solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cu. yd. of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.

2. A minimum frequency of 7000 revolutions per minute is required for mechanical vibrators. Do not use vibrators to transport concrete within forms. Insert vibrators and withdraw at points from 18-in to 30-in apart. At each insertion, vibrate sufficiently to consolidate concrete, generally from five to 15 seconds. Do not over vibrate so as to segregate.

E. CURING:

1. Immediately after placement, concrete shall be protected from premature drying extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement prior to placing concrete. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time. Concrete curing shall be performed as specified in ACI 30l and as stated herein. All curing procedures shall have prior approval of the Engineer.

2. Curing procedure shall be continued for at least 7 days.

   a. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.

   b. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.

   c. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

F. FINISHING OF FORMED SURFACES:

1. Schedule of Finishes:

   a. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.

b. Finishes to the base concrete for the following conditions shall be finished as noted and as further specified herein:

i. Exposed exterior formed concrete, except exposed slabs and walking surfaces – Rubbed finish.

ii. Concrete to receive chemical hardener – Light broom finish, non slip, except at electrical rooms provide wood float, non slip.

iii. Exterior concrete slab, stairs and other horizontal areas -- Broomed finish, non-slip.

iv. Walls and vertical surfaces in process tanks and basins – Off form finish.

v. Concrete receiving sheet membrane waterproofing – cleared of laitance and foreign materials and rubbed at vertical surfaces, steel trowel finish at horizontal/sloping surfaces.

vi. Concrete to receive paint – Rubbed finish

vii. Top of curbs and pads – Steel troweled finish

2. Concrete shall not be stripped before the concrete has been cured and attained required strength.

3. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.

4. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

5. Off-Form Finish – Fins and other projections shall be removed, dull of and sharpen edges, and tie cones and defects filled.

6. Rubbed Finish

a. Immediately upon stripping forms and before concrete has changed in color, all fins shall be carefully removed with a hammer. While the wall is still damp apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to provide a bonding coat with all pits, air holes or blemishes in the parent concrete; avoid coating large areas of the finished surface with this slurry

b. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout consisting of one volume cement to 1-1/2 volumes of clean masonry sand having a fineness modulus of approximately 2.25 and complying with the gradation requirements of the ASTM for such a material. Grout shall be uniformly applied by means of camp (neither dripping wet nor dry) pads of coarse burlap approximately 6-in square

used as a float. Grout shall be well scrubbed into the pits and air holes to provide a dense mortar in the imperfections to be patched.

c. Allow the mortar to partially harden for one or two hours depending upon the weather. If the air is hot and dry, keep the wall damp during this period using a fine fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the perpendicular edge of a steel trowel without damaging the grout in the small pits or holes, cut off all that can be removed with a trowel. Grout allowed to remain on the wall to long will get too hard and will be difficult to remove.

d. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout should remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cut with the trowel so it can be wiped off clean with the burlap.

e. On the day following the repair of pits, air holes and blemishes, the walls again shall be wiped off clean with dry, used pieces of burlap containing old hardened mortar which will act as a mild-abrasive. After this treatment, there shall be no built-up firm remaining on the parent surface. If, however, such is present a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the original concrete. Such scrubbing shall be light and sufficient only to remove excess material without working up a lather or mortar or change the texture of the concrete. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.

f. A thorough wash-down with stiff bristle brushes shall follow the final bagging or stoning operation in order that no extraneous materials remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.

g. In addition to scraping, interior concrete surfaces which will be exposed to view and concrete surfaces which are to be prepared and painted as specified in Section 09900, PAINTING, shall receive a smooth rubbed finish, in accordance with ACI 301 and as described below.

h. Form tie holes and other voids and faults shall be patched. Voids shall be cleaned out, roughened, thoroughly wetted, coated with neat cement

paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.

G. TESTING:

1. Concrete inspection and testing shall be performed by an independent inspection laboratory, engaged and paid for by the Contractor. The Engineer shall approve the inspection laboratory before concrete work commences. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

2. At least one slump test shall be performed from each truck load of concrete. The sample for slump shall be taken from the middle third of a truck load. Air content tests shall be made at the discretion of the Engineer. If the measured slump or air content falls outside the specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and shall be immediately removed from the jobsite to be discarded.

3. The Contractor shall advise the Engineer of his readiness to proceed with concrete placement at least one working day prior to each placement. The Engineer will inspect the preparations for concrete, including the preparation of previously placed concrete, the reinforcing, and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.

4. A minimum of four standard compression test cylinders shall be made and tested for each 100 cubic yards or fraction thereof for each type and design strength of concrete from each day's placement of concrete. One cylinder shall be tested at 7 days and two cylinders at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. The Engineer reserves the right to require test cylinders to be made for each truckload of concrete if the nature of the project or project experience indicates such additional tests are required for proper control of concrete quality.

5. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength f'c, and no individual strength test (average of two cylinders) result falls below the specified strength f'c by more than 500 psi.

6. In the event the average compressive strength of the two 28 day cylinders does not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days.

H. FAILURE TO MEET REQUIREMENTS:

1. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense.

2. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan to the Engineer, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.

3. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.

4. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes to the satisfaction of the Engineer.

5. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, engineering, repair of the holes, or removal and replacement of the concrete in question, and all associated costs therefore, shall be at the expense of the Contractor.

6. If load testing of the concrete is permitted, and if not otherwise indicated, slabs or beams under load test shall be loaded with their own weights plus a superimposed load of 2 times the design live load. The load shall be applied uniformly over the portion being tested in the approved manner and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period, does not exceed the following value:

D equals 0.001 (L x L)/t

in which "L" is span in feet, "t" is depth of slab, or beam in inches. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, the slab, or beam under test recovers at least 75 percent of the observed deflection.

7. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review by the Engineer.

END OF SECTION 03300

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APPENDIX A

DRAIN CCTV REPORTS

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-18940	R49-18935	R49-18940_R49-18935	11/11/2015	Jennings Rd.	Corrugated Metal Pipe	24	30	30

Pipe Size: 24 Total Ln.: 30 Inspected Ln.: 30

Project Total Ln.: 30.0 Project Inspected Ln.: 30.0

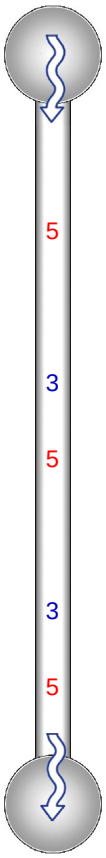
Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18935	Waltham	Jennings Rd.	Corrugated Metal Pi...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18940	30		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18935	30		24	24		

SPR	30	MPR	12	PO Number	Customer
SPRI	5	MPRI	3		Enviornmental Partners
QSR	5600	QMR	3400	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
42	Jim_G	Downstream	20151111		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
4.2	U-512-15321	No Pre-Cleaning	12:01	Dry	
Date Cleaned			**End Time**	**Additional Info**	
			12:07		



0.0 ft.	Access Point Manhole	
6.7 ft.	Surface Reinforcement Corroded - S01	5
8.3 ft.	Water Level	
8.3 ft.	Roots Medium Joint - S02	3
20.8 ft.	Deformed	5
30.0 ft.	Access Point Manhole	
30.0 ft.	Roots Medium Joint - F02	3
30.0 ft.	Surface Reinforcement Corroded - F01	5

Inland Waters Inc
275 Scituate Ave
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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18935	Waltham	Jennings Rd.	Corrugated Metal Pi...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	30		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18935	30		24	24		

SPR	30	MPR	12	PO Number	Customer
SPRI	5	MPRI	3		Enviornmental Partners
QSR	5600	QMR	3400	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
42	Jim_G	Downstream	20151111		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
4.2	U-512-15321	No Pre-Cleaning	12:01	Dry	
Date Cleaned			End Time	Additional Info	
			12:07		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18940								
6.7 ft.	Surface Reinforcement Corroded	S01				☐	9	3	5
8.3 ft.	Water Level				15	☐			
8.3 ft.	Roots Medium Joint	S02			10	☑	9	3	3
20.8 ft.	Deformed				20	☐			5
30.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18935								
30.0 ft.	Roots Medium Joint	F02			10	☑	9	3	3
30.0 ft.	Surface Reinforcement Corroded	F01				☐	9	3	5

Inland Waters Inc
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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18935	Waltham	Jennings Rd.	Corrugated Metal Pi...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	30		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18935	30		24	24		

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18940		

Distance:	6.7 ft.	Grade:	5
Condition:	Surface Reinforcement Corroded		
Remarks:	N/A		

Distance:	8.3 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	8.3 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	N/A		

Inland Waters Inc
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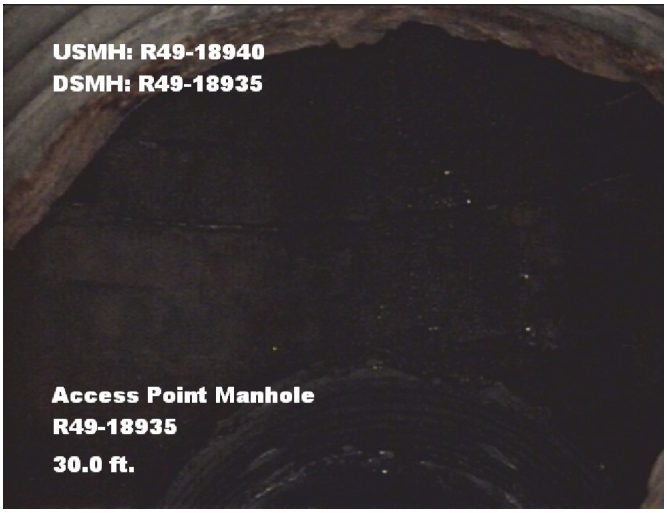
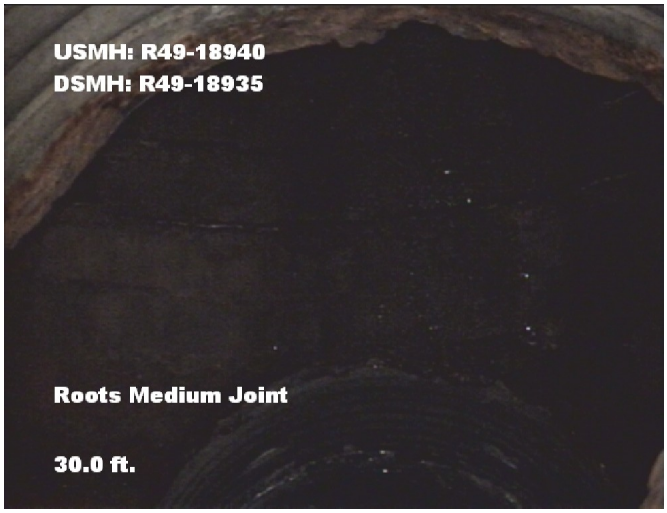
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18935	Waltham	Jennings Rd.	Corrugated Metal Pi...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	30		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18935	30		24	24		

Distance:	20.8 ft.	Grade:	5
Condition:	Deformed		
Remarks:	N/A		



Distance:	30.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18935		



Distance:	30.0 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	N/A		

Distance:	30.0 ft.	Grade:	5
Condition:	Surface Reinforcement Corroded		
Remarks:	N/A		

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-18940	R49-18965	R49-18940_R49-18965	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	24	160	160

Pipe Size: 24 Total Ln.: 160 Inspected Ln.: 160

Project Total Ln.: 160.0 Project Inspected Ln.: 160.0

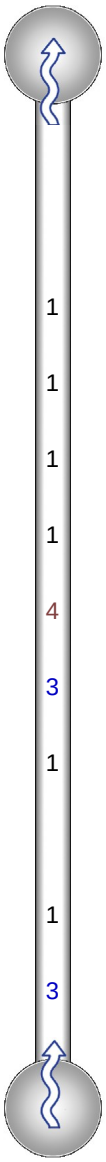
Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18965	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18940	160		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18965	160		24	24	4	

SPR	N/A	MPR	95	PO Number	Customer: Enviornmental Partners
SPRI	N/A	MPRI	2.2	Work Order	Purpose: Infiltration/Inflow Investigat...
QSR	N/A	QMR	413C		

OPR	Surveyed By	Direction	Date	Media label	
95	Jim_G	Upstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
2.2	U-512-15321	No Pre-Cleaning	08:26	Dry	
Date Cleaned			**End Time**	**Additional Info**	
			08:35		



0.0 ft.	Access Point Manhole	
0.3 ft.	Water Level	
1.0 ft.	Roots Fine Joint	1
5.0 ft.	Roots Fine Joint	1
9.6 ft.	Roots Fine Joint - S01	1
34.5 ft.	Roots Fine Joint - F01	1
34.5 ft.	Roots Ball Joint	4
38.2 ft.	Roots Medium Joint - S02	3
100.3 ft.	Roots Fine Joint - S03	1
160.0 ft.	Access Point Manhole	
160.0 ft.	Roots Fine Joint - F03	1
160.0 ft.	Roots Medium Joint - F02	3

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18965	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	160		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18965	160		24	24	4	

SPR	N/A	MPR	95	PO Number	Customer
SPRI	N/A	MPRI	2.2		Enviornmental Partners
QSR	N/A	QMR	413C	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
95	Jim_G	Upstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
2.2	U-512-15321	No Pre-Cleaning	08:26	Dry	
Date Cleaned			End Time	Additional Info	
			08:35		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18965								
0.3 ft.	Water Level				0	☐			
1.0 ft.	Roots Fine Joint					☑	7	9	1
5.0 ft.	Roots Fine Joint					☑	8		1
9.6 ft.	Roots Fine Joint	S01				☑	7	5	1
34.5 ft.	Roots Fine Joint	F01				☑	7	5	1
34.5 ft.	Roots Ball Joint				55	☑	8	9	4
38.2 ft.	Roots Medium Joint	S02			25	☑	12	12	3
100.3 ft.	Roots Fine Joint	S03				☑	9		1
160.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18940								
160.0 ft.	Roots Fine Joint	F03				☑	9		1
160.0 ft.	Roots Medium Joint	F02			25	☑	12	12	3

Inland Waters Inc
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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18965	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	160		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18965	160		24	24	4	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-18965

Distance: 0.3 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 1.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 5.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Inland Waters Inc
275 Scituate Ave
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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18965	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	160		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18965	160		24	24	4	

Distance:	9.6 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	34.5 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	34.5 ft.	Grade:	4
Condition:	Roots Ball Joint		
Remarks:	N/A		

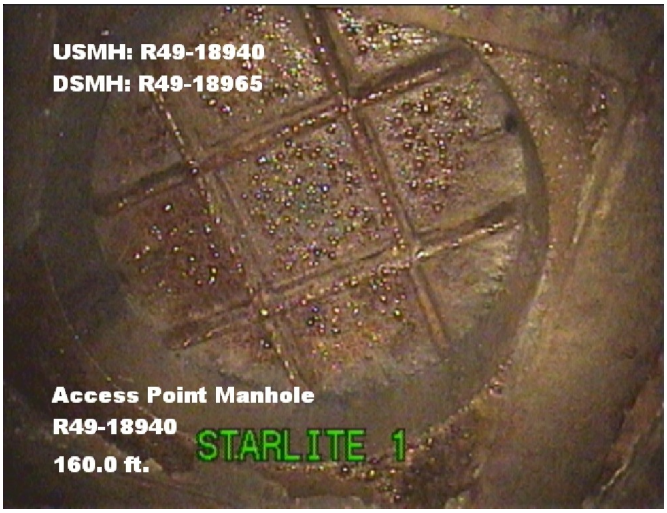
Distance:	38.2 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	N/A		

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Image Report 4/Page

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18940_R49-18965	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18940	160		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18965	160		24	24	4	

Distance: 100.3 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 160.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-18940

Distance: 160.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 160.0 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-18965	R49-18970	R49-18965_R49-18970	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	24	190	190

Pipe Size: 24 Total Ln.: 190 Inspected Ln.: 190

Project Total Ln.: 190.0 Project Inspected Ln.: 190.0

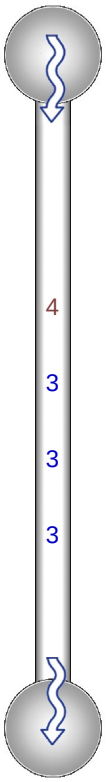
Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18965_R49-18970	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18965	190		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18970	190		24	24	4	

SPR	N/A	MPR	103	PO Number	Customer
SPRI	N/A	MPRI	3		Enviornmental Partners
QSR	N/A	QMR	413E	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
103	Jim_G	Downstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
3	U-512-15321	No Pre-Cleaning	08:40	Dry	
Date Cleaned			**End Time**	**Additional Info**	
			08:49		



			R49-18965
0.5 ft.	Access Point Manhole		R49-18965
9.2 ft.	Water Level		
21.6 ft.	Roots Ball Joint	4	
25.2 ft.	Roots Medium Joint - S01	3	Closing Cont Defect
36.7 ft.	Deposits Settled Other	3	Bricks And Rocks
182.7 ft.	Roots Medium Joint - F01	3	Closing Cont Defect
190.0 ft.	Access Point Manhole		R49-18970
			R49-18970

Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18965_R49-18970	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18965	190		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18970	190		24	24	4	

SPR	N/A	MPR	103	PO Number	Customer
SPRI	N/A	MPRI	3		Enviornmental Partners
QSR	N/A	QMR	413E	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
103	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
3	U-512-15321	No Pre-Cleaning	08:40	Dry	
Date Cleaned			End Time	Additional Info	
			08:49		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.5 ft.	Access Point Manhole					☐			
Remarks:	R49-18965								
9.2 ft.	Water Level				0	☐			
21.6 ft.	Roots Ball Joint				60	☑	4		4
25.2 ft.	Roots Medium Joint	S01			15	☑	3		3
Remarks:	Closing Cont Defect								
36.7 ft.	Deposits Settled Other				15	☐	6		3
Remarks:	Bricks And Rocks								
182.7 ft.	Roots Medium Joint	F01			15	☑	3		3
Remarks:	Closing Cont Defect								
190.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18970								

Inland Waters Inc
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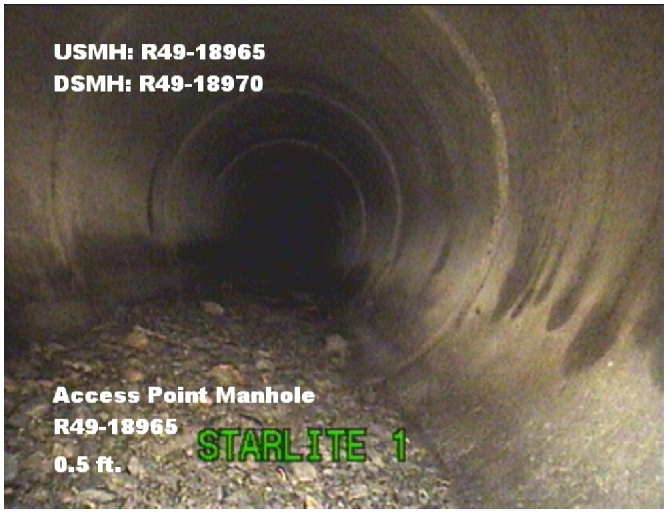
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18965_R49-18970	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18965	190		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18970	190		24	24	4	



Distance:	0.5 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18965		

Distance:	9.2 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	21.6 ft.	Grade:	4
Condition:	Roots Ball Joint		
Remarks:	N/A		

Distance:	25.2 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	Closing Cont Defect		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18965_R49-18970	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18965	190		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18970	190		24	24	4	

Distance:	36.7 ft.	Grade:	3
Condition:	Deposits Settled Other		
Remarks:	Bricks And Rocks		

Distance:	182.7 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	Closing Cont Defect		

Distance:	190.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18970		

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-18970	R49-18975	R49-18970-R49-18975	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	24	186	186

Pipe Size: 24 Total Ln.: 186 Inspected Ln.: 186

Project Total Ln.: 186.0 Project Inspected Ln.: 186.0

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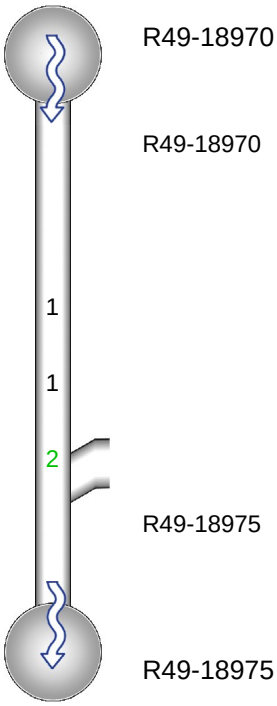
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18970-R49-18975	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18970	186		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18975	186		24	24	4	

SPR	N/A	MPR	9	PO Number	Customer
SPRI	N/A	MPRI	1.1		Enviornmental Partners
QSR	N/A	QMR	2117	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
9	Jim_G	Downstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1.1	U-512-15321	No Pre-Cleaning	08:52	Dry	
Date Cleaned			**End Time**	**Additional Info**	
			09:02		



0.0 ft.	Access Point Manhole
0.0 ft.	Water Level
72.3 ft.	Roots Fine Joint - S01
106.4 ft.	Roots Fine Joint - F01
178.3 ft.	Tap Break-In Intruding
186.0 ft.	Access Point Manhole

Inland Waters Inc
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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18970-R49-18975	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18970	186		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	186		24	24	4	

SPR	N/A	MPR	9	PO Number	Customer
SPRI	N/A	MPRI	1.1		Enviornmental Partners
QSR	N/A	QMR	2117	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
9	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
1.1	U-512-15321	No Pre-Cleaning	08:52	Dry	
Date Cleaned			End Time	Additional Info	
			09:02		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18970								
0.0 ft.	Water Level				5	☐			
72.3 ft.	Roots Fine Joint	S01				☑	3	9	1
106.4 ft.	Roots Fine Joint	F01				☑	3	9	1
178.3 ft.	Tap Break-In Intruding		8	3		☐	10		2
186.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18975								

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18970-R49-18975	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18970	186		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	186		24	24	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18970		

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

Distance:	72.3 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	106.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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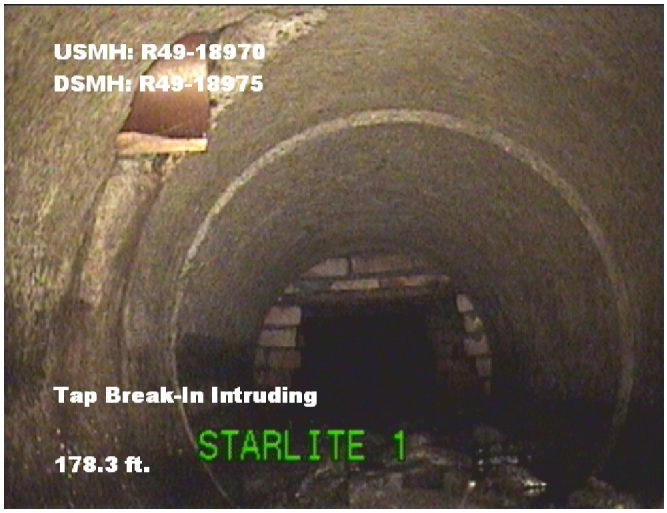
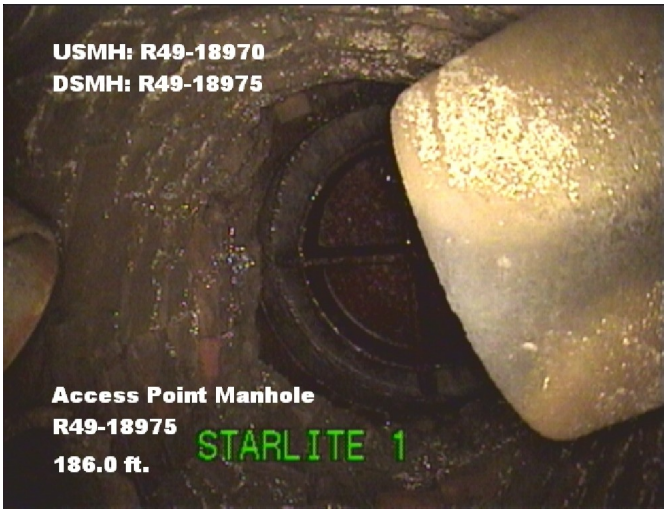
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18970-R49-18975	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18970	186		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	186		24	24	4	



Distance: 178.3 ft. Grade: 2
Condition: Tap Break-In Intruding
Remarks: N/A



Distance: 186.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-18975

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-18980	R49-18975	R49-18975_R49-18980	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	24	147	147

Pipe Size: 24 Total Ln.: 147 Inspected Ln.: 147

Project Total Ln.: 147.0 Project Inspected Ln.: 147.0

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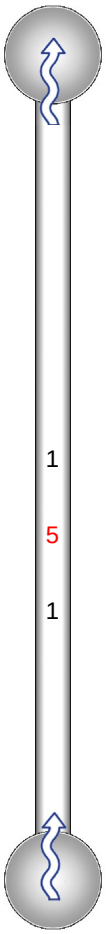
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18975_R49-18980	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18980	147		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18975	147		24	24	4	

SPR	7	MPR	N/A	PO Number	Customer
SPRI	2.3	MPRI	N/A		Enviornmental Partners
QSR	5112	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
7	Jim_G	Upstream	20151110	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.3	U-512-15321	Heavy Cleaning	09:37	Dry
Date Cleaned			**End Time**	**Additional Info**
20151110			10:52	



			R49-18975
0.0 ft.	Access Point Manhole		18975
0.0 ft.	Water Level		
0.0 ft.	General Observation		6 Inch Line In MH Coming From House
30.1 ft.	General Observation		Heavy Cleaning Required
54.6 ft.	Joint Offset Medium	1	
129.9 ft.	Surface Reinforcement Corroded	5	
133.3 ft.	Joint Offset Medium	1	
137.3 ft.	Shape or Size Change		
147.0 ft.	Access Point Manhole		R49-18980
			R49-18980

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18975_R49-18980	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-18980	147		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-18975	147		24	24	4	

SPR	7	MPR	N/A	PO Number	Customer
SPRI	2.3	MPRI	N/A		Enviornmental Partners
QSR	5112	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
7	Jim_G	Upstream	20151110	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.3	U-512-15321	Heavy Cleaning	09:37	Dry
Date Cleaned			**End Time**	**Additional Info**
20151110			10:52	

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	18975								
0.0 ft.	Water Level				0	☐			
0.0 ft.	General Observation					☐			
Remarks:	6 Inch Line In MH Coming From House								
30.1 ft.	General Observation					☐			
Remarks:	Heavy Cleaning Required								
54.6 ft.	Joint Offset Medium					☐			1
129.9 ft.	Surface Reinforcement Corroded					☐	9	3	5
133.3 ft.	Joint Offset Medium					☐			1
137.3 ft.	Shape or Size Change		24	12		☐			
147.0 ft.	Access Point Manhole					☐			
Remarks:	R49-18980								

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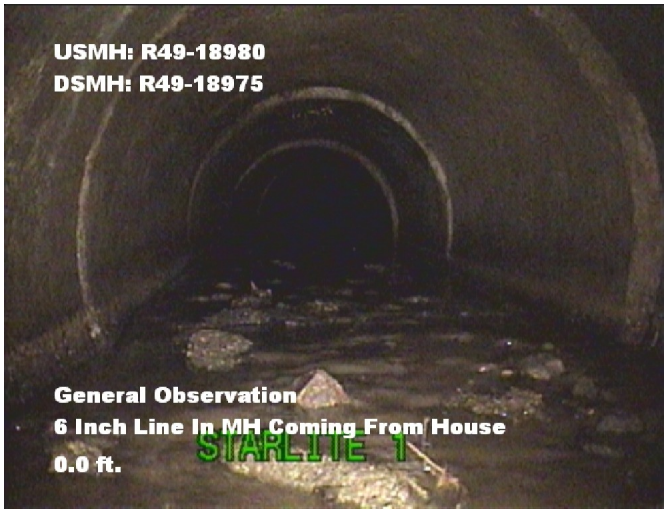
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18975_R49-18980	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18980	147		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	147		24	24	4	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: 18975

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



Distance: 0.0 ft. Grade: 0
Condition: General Observation
Remarks: 6 Inch Line In MH Coming From House

Distance: 30.1 ft. Grade: 0
Condition: General Observation
Remarks: Heavy Cleaning Required

Inland Waters Inc
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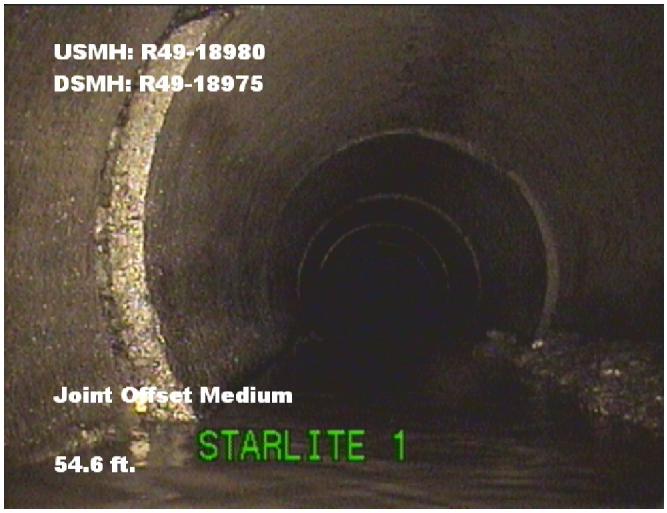
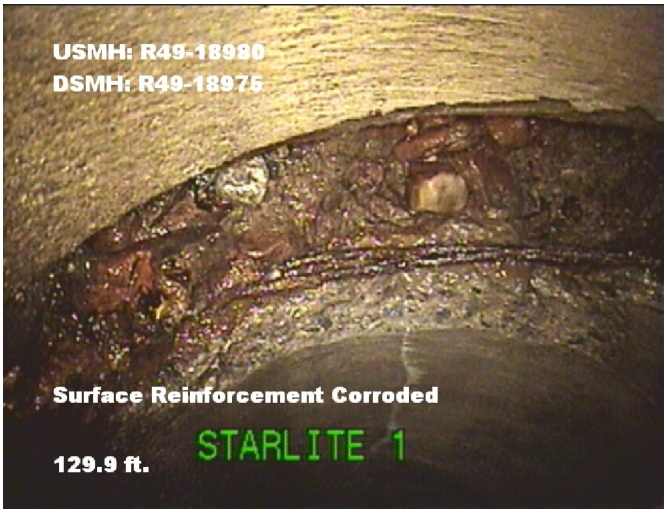
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18975_R49-18980	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18980	147		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	147		24	24	4	



Distance: 54.6 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 129.9 ft. Grade: 5
Condition: Surface Reinforcement Corroded
Remarks: N/A

Distance: 133.3 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 137.3 ft. Grade: 0
Condition: Shape or Size Change
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-18975_R49-18980	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-18980	147		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-18975	147		24	24	4	

Distance:	147.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-18980		

Inland Waters Inc
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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19010	R49-19005	R49-19010_R49-19005	11/10/2015	Jennings Rd.	Vitrified Clay Pipe	8	97	97

Pipe Size: 8 Total Ln.: 97 Inspected Ln.: 97

Project Total Ln.: 97.0 Project Inspected Ln.: 97.0

Inland Waters Inc
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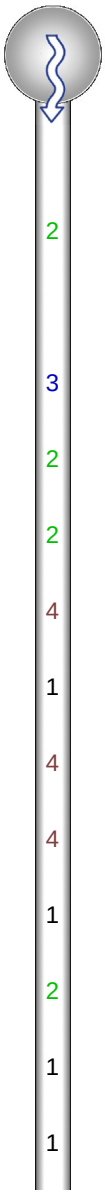
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19010	97		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19005	97		8	8	3	

SPR	60	MPR	13	PO Number	Customer
SPRI	2.9	MPRI	2.2		Enviornmental Partners
QSR	5544	QMR	4132	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
73	Jim_G	Downstream	20151110	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.7	U-512-15321	Jetting	12:58	Dry
Date Cleaned			**End Time**	**Additional Info**
20151110			13:21	



0.0 ft.	Access Point Manhole	
0.0 ft.	Fracture Circumferential	2
0.0 ft.	Water Level	
3.0 ft.	Fracture Longitudinal	3
3.0 ft.	Fracture Circumferential	2
9.9 ft.	Fracture Circumferential	2
13.0 ft.	Fracture Multiple	4
22.0 ft.	Joint Offset Medium	1
23.1 ft.	Fracture Multiple	4
25.8 ft.	Fracture Multiple	4
37.1 ft.	Alignment Left	1
44.6 ft.	Crack Longitudinal	2
49.8 ft.	Joint Offset Medium	1
56.0 ft.	Joint Offset Medium	1

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Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

SPR	60	MPR	13	PO Number	Customer
SPRI	2.9	MPRI	2.2		Enviornmental Partners
QSR	5544	QMR	4132	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
73	Jim_G	Downstream	20151110	
OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.7	U-512-15321	Jetting	12:58	Dry
Date Cleaned			End Time	Additional Info
20151110			13:21	

58.8 ft.	Joint Offset Medium	1	
61.4 ft.	Joint Offset Medium	1	
62.7 ft.	Fracture Circumferential	2	
64.7 ft.	Joint Offset Medium	1	
64.7 ft.	Fracture Multiple	4	
67.3 ft.	Fracture Longitudinal Hinge 4	5	
69.2 ft.	Shape or Size Change		
69.2 ft.	Material Change		VCP-RCP
71.3 ft.	Hole Soil Visible	5	
75.3 ft.	Hole Soil Visible	5	
79.0 ft.	Roots Ball Joint	4	
82.8 ft.	Hole Soil Visible	5	
82.8 ft.	Obstacle In Joint	3	Rocks
83.4 ft.	Roots Fine Joint	1	
86.8 ft.	Hole Soil Visible	5	
87.0 ft.	Roots Medium Joint	3	

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Defect Listing Plot

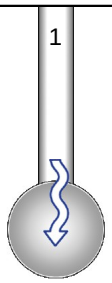
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

SPR	60	MPR	13	PO Number	Customer
SPRI	2.9	MPRI	2.2		Enviornmental Partners
QSR	5544	QMR	4132	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
73	Jim_G	Downstream	20151110	
OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.7	U-512-15321	Jetting	12:58	Dry
Date Cleaned			End Time	Additional Info
20151110			13:21	

91.3 ft. Roots Fine Joint

97.0 ft. Access Point Manhole



R49-19005

R49-19005

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

SPR	60	MPR	13	PO Number	Customer
SPRI	2.9	MPRI	2.2		Enviornmental Partners
QSR	5544	QMR	4132	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
73	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
2.7	U-512-15321	Jetting	12:58	Dry	
Date Cleaned			End Time	Additional Info	
20151110			13:21		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19010								
0.0 ft.	Fracture Circumferential					☐	6	9	2
0.0 ft.	Water Level				0	☐			
3.0 ft.	Fracture Longitudinal					☐	12		3
3.0 ft.	Fracture Circumferential					☐	7	10	2
9.9 ft.	Fracture Circumferential					☐	12	12	2
13.0 ft.	Fracture Multiple					☐	12	12	4
22.0 ft.	Joint Offset Medium					☐			1
23.1 ft.	Fracture Multiple					☐	12	12	4
25.8 ft.	Fracture Multiple					☐	12	12	4
37.1 ft.	Alignment Left				5	☐			1
44.6 ft.	Crack Longitudinal					☐	12		2
49.8 ft.	Joint Offset Medium					☐			1
56.0 ft.	Joint Offset Medium					☐			1
58.8 ft.	Joint Offset Medium					☐			1
61.4 ft.	Joint Offset Medium					☐			1
62.7 ft.	Fracture Circumferential					☐	9	3	2
64.7 ft.	Joint Offset Medium					☐			1
64.7 ft.	Fracture Multiple					☐	1	6	4
67.3 ft.	Fracture Longitudinal Hinge 4					☐	12	12	5
69.2 ft.	Shape or Size Change		8	12		☐			
69.2 ft.	Material Change					☐			
Remarks:	VCP-RCP								
71.3 ft.	Hole Soil Visible					☐	1		5
75.3 ft.	Hole Soil Visible					☐	9	4	5
79.0 ft.	Roots Ball Joint				65	☑	2	10	4
82.8 ft.	Hole Soil Visible					☐	9	3	5
82.8 ft.	Obstacle In Joint				15	☑	9	3	3
Remarks:	Rocks								
83.4 ft.	Roots Fine Joint					☑	2	8	1
86.8 ft.	Hole Soil Visible					☐	12		5
87.0 ft.	Roots Medium Joint				10	☑	3		3

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19010	97		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19005	97		8	8	3	

SPR	60	MPR	13	PO Number	Customer
SPRI	2.9	MPRI	2.2		Enviornmental Partners
QSR	5544	QMR	4132	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
73	Jim_G	Downstream	20151110	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
2.7	U-512-15321	Jetting	12:58	Dry
Date Cleaned			**End Time**	**Additional Info**
20151110			13:21	

91.3 ft.	Roots Fine Joint					☑	9		1
97.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19005								

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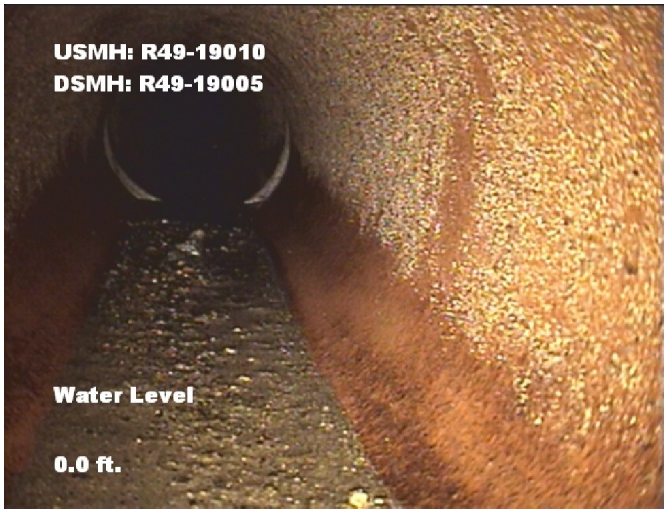
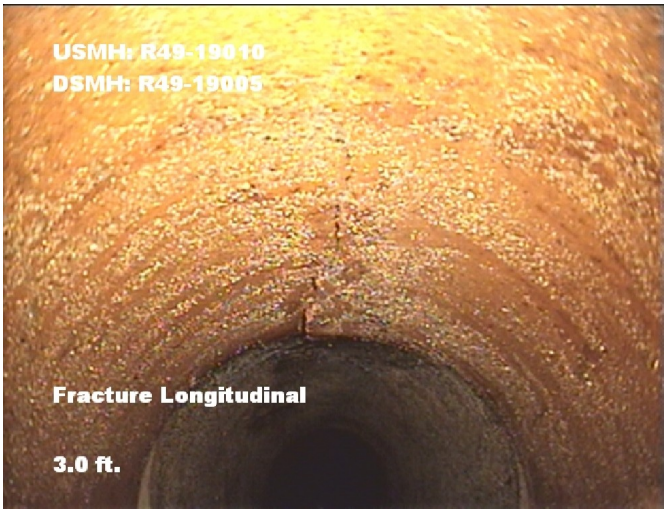
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19010

Distance: 0.0 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



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



Distance: 3.0 ft. Grade: 3
Condition: Fracture Longitudinal
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance: 3.0 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 9.9 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A

Distance: 13.0 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 22.0 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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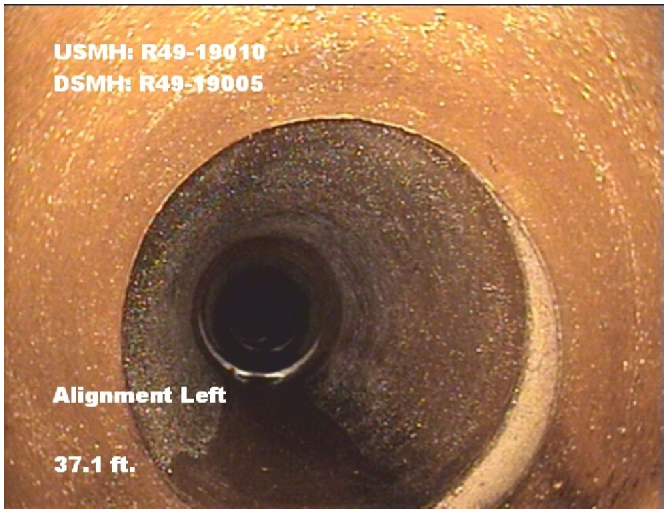
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance:	23.1 ft.	Grade:	4
Condition:	Fracture Multiple		
Remarks:	N/A		

Distance:	25.8 ft.	Grade:	4
Condition:	Fracture Multiple		
Remarks:	N/A		



Distance:	37.1 ft.	Grade:	1
Condition:	Alignment Left		
Remarks:	N/A		

Distance:	44.6 ft.	Grade:	2
Condition:	Crack Longitudinal		
Remarks:	N/A		

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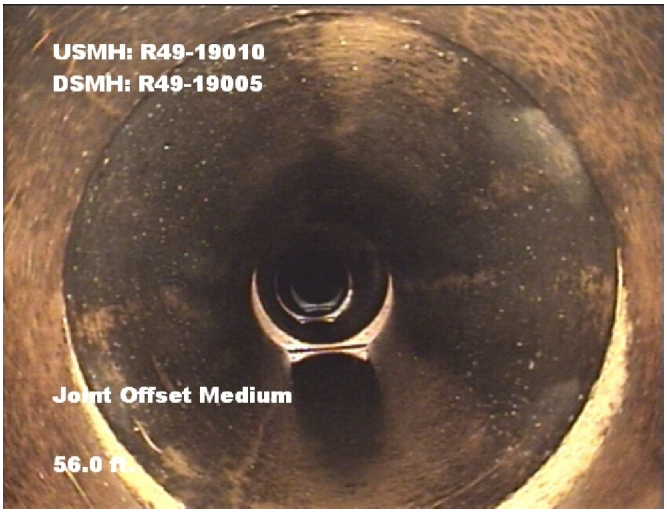
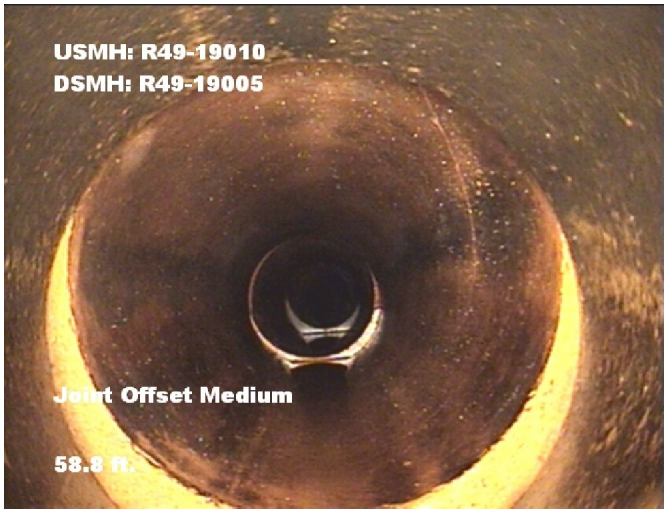
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

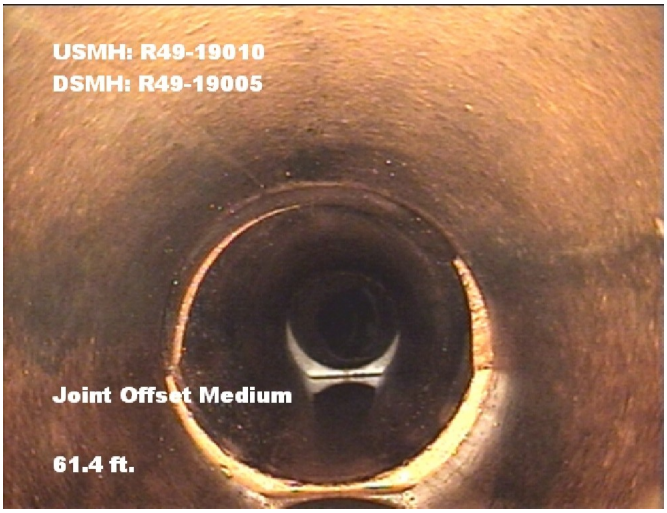
Distance: 49.8 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 56.0 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 58.8 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 61.4 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

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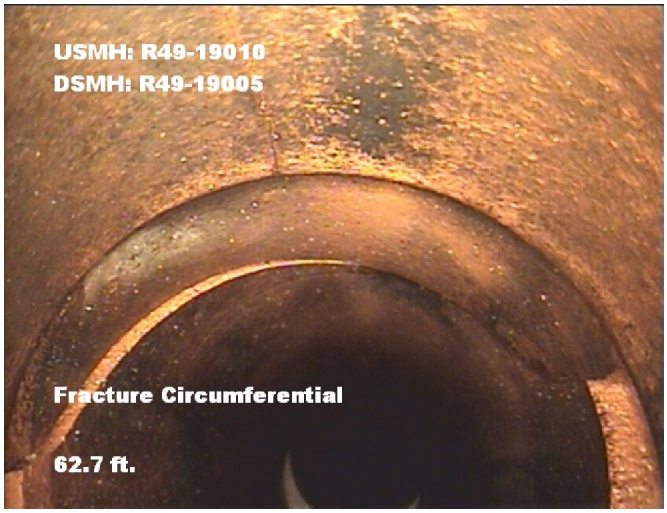
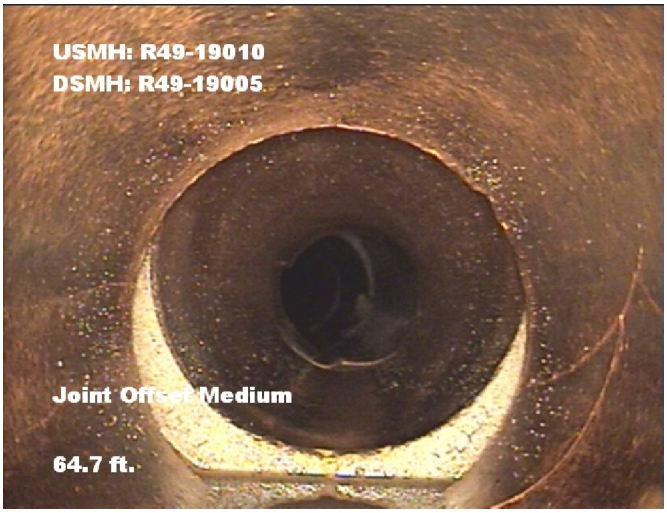
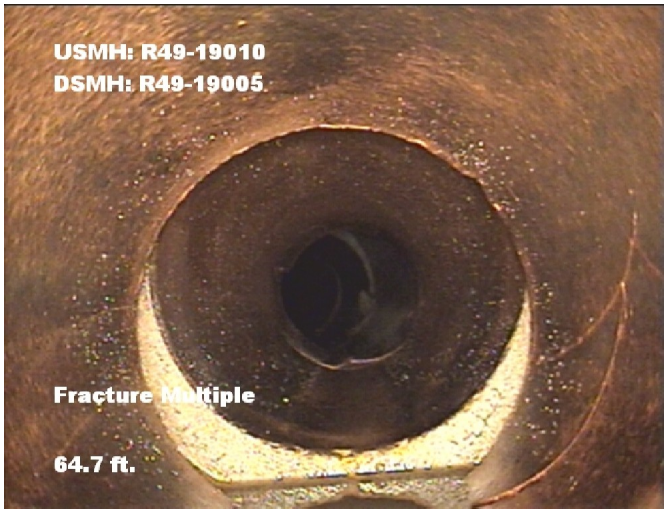
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	



Distance: 62.7 ft. Grade: 2
Condition: Fracture Circumferential
Remarks: N/A



Distance: 64.7 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A



Distance: 64.7 ft. Grade: 4
Condition: Fracture Multiple
Remarks: N/A

Distance: 67.3 ft. Grade: 5
Condition: Fracture Longitudinal Hinge 4
Remarks: N/A

Inland Waters Inc
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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance:	69.2 ft.	Grade:	0
Condition:	Shape or Size Change		
Remarks:	N/A		

Distance:	69.2 ft.	Grade:	0
Condition:	Material Change		
Remarks:	VCP-RCP		

Distance:	71.3 ft.	Grade:	5
Condition:	Hole Soil Visible		
Remarks:	N/A		

Distance:	75.3 ft.	Grade:	5
Condition:	Hole Soil Visible		
Remarks:	N/A		

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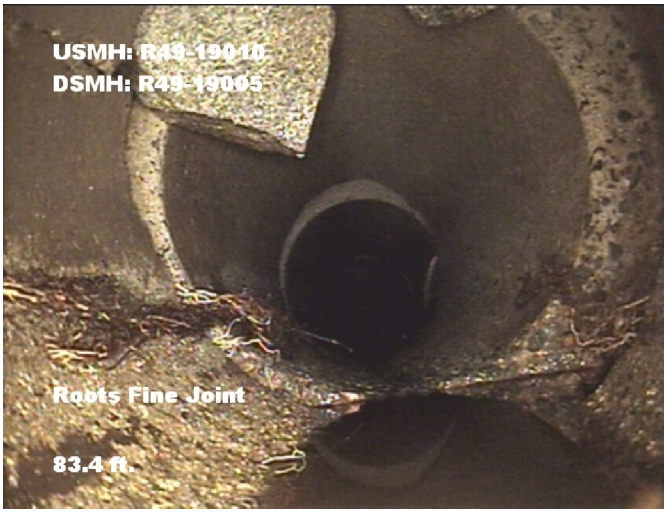
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance:	79.0 ft.	Grade:	4
Condition:	Roots Ball Joint		
Remarks:	N/A		

Distance:	82.8 ft.	Grade:	5
Condition:	Hole Soil Visible		
Remarks:	N/A		

Distance:	82.8 ft.	Grade:	3
Condition:	Obstacle In Joint		
Remarks:	Rocks		



Distance:	83.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19010_R49-19005	Waltham	Jennings Rd.	Vitrified Clay Pipe		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19010	97		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19005	97		8	8	3	

Distance:	86.8 ft.	Grade:	5
Condition:	Hole Soil Visible		
Remarks:	N/A		

Distance:	87.0 ft.	Grade:	3
Condition:	Roots Medium Joint		
Remarks:	N/A		

Distance:	91.3 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	97.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19005		

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19015	R49-19010	R49-19015_R49-19010	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	15	214	214

Pipe Size: 15 Total Ln.: 214 Inspected Ln.: 214

Project Total Ln.: 214.0 Project Inspected Ln.: 214.0

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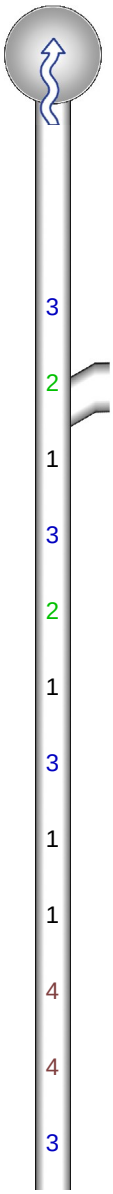
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19015	214		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19010	214		15	15	4	

SPR	1	MPR	72	PO Number	Customer: Enviornmental Partners
SPRI	1	MPRI	2.8	Work Order	Purpose: Infiltration/Inflow Investigat...
QSR	1100	QMR	423B		

OPR	Surveyed By	Direction	Date	Media label	
73	Jim_G	Upstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
2.7	U-512-15321	Heavy Cleaning	12:32	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20151110			12:44		



0.0 ft.	Access Point Manhole	
0.0 ft.	Water Level	
2.0 ft.	Roots Medium Joint	3
11.5 ft.	Tap Break-In Intruding	2
21.7 ft.	Joint Offset Medium	1
55.6 ft.	Roots Medium Joint - S01	3
62.6 ft.	Roots Tap Joint	2
69.2 ft.	Roots Fine Joint	1
75.5 ft.	Roots Medium Joint - F01	3
110.0 ft.	Roots Fine Joint	1
113.6 ft.	Roots Fine Joint	1
120.3 ft.	Roots Ball Joint	4
126.8 ft.	Roots Ball Joint	4
134.6 ft.	Roots Medium Joint - S02	3

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Defect Listing Plot

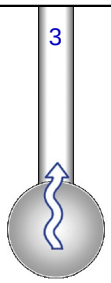
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19015	214		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19010	214		15	15	4	

SPR	1	MPR	72	PO Number	Customer
SPRI	1	MPRI	2.8		Enviornmental Partners
QSR	1100	QMR	423B	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
73	Jim_G	Upstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
2.7	U-512-15321	Heavy Cleaning	12:32	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20151110			12:44		

203.8 ft. Roots Medium Joint - F02

214.0 ft. Access Point Manhole



Defect Wanders

R49-19015

R49-19015

Inland Waters Inc
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Defect Listing

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...	Light High...	Stormwater

Upstream MH	Total Length	Year Laid	Shape	Location Details
R49-19015	214		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
R49-19010	214		15	15	4

SPR	1	MPR	72	PO Number	Customer
SPRI	1	MPRI	2.8		Enviornmental Partners
QSR	1100	QMR	423B	Work Order	Purpose: Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
73	Jim_G	Upstream	20151110	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
2.7	U-512-15321	Heavy Cleaning	12:32	Dry

Date Cleaned	End Time	Additional Info
20151110	12:44	

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19010								
0.0 ft.	Water Level				0	☐			
2.0 ft.	Roots Medium Joint				15	☑	9		3
11.5 ft.	Tap Break-In Intruding		8	4		☐	10		2
21.7 ft.	Joint Offset Medium					☐			1
55.6 ft.	Roots Medium Joint	S01			25	☑	12	12	3
62.6 ft.	Roots Tap Joint				20	☑	12		2
69.2 ft.	Roots Fine Joint					☑	3		1
75.5 ft.	Roots Medium Joint	F01			25	☑	12	12	3
110.0 ft.	Roots Fine Joint					☑	5		1
113.6 ft.	Roots Fine Joint					☑	3		1
120.3 ft.	Roots Ball Joint				75	☑	12	12	4
126.8 ft.	Roots Ball Joint					☑	1	10	4
134.6 ft.	Roots Medium Joint	S02			10	☑	12	12	3
Remarks:	Defect Wanders								
203.8 ft.	Roots Medium Joint	F02			10	☑	12	12	3
Remarks:	Defect Wanders								
214.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19015								

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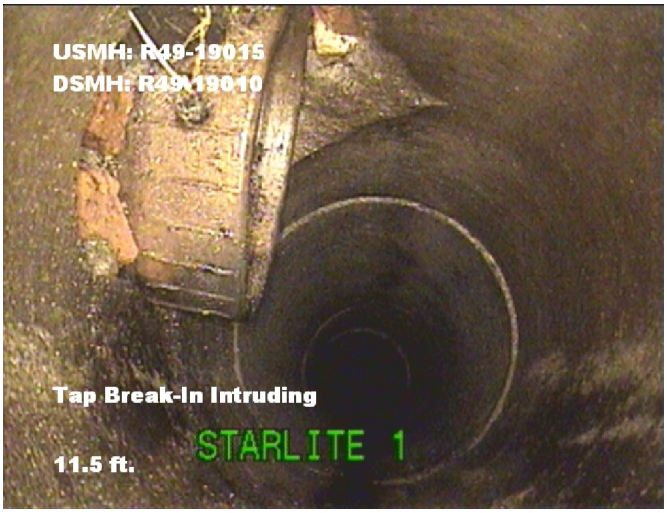
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19015	214		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19010	214		15	15	4	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19010

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

Distance: 2.0 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A



Distance: 11.5 ft. Grade: 2
Condition: Tap Break-In Intruding
Remarks: N/A

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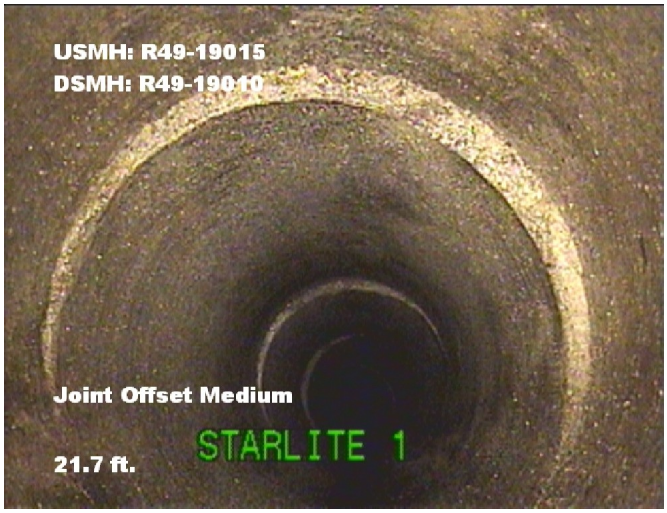
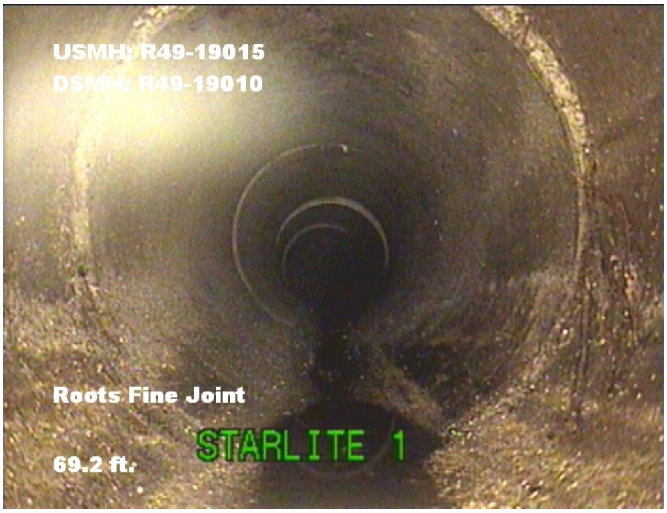
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19015	214		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19010	214		15	15	4	



Distance: 21.7 ft. Grade: 1
Condition: Joint Offset Medium
Remarks: N/A

Distance: 55.6 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 62.6 ft. Grade: 2
Condition: Roots Tap Joint
Remarks: N/A



Distance: 69.2 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19015	214		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19010	214		15	15	4	

Distance: 75.5 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 110.0 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 113.6 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A

Distance: 120.3 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A

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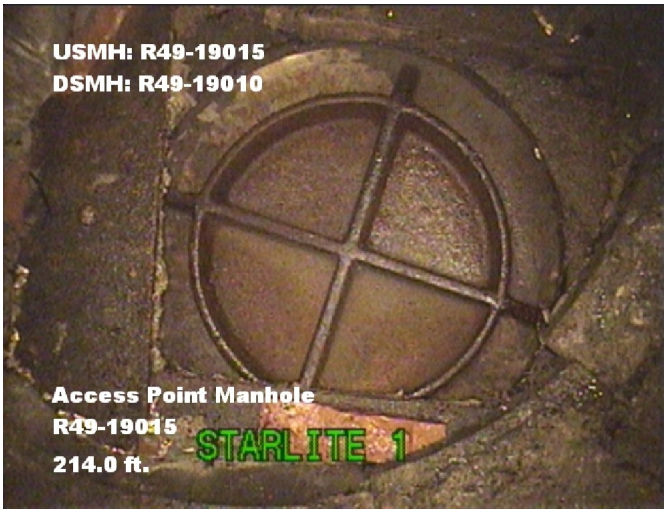
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19015_R49-19010	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19015	214		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19010	214		15	15	4	

Distance: 126.8 ft. Grade: 4
Condition: Roots Ball Joint
Remarks: N/A

Distance: 134.6 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: Defect Wanders

Distance: 203.8 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: Defect Wanders



Distance: 214.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19015

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19020	R49-19015	R49-19020_R49-19015	11/10/2015	Jennings Rd.	Reinforced Concrete Pipe	15	73	73

Pipe Size: 15 Total Ln.: 73 Inspected Ln.: 73

Project Total Ln.: 73.0 Project Inspected Ln.: 73.0

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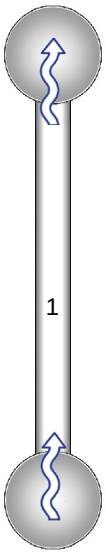
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19020_R49-19015	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19020	73		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19015	73		15	15	4	

SPR	N/A	MPR	1	PO Number	Customer
SPRI	N/A	MPRI	1		Enviornmental Partners
QSR	N/A	QMR	1100	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
1	Jim_G	Upstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1	U-512-15321	Jetting	12:47	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20151110			12:52		



R49-19015

0.0 ft.	Access Point Manhole	R49-19015
0.0 ft.	Water Level	
68.4 ft.	Roots Fine Joint	
73.0 ft.	Access Point Manhole	R49-19020

R49-19020

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19020_R49-19015	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19020	73		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19015	73		15	15	4	

SPR	N/A	MPR	1	PO Number	Customer
SPRI	N/A	MPRI	1		Enviornmental Partners
QSR	N/A	QMR	1100	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
1	Jim_G	Upstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
1	U-512-15321	Jetting	12:47	Dry	
Date Cleaned			End Time	Additional Info	
20151110			12:52		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19015								
0.0 ft.	Water Level				0	☐			
68.4 ft.	Roots Fine Joint					☑	12		1
73.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19020								

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19020_R49-19015	Waltham	Jennings Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19020	73		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19015	73		15	15	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19015		

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

Distance:	68.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	73.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19020		

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19025	R49-19020	R49-19025_R49-19020	11/11/2015	Woodland Rd.	Reinforced Concrete Pipe	15	56	56

Pipe Size: 15 Total Ln.: 56 Inspected Ln.: 56

Project Total Ln.: 56.0 Project Inspected Ln.: 56.0

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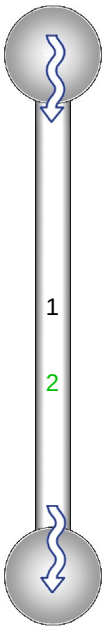
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19025_R49-19020	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19025	56		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19020	56		15	15	4	

SPR	1	MPR	2	PO Number	Customer
SPRI	1	MPRI	2		Enviornmental Partners
QSR	1100	QMR	2100	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
3	Jim_G	Downstream	20151111		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1.5	U-512-15321	Jetting	08:20	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20151111			08:23		



0.0 ft.	Access Point Manhole
4.0 ft.	Water Level
40.4 ft.	Joint Offset Medium
45.0 ft.	Deposits Attached Other
56.0 ft.	Access Point Manhole

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19025_R49-19020	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19025	56		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19020	56		15	15	4	

SPR	1	MPR	2	PO Number	Customer
SPRI	1	MPRI	2		Enviornmental Partners
QSR	1100	QMR	2100	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
3	Jim_G	Downstream	20151111		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
1.5	U-512-15321	Jetting	08:20	Dry	
Date Cleaned			End Time	Additional Info	
20151111			08:23		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19025								
4.0 ft.	Water Level				10	☐			
40.4 ft.	Joint Offset Medium					☐			1
45.0 ft.	Deposits Attached Other				10	☐	7		2
Remarks:	Concrete								
56.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19020								

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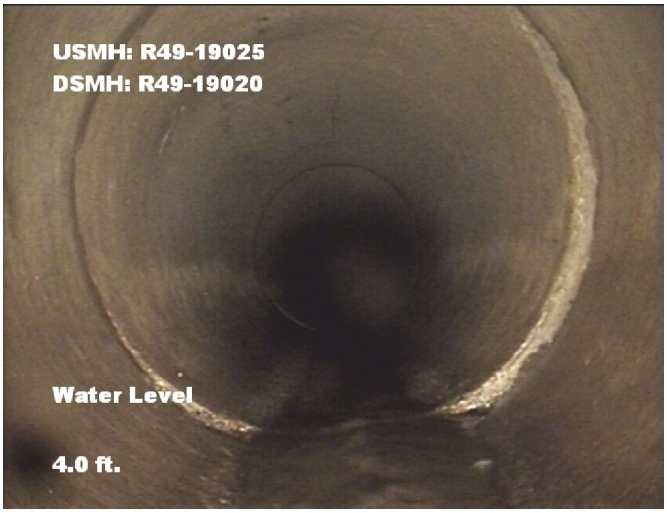
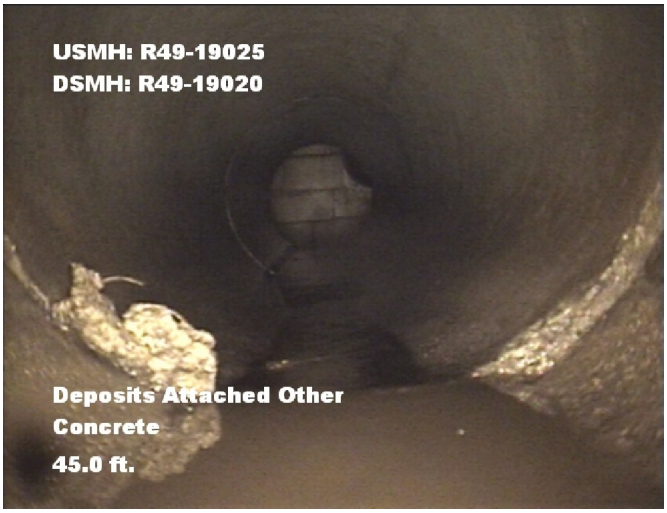
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19025_R49-19020	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19025	56		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19020	56		15	15	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19025		



Distance:	4.0 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	40.4 ft.	Grade:	1
Condition:	Joint Offset Medium		
Remarks:	N/A		



Distance:	45.0 ft.	Grade:	2
Condition:	Deposits Attached Other		
Remarks:	Concrete		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19025_R49-19020	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19025	56		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19020	56		15	15	4	

Distance:	56.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19020		

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19030	R49-19025	R49-19030_R49-19025	11/11/2015	Woodland Rd.	Reinforced Concrete Pipe	15	88	88

Pipe Size: 15 Total Ln.: 88 Inspected Ln.: 88

Project Total Ln.: 88.0 Project Inspected Ln.: 88.0

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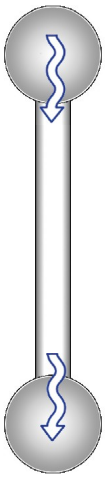
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19030_R49-19025	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19030	88		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19025	88		15	15	4	

				PO Number	Customer
SPR	N/A	MPR	N/A		Enviornmental Partners
SPRI	N/A	MPRI	N/A	Work Order	Purpose
QSR	N/A	QMR	N/A		Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
N/A	Jim_G	Downstream	20151111		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
N/A	U-512-15321	Jetting	08:13	Dry	
Date Cleaned			End Time	Additional Info	
20151111			08:17		



0.0 ft.	Access Point Manhole
1.9 ft.	Water Level
88.0 ft.	Access Point Manhole

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19030_R49-19025	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19030	88		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19025	88		15	15	4	

SPR	N/A	MPR	N/A	PO Number	Customer
SPRI	N/A	MPRI	N/A		Enviornmental Partners
QSR	N/A	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
N/A	Jim_G	Downstream	20151111		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
N/A	U-512-15321	Jetting	08:13	Dry	
Date Cleaned			End Time	Additional Info	
20151111			08:17		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19030								
1.9 ft.	Water Level				10	☐			
88.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19025								

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19030_R49-19025	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19030	88		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19025	88		15	15	4	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19030

Distance: 1.9 ft. Grade: 0
Condition: Water Level
Remarks: N/A

Distance: 88.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19025

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19040	R49-19035	R49-19040_R49-19035	11/11/2015	Woodland Rd.	Reinforced Concrete Pipe	15	64	64

Pipe Size: 15 Total Ln.: 64 Inspected Ln.: 64

Project Total Ln.: 64.0 Project Inspected Ln.: 64.0

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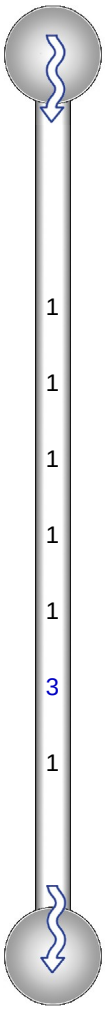
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19040_R49-19035	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19040	64		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19035	64		15	15	4	

SPR	N/A	MPR	9	PO Number	Customer
SPRI	N/A	MPRI	1.3		Enviornmental Partners
QSR	N/A	QMR	3116	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
9	Jim_G	Downstream	20151111		
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**	
1.3	U-512-15321	Jetting	07:57	Dry	
Date Cleaned			**End Time**	**Additional Info**	
20151111			08:03		



0.0 ft.	Access Point Manhole	
0.0 ft.	Water Level	
2.9 ft.	Roots Fine Joint	1
7.4 ft.	Roots Fine Joint	1
23.6 ft.	Roots Fine Joint	1
39.3 ft.	Roots Fine Joint	1
43.7 ft.	Roots Fine Joint	1
44.6 ft.	Deposits Attached Encrustation	3
57.4 ft.	Roots Fine Joint	1
64.0 ft.	Access Point Manhole	

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19040_R49-19035	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19040	64		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19035	64		15	15	4	

SPR	N/A	MPR	9	PO Number	Customer
SPRI	N/A	MPRI	1.3		Enviornmental Partners
QSR	N/A	QMR	3116	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
9	Jim_G	Downstream	20151111		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
1.3	U-512-15321	Jetting	07:57	Dry	
Date Cleaned			End Time	Additional Info	
20151111			08:03		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19040								
0.0 ft.	Water Level				10	☐			
2.9 ft.	Roots Fine Joint					☑	2		1
7.4 ft.	Roots Fine Joint					☑	2		1
23.6 ft.	Roots Fine Joint					☑	9	11	1
39.3 ft.	Roots Fine Joint					☑	9	3	1
43.7 ft.	Roots Fine Joint					☑	3		1
44.6 ft.	Deposits Attached Encrustation				15	☐	6	9	3
57.4 ft.	Roots Fine Joint					☑	3	9	1
64.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19035								

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19040_R49-19035	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19040	64		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19035	64		15	15	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19040		

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

Distance:	2.9 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	7.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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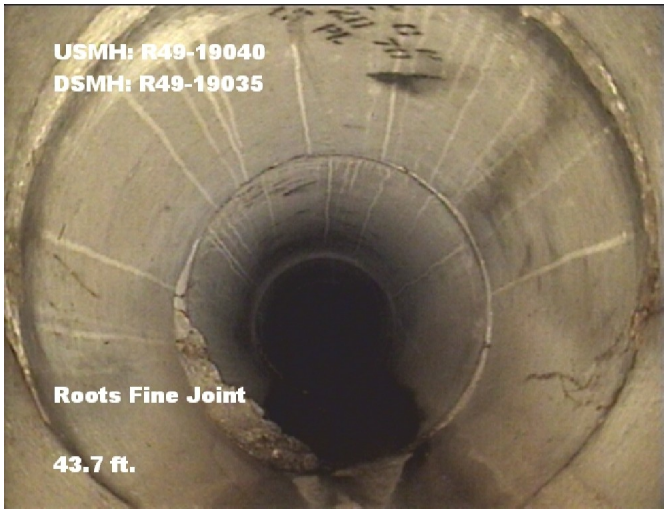
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19040_R49-19035	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19040	64		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19035	64		15	15	4	

Distance:	23.6 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	39.3 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		



Distance:	43.7 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	44.6 ft.	Grade:	3
Condition:	Deposits Attached Encrustation		
Remarks:	N/A		

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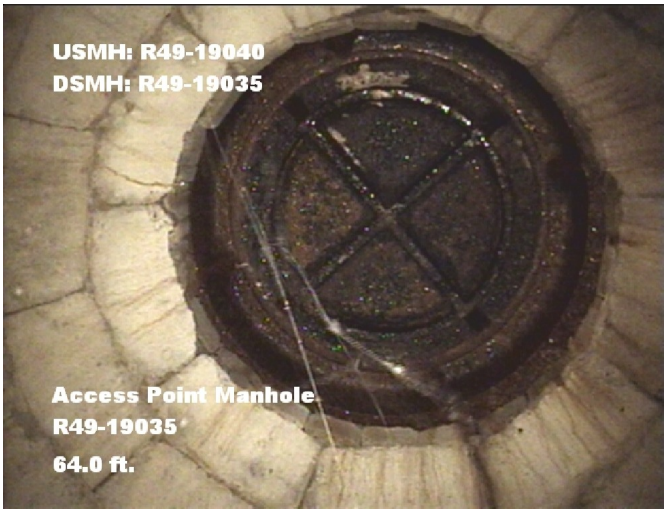
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19040_R49-19035	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19040	64		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19035	64		15	15	4	

Distance:	57.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		



Distance:	64.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19035		

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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19055	R49-19045	R49-19055_R49-19045	11/11/2015	Woodland Rd.	Reinforced Concrete Pipe	15	28	28

Pipe Size: 15 Total Ln.: 28 Inspected Ln.: 28

Project Total Ln.: 28.0 Project Inspected Ln.: 28.0

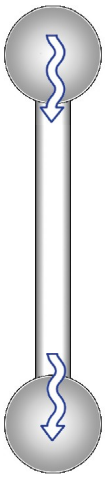
Inland Waters Inc
275 Scituate Ave
Johnston Rhode Island 02919
401-943-5302

Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19055_R49-19045	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	**Shape**		Location Details	
R49-19055	28		Circular			
DS Manhole	Length surveyed	Year Renewed	**Height**	Width	Pipe Joint...	
R49-19045	28		15	15	4	

				PO Number	Customer
SPR	N/A	MPR	N/A		Enviornmental Partners
SPRI	N/A	MPRI	N/A	Work Order	Purpose
QSR	N/A	QMR	N/A		Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
N/A	Jim_G	Downstream	20151111	
OPRI	**Certificate Number**	**Pre-Cleaning**	Time	Weather
N/A	U-512-15321	Jetting	07:31	Dry
Date Cleaned			End Time	Additional Info
			07:35	



		R49-19055
0.0 ft.	Access Point Manhole	R49-19055
0.0 ft.	Water Level	
28.0 ft.	Access Point Manhole	R49-19045
		R49-19045

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Defect Listing

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
R49-19055_R49-19045	Waltham	Woodland Rd.	Reinforced Concrete...	Light High...	Stormwater

Upstream MH	Total Length	Year Laid	Shape	Location Details
R49-19055	28		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
R49-19045	28		15	15	4

SPR	N/A	MPR	N/A	PO Number	Customer
SPRI	N/A	MPRI	N/A		Enviornmental Partners
QSR	N/A	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
N/A	Jim_G	Downstream	20151111	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
N/A	U-512-15321	Jetting	07:31	Dry

Date Cleaned	End Time	Additional Info
	07:35	

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19055								
0.0 ft.	Water Level				0	☐			
28.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19045								

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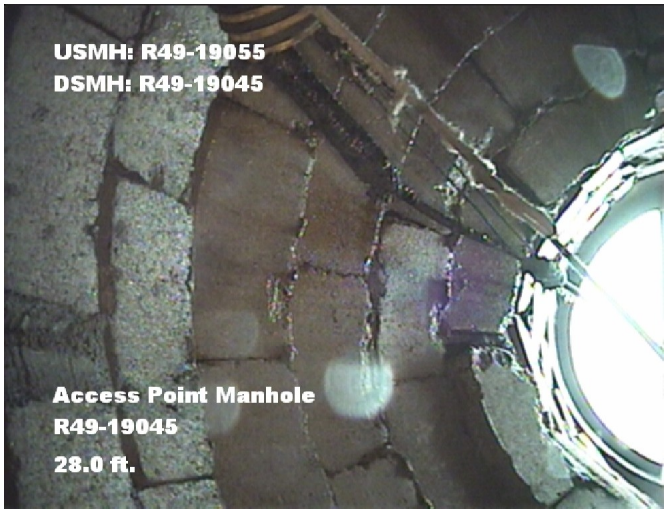
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19055_R49-19045	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19055	28		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19045	28		15	15	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19055		

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



Distance:	28.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19045		

Inland Waters Inc
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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19060	R49-19055	R49-19060_R49-19055	11/11/2015	Woodland Rd.	Reinforced Concrete Pipe	15	140	140

Pipe Size: 15 Total Ln.: 140 Inspected Ln.: 140

Project Total Ln.: 140.0 Project Inspected Ln.: 140.0

Inland Waters Inc
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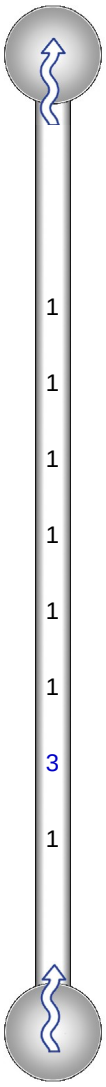
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19060_R49-19055	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	**Total Length**	**Year Laid**	**Shape**		**Location Details**	
R49-19060	140		Circular			
DS Manhole	**Length surveyed**	**Year Renewed**	**Height**	**Width**	**Pipe Joint...**	
R49-19055	140		15	15	4	

SPR	3	MPR	7	PO Number	Customer
SPRI	1	MPRI	1.4		Enviornmental Partners
QSR	1300	QMR	3114	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label
10	Jim_G	Upstream	20151111	
OPRI	**Certificate Number**	**Pre-Cleaning**	**Time**	**Weather**
1.3	U-512-15321	Jetting	07:21	Dry
Date Cleaned			**End Time**	**Additional Info**
20151111			07:28	



0.0 ft.	Access Point Manhole	
0.0 ft.	Water Level	
16.1 ft.	Joint Offset Medium	1
76.1 ft.	Joint Offset Medium	1
84.4 ft.	Roots Fine Joint	1
92.5 ft.	Roots Fine Joint	1
100.7 ft.	Joint Offset Medium	1
101.3 ft.	Roots Fine Joint	1
105.7 ft.	Roots Medium Joint	3
124.7 ft.	Roots Fine Joint	1
140.0 ft.	Access Point Manhole	

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Defect Listing

Pipe Segment Refere...	City	Street	Material	Location C...	Sewer Use
R49-19060_R49-19055	Waltham	Woodland Rd.	Reinforced Concrete...	Light High...	Stormwater

Upstream MH	Total Length	Year Laid	Shape	Location Details
R49-19060	140		Circular	

DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...
R49-19055	140		15	15	4

SPR	3	MPR	7	PO Number	Customer: Enviornmental Partners
SPRI	1	MPRI	1.4	Work Order	Purpose: Infiltration/Inflow Investigat...
QSR	1300	QMR	3114		

OPR	Surveyed By	Direction	Date	Media label
10	Jim_G	Upstream	20151111	

OPRI	Certificate Number	Pre-Cleaning	Time	Weather
1.3	U-512-15321	Jetting	07:21	Dry

Date Cleaned	End Time	Additional Info
20151111	07:28	

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19055								
0.0 ft.	Water Level				5	☐			
16.1 ft.	Joint Offset Medium					☐			1
76.1 ft.	Joint Offset Medium					☐			1
84.4 ft.	Roots Fine Joint					☑	6		1
92.5 ft.	Roots Fine Joint					☑	7		1
100.7 ft.	Joint Offset Medium					☐			1
101.3 ft.	Roots Fine Joint					☑	5		1
105.7 ft.	Roots Medium Joint				10	☑	3	9	3
124.7 ft.	Roots Fine Joint					☑	10		1
140.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19060								

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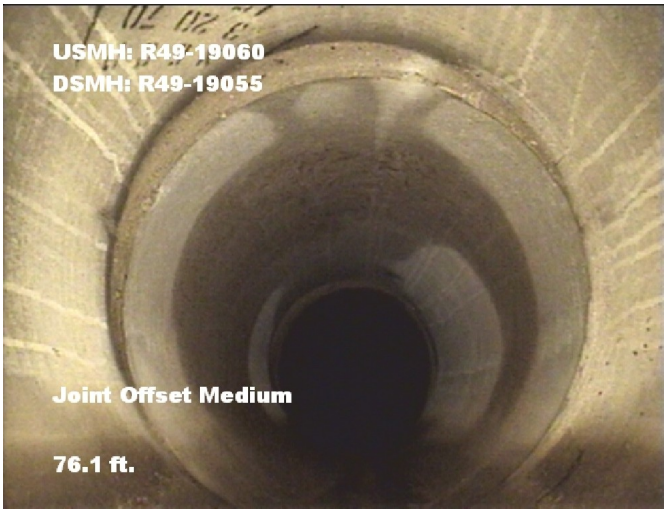
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19060_R49-19055	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19060	140		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19055	140		15	15	4	

Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19055		

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

Distance:	16.1 ft.	Grade:	1
Condition:	Joint Offset Medium		
Remarks:	N/A		



Distance:	76.1 ft.	Grade:	1
Condition:	Joint Offset Medium		
Remarks:	N/A		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19060_R49-19055	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19060	140		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19055	140		15	15	4	

Distance:	84.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	92.5 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	100.7 ft.	Grade:	1
Condition:	Joint Offset Medium		
Remarks:	N/A		

Distance:	101.3 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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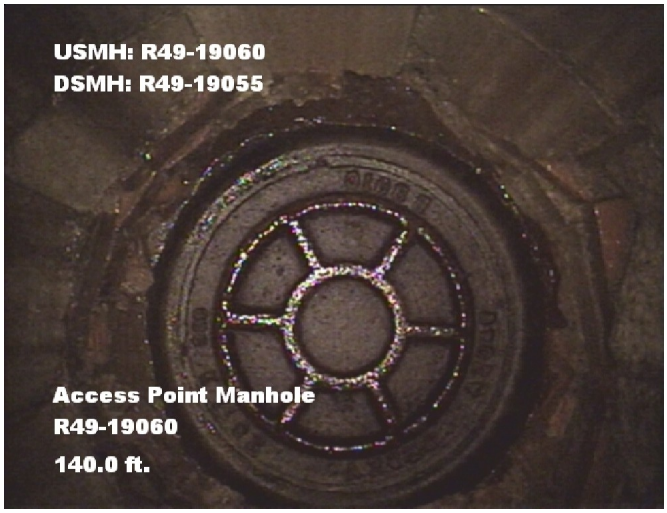
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19060_R49-19055	Waltham	Woodland Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19060	140		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19055	140		15	15	4	

Distance: 105.7 ft. Grade: 3
Condition: Roots Medium Joint
Remarks: N/A

Distance: 124.7 ft. Grade: 1
Condition: Roots Fine Joint
Remarks: N/A



Distance: 140.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19060

Inland Waters Inc
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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19065	R49-19060	R49-19065_R49-19060	11/10/2015	Prospect Hill Rd.	Reinforced Concrete Pipe	15	15	15

Pipe Size: 15 Total Ln.: 15 Inspected Ln.: 15

Project Total Ln.: 15.0 Project Inspected Ln.: 15.0

Inland Waters Inc
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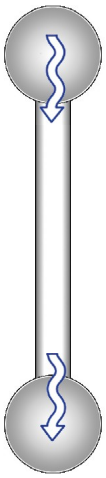
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19065_R49-19060	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19065	15		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19060	15		15	15	8	

SPR	N/A	MPR	N/A	PO Number	Customer
SPRI	N/A	MPRI	N/A		Enviornmental Partners
QSR	N/A	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
N/A	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
N/A	U-512-15321	No Pre-Cleaning	14:26	Dry	
Date Cleaned			End Time	Additional Info	
			14:28		



		R49-19065
0.0 ft.	Access Point Manhole	R49-19065
0.0 ft.	Water Level	
15.0 ft.	Access Point Manhole	R49-19060
		R49-19060

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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19065_R49-19060	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19065	15		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19060	15		15	15	8	

SPR	N/A	MPR	N/A	PO Number	Customer
SPRI	N/A	MPRI	N/A		Enviornmental Partners
QSR	N/A	QMR	N/A	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
N/A	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
N/A	U-512-15321	No Pre-Cleaning	14:26	Dry	
Date Cleaned			End Time	Additional Info	
			14:28		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19065								
0.0 ft.	Water Level				10	☐			
15.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19060								

Inland Waters Inc
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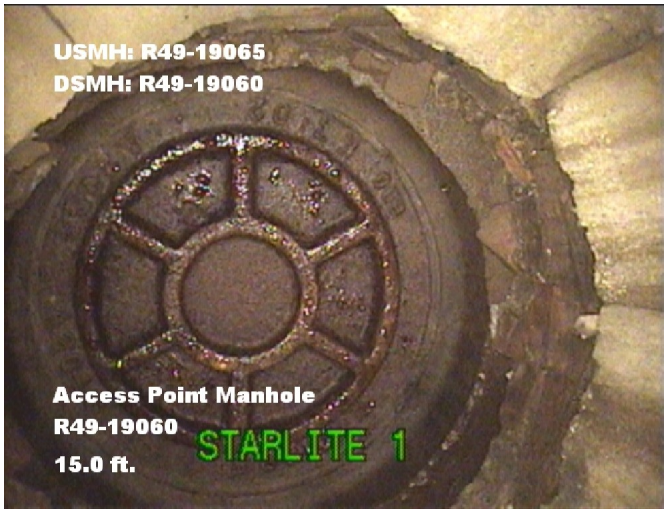
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19065_R49-19060	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19065	15		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19060	15		15	15	8	

Distance: 0.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19065

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



Distance: 15.0 ft. Grade: 0
Condition: Access Point Manhole
Remarks: R49-19060

Inland Waters Inc
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Project Summary

Project Name:	Waltham Ma 11-10-15							
US MH	DS MH	Pipe ID	Date	Street	Material	Size	Total	Insp
R49-19070	R49-19065	R49-19070_R49-19065	11/10/2015	Prospect Hill Rd.	Reinforced Concrete Pipe	15	208	208

Pipe Size: 15 Total Ln.: 208 Inspected Ln.: 208

Project Total Ln.: 208.0 Project Inspected Ln.: 208.0

Inland Waters Inc
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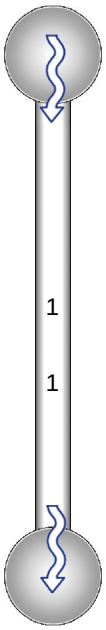
Defect Listing Plot

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19070_R49-19065	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	**Shape**		Location Details	
R49-19070	208		Circular			
DS Manhole	Length surveyed	Year Renewed	**Height**	Width	Pipe Joint...	
R49-19065	208		15	15	8	

				PO Number	Customer
SPR	N/A	MPR	2		Enviornmental Partners
SPRI	N/A	MPRI	1	Work Order	Purpose
QSR	N/A	QMR	1200		Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
2	Jim_G	Downstream	20151110		
OPRI	Certificate Number	Pre-Cleaning	Time	Weather	
1	U-512-15321	Jetting	14:17	Dry	
Date Cleaned			End Time	Additional Info	
20151110			14:23		



R49-19070

0.0 ft.	Access Point Manhole	R49-19070
1.8 ft.	Water Level	
75.5 ft.	Roots Fine Joint	
101.4 ft.	Roots Fine Joint	
208.0 ft.	Access Point Manhole	R49-19065

R49-19065

Inland Waters Inc
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Defect Listing

Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19070_R49-19065	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	**Shape**		Location Details	
R49-19070	208		Circular			
DS Manhole	Length surveyed	Year Renewed	**Height**	Width	Pipe Joint...	
R49-19065	208		15	15	8	

SPR	N/A	MPR	2	PO Number	Customer
SPRI	N/A	MPRI	1		Enviornmental Partners
QSR	N/A	QMR	1200	Work Order	Purpose
					Infiltration/Inflow Investigat...

OPR	Surveyed By	Direction	Date	Media label	
2	Jim_G	Downstream	20151110		
OPRI	**Certificate Number**	**Pre-Cleaning**	Time	Weather	
1	U-512-15321	Jetting	14:17	Dry	
Date Cleaned			End Time	Additional Info	
20151110			14:23		

Distance	Condition	Cont. Dfct.	Values			Joint	Clock Position		Grade
			1st	2nd	%		At/From	To	
0.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19070								
1.8 ft.	Water Level				5	☐			
75.5 ft.	Roots Fine Joint					☑	12		1
101.4 ft.	Roots Fine Joint					☑	7		1
208.0 ft.	Access Point Manhole					☐			
Remarks:	R49-19065								

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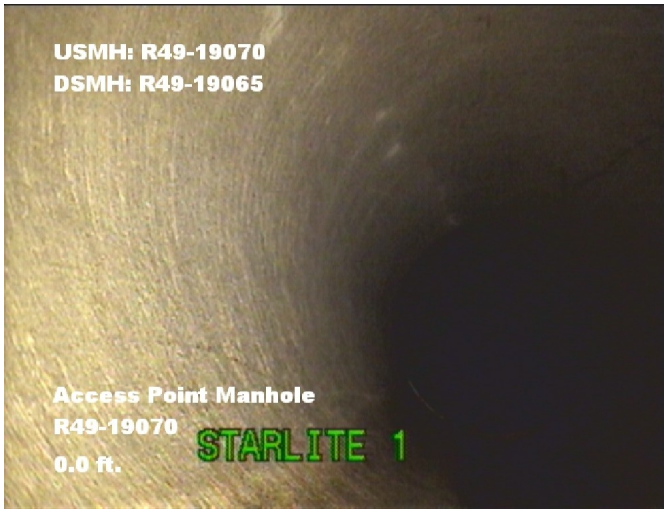
Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19070_R49-19065	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19070	208		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19065	208		15	15	8	



Distance:	0.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19070		

Distance:	1.8 ft.	Grade:	0
Condition:	Water Level		
Remarks:	N/A		

Distance:	75.5 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

Distance:	101.4 ft.	Grade:	1
Condition:	Roots Fine Joint		
Remarks:	N/A		

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Pipe Segment Refere...	City	Street	Material		Location C...	Sewer Use
R49-19070_R49-19065	Waltham	Prospect Hill Rd.	Reinforced Concrete...		Light High...	Stormwater
Upstream MH	Total Length	Year Laid	Shape		Location Details	
R49-19070	208		Circular			
DS Manhole	Length surveyed	Year Renewed	Height	Width	Pipe Joint...	
R49-19065	208		15	15	8	

Distance:	208.0 ft.	Grade:	0
Condition:	Access Point Manhole		
Remarks:	R49-19065		

APPENDIX B

BORING LOGS

Environmental Partners GROUP
A partnership for engineering solutions.

Memorandum

To: Paul C. Millett, P.E.; Ryan J. Paul, P.E.

From: William M. Watts

Cc: Natalie M. Pommersheim

Date: July 11, 2018

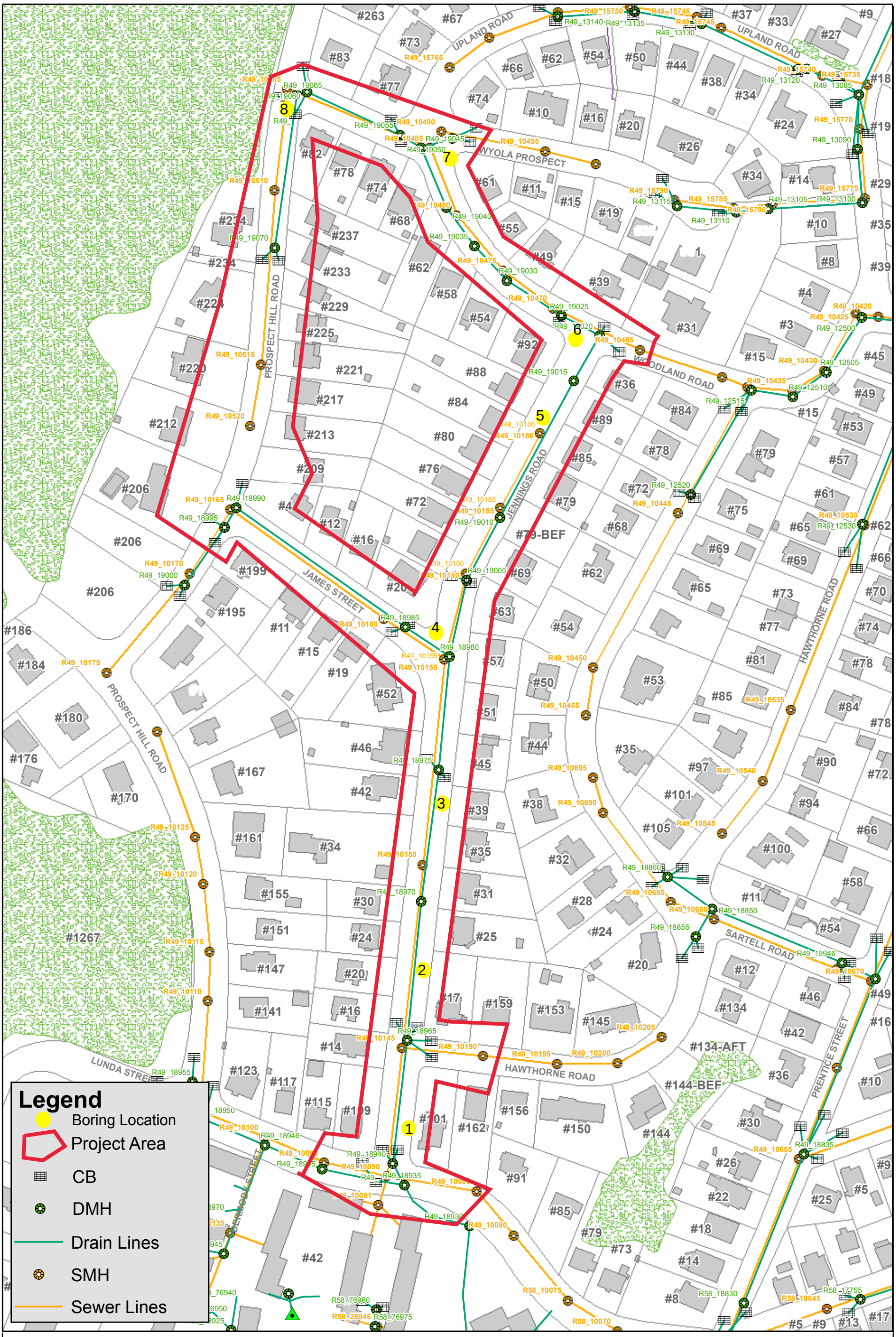
Subject: Waltham Field Investigation Program – Jennings Road Drilling

---

The following memorandum summarizes the drilling event performed at Jennings Road and Woodland Road as part of the Waltham IDDE program. The drilling was conducted by Northern Drill Services using the drive-and-wash drilling technique. Drilling oversight and soil descriptions were performed by Environmental Partners on November 27th and November 28th, 2017.

Of the eight planned borings (B1 – B8), four of them (B1, B2, B3, and B8) could not be drilled due to the amount of utilities in the road; drain, sewer, water, and gas lines are all present in the road and could not be avoided. All eight boring locations can be seen in the attached figure.

Overall, the geology consists of sands of varying grain size with little gravel and silt. Borings B4 and B5 hit refusal at 6.5' below ground surface (bgs) and 9' bgs, respectively. A ledge core sample was taken at B5 from 9' bgs to 13.5' bgs. Borings B6 and B7 did not hit refusal (total depth of 12' bgs). Soil sample jars were collected and blow counts were recorded at each boring location. Detailed boring logs are attached.



Waltham IDDE Program
Borings Locations
Jennings Rd

BORING LOG

Project: Waltham IDDE
Location: Waltham, MA
Client: Waltham Engineering Dept.
Driller: Northern Drill Service, Inc.
Drilling Methods: Drive-and-wash
Weather: Clear, low 20s
Performed By: WMW Date: 11/28/17
Checked By: Date:

See geoprobe location figure

Boring Locus Map

Boring No: B4
Location: Jennings Rd
Approx. Ground Elevation:
Approx. Groundwater Elevatior
Date/Time of Groundwater Elevation:
Datum:
Project No. R253-1702

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*Pen./ Rec.*	*Soil Description*	*Stratum Change Depth (feet)*	*Well Construction Observations*	*Note No.*
				0-4" pavement	PAVEMENT		
1	1	13-10-7-9	24/12"	0-10" fine sand with little moderately-sorted sub angular gravel, brown. 10-12" angular gravel with little fine sand, black.	FINE SAND WITH LITTLE GRAVEL		
2					GRAVEL WITH LITTLE FINE SAND		
3							
4							
5	2	6-11-25-29	24/10"	0-10" fine/medium sand with some well-sorted angular gravel, brown.	FINE/MEDIUM SAND WITH SOME GRAVEL		2
6							
7				**REFUSAL AT 6.5' BGS**			
8							
9							
10							
11							
12							
13							

NOTES:

1. Bottom of boring - 6.5 ft bgs (refusal)
2. Saturated 4-4.8 ft bgs

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample		
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

BORING LOG

Project: Waltham IDDE
Location: Waltham, MA
Client: Waltham Engineering Dept.
Driller: Northern Drill Service, Inc.
Drilling Methods: Drive-and-wash
Weather: Overcast, high 30s
Performed By: WMW Date: 11/27/17
Checked By: Date:

See geoprobe location figure

Boring Locus Map

Boring No: B5
Location: Jennings Rd
Approx. Ground Elevation:
Approx. Groundwater Elevatior
Date/Time of Groundwater Elevation:
Datum:
Project No. R253-1702

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*Pen./ Rec.*	*Soil Description*	*Stratum Change Depth (feet)*	*Well Construction Observations*	*Note No.*
				0-4" pavement	PAVEMENT		
1	1	8-5-7-9	24/11"	0-3" silt, getting sandier, with very trace sub rounded gravel, tan. 3-11" fine sand with trace sub angular gravel, tan and brown.	SILT WITH GRAVEL		
2							
3							
4							
5	2	18-23-26-35	24/16"	0-16" very fine sand, getting coarser, with moderately-sorted trace angular gravel, grey and brown.	FINE SAND WITH TRACE GRAVEL		
6							
7							
8							
9	3	18-33-50-X	24/7"	0-5" fine sand and angular gravel, well-sorted, grey. 5-7" angular gravel.	FINE SAND AND GRAVEL GRAVEL		2
10				**REFUSAL AT 9' BGS**			
11							
12							
13							

NOTES:

1. Bottom of boring - 9 ft bgs (refusal)
2. Rock core sample taken 9-13.4 ft bgs

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample		
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

BORING LOG

Project: Waltham IDDE
Location: Waltham, MA
Client: Waltham Engineering Dept.
Driller: Northern Drill Service, Inc.
Drilling Methods: Drive-and-wash
Weather: Clear, mid 30s
Performed By: WMW Date: 11/27/17
Checked By: Date:

See geoprobe location figure

Boring Locus Map

Boring No: B6
Location: Woodland Rd
Approx. Ground Elevation:
Approx. Groundwater Elevatior
Date/Time of Groundwater Elevation:
Datum:
Project No. R253-1702

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec.	Soil Description	Stratum Change Depth (feet)	Well Construction Observations	Note No.
				0-4" pavement	PAVEMENT		
1	1	10-7-3-5	24/11"	0-4" silty sand, black and white. 4-8" clay/silt with trace poorly-sorted medium sand, brown. 8-11" fine sand with trace coarse sand, grey/brown.	SILTY SAND CLAY/SILT WITH SAND FINE SAND WITH TRACE COARSE SAND		
2							
3							
4							
5	2	2-2-7-112	24/12"	0-10" clay/silt with very trace fine sand, brown. 10-12" sandy silt and angular gravel, brown.	CLAY/SILT WITH TRACE FINE SAND		2
6							
7					SANDY SILT AND GRAVEL		
8							
9	3	21-39-42-39	24/16"	0-4" sandy silt with trace angular gravel, brown and orange. 4-16" fine sand with little well-sorted coarse sand, grey.	FINE SAND WITH COARSE SAND		
10							
11	4	33-64-88-105	24/13"	0-4" medium/fine sand with trace angular gravel, grey and red. 4-9" coarse/medium sand with trace fine sand, grey. 9-11" fine/medium sand, grey. 11-13" very fine sand, grey.	MEDIUM/FINE SAND COARSE/MED SAND FINE/MEDIUM SAND FINE SAND		3
12							
13				**BOTTOM OF BORING: 12' BGS**			

NOTES:

1. Bottom of boring - 12 ft bgs
2. Saturated 4-5 ft bgs
3. Saturated 10.8-11.1 ft bgs

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample		
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

BORING LOG

Project: Waltham IDDE
Location: Waltham, MA
Client: Waltham Engineering Dept.
Driller: Northern Drill Service, Inc.
Drilling Methods: Drive-and-wash
Weather: Overcast, mid 30s
Performed By: WMW Date: 11/27/17
Checked By: Date:

See geoprobe location figure

Boring Locus Map

Boring No: **B7**
Location: Woodland Rd
Approx. Ground Elevation:
Approx. Groundwater Elevatior
Date/Time of Groundwater Elevation:
Datum:
Project No. R253-1702

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*Pen./ Rec.*	*Soil Description*	*Stratum Change Depth (feet)*	*Well Construction Observations*	*Note No.*
				0-4" pavement	PAVEMENT		
1	1	8-6-6-9	24/16"	0-8" fine sand with trace gravel, tan. 8-9" sandy silt, tan. 9-11" fine sand with trace gravel, dark tan. 11-16" fine sand with trace medium sand, grey.	FINE SAND WITH TRACE GRAVEL		
2					SANDY SILT		
3					FINE SAND WITH TRACE MEDIUM SAND		
4							
5	2	18-53-67-52	24/14"	0-12" fine sand and well-sorted coarse sand, grey. 12-14" angular gravel.	FINE SAND AND COARSE SAND		
6					GRAVEL		
7					FINE SAND WITH SOME COARSE SAND		
8							
9	3	19-64-38-53	24/15"	0-15" fine sand with some coarse sand, grey.			
10							
11	4	57-46-31-59	24/24"	0-9" fine sand with some angular gravel, dark tan. 9-19" medium/coarse sand with little fine sand, grey. 19-24" fine sand, getting coarser, grey.	FINE SAND WITH SOME GRAVEL		
12					MEDIUM/COARSE SAND WITH LITTLE FINE SAND		
					FINE SAND		
13				**BOTTOM OF BORING: 12' BGS**			

NOTES:

1. Bottom of boring - 12 ft bgs

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample		
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

APPENDIX C

PRICE ADJUSTMENT CLAUSES

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	**FUEL FACTORS**	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

****
*

END OF DOCUMENT

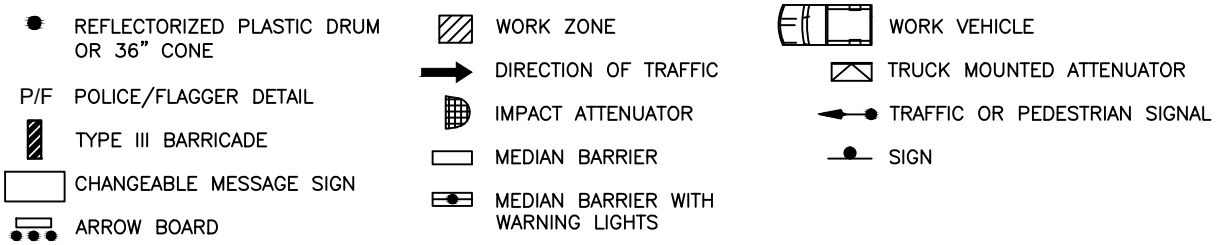
APPENDIX D

TRAFFIC MANAGEMENT PLAN

NOTES:

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
2. ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. 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.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
6. 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.
7. THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
8. THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
9. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
10. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
11. MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
12. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:



THE IDEAL CAPACITY OF A MAJOR HIGHWAY IS GENERALLY CONSIDERED TO BE 1900 PASSENGER CARS PER HOUR PER LANE (PCPHPL). IN WORK ZONES ON A MULTI–LANE DIVIDED HIGHWAY, THE FOLLOWING VOLUME GUIDELINES HAVE BEEN SUGGESTED:

MEASURED AVERAGE WORK ZONE CAPACITIES

NUMBER OF LANES		NUMBER OF STUDIES	AVERAGE CAPACITY	
NORMAL (EXISTING)	OPEN (TO TRAFFIC)		VPH	VPHPL
3	1	7	1,170	1,170
2	1	8	1,340	1,340
5	2	8	2,740	1,370
4	2	4	2,960	1,480
3	2	9	2,980	1,490
4	3	4	4,560	1,520

Source: Dudek, C., Notes on Work Zone Capacity and Level of Service. Texas Transportation Institute, Texas A&M University, College Station, Texas (1984)

BY OBTAINING HOURLY TRAFFIC COUNTS FOR A PARTICULAR ROADWAY (WITH A MINIMUM OF A 48–HOUR AUTOMATIC TRAFFIC RECORDER (ATR) COUNT), THIS WILL HELP TO DETERMINE AT WHAT TIMES OF THE DAY OR NIGHT A CERTAIN NUMBER OF LANES MAY BE CLOSED.

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS □□		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350 (100)	350 (100)	350 (100)
MOST OTHER ROADWAYS*	500 (150)	500 (150)	500 (150)
FREEWAYS AND EXPRESSWAYS*	1,000 (300)	1,500 (450)	2,640 (800)

* ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING.

** DISTANCES ARE SHOWN IN FEET (METERS). 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 TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TTCP SETUPS. THESE ADVANCE WARNING SIGNS ARE LOCATED PRIOR TO 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. ADDITIONAL SIGNS (i.e. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

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.

R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

R2-10a, R2-10e, AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

Based on: Table 6C-1 MUTCD LATEST EDITION

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED* □km/h□	DISTANCE □m□
30	35
40	50
50	65
60	85
70	105
80	130
90	160
100	185
110	220
120	250

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 MUTCD LATEST EDITION

CONVENTIONAL ROADWAY– A STREET OR HIGHWAY OTHER THAN A LOW–VOLUME ROAD, EXPRESSWAY, OR FREEWAY.

EXPRESSWAY– A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.

FREEWAY– A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS.

LOW–VOLUME ROAD– A FACILITY LYING OUTSIDE OF BUILT–UP AREAS OF CITIES, TOWNS, AND COMMUNITIES, AND IT SHALL HAVE A TRAFFIC VOLUME OF LESS THAN 400 AADT. IT SHALL NOT BE A FREEWAY, EXPRESSWAY, INTERCHANGE RAMP, FREEWAY SERVICE ROAD OR A ROAD ON A DESIGNATED STATE HIGHWAY SYSTEM.

Source: MUTCD LATEST EDITION

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	50 FT MIN.(15 m) 100 FT(30 m) MAX.
DOWNSTREAM TAPER	50 FT MIN.(15 m) 100 FT MAX.(30 m) PER LANE

Source: Table 6C–3 MUTCD LATEST EDITION

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	$L = WS$

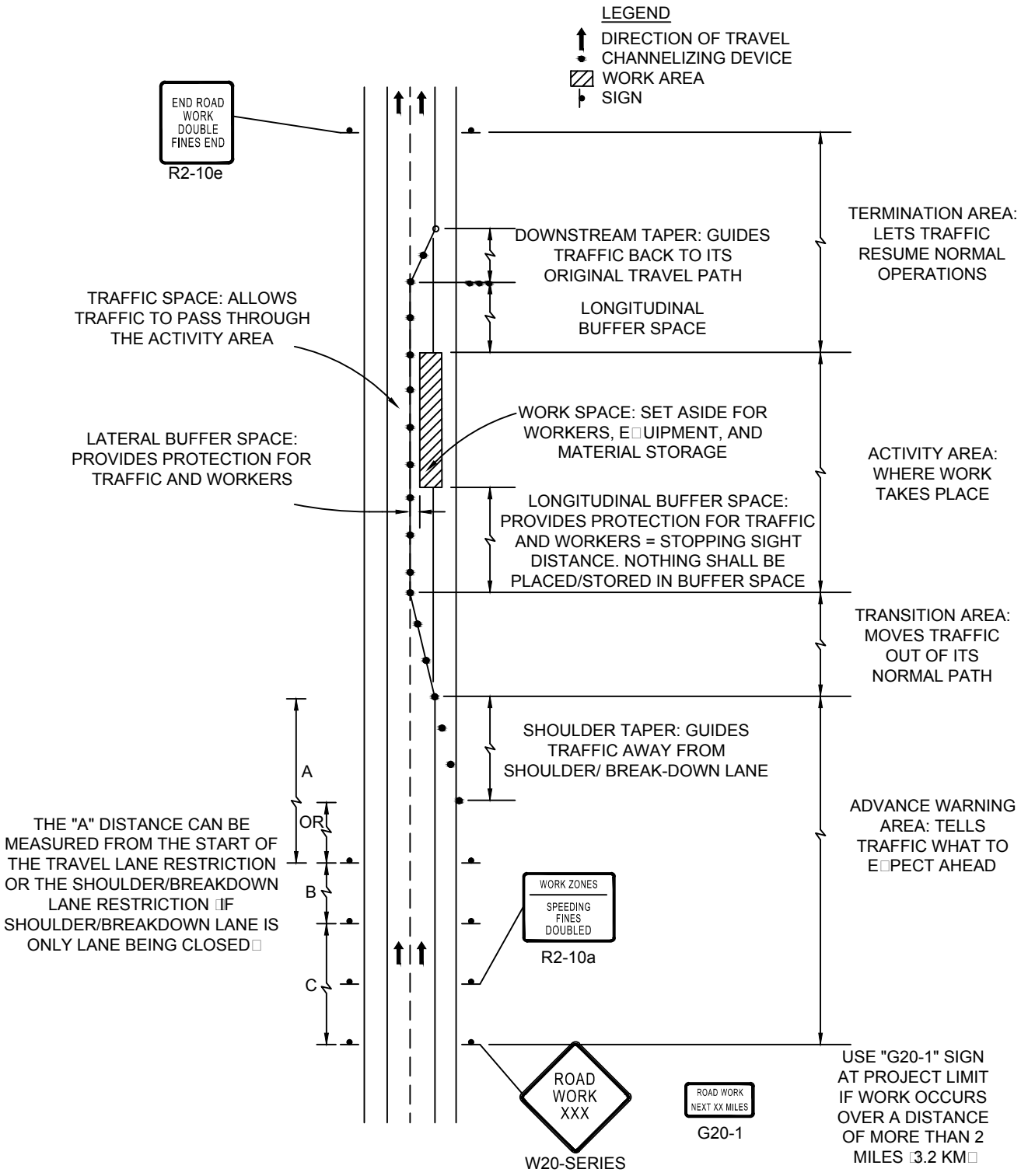
SPEED LIMIT "S"	TAPER LENGTH "L" Meters
60 KM/H OR LESS	$L = \frac{WS^2}{155}$
70 KM/H OR MORE	$L = \frac{WS}{1.6}$

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 ANTICAPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C–4 MUTCD LATEST EDITION



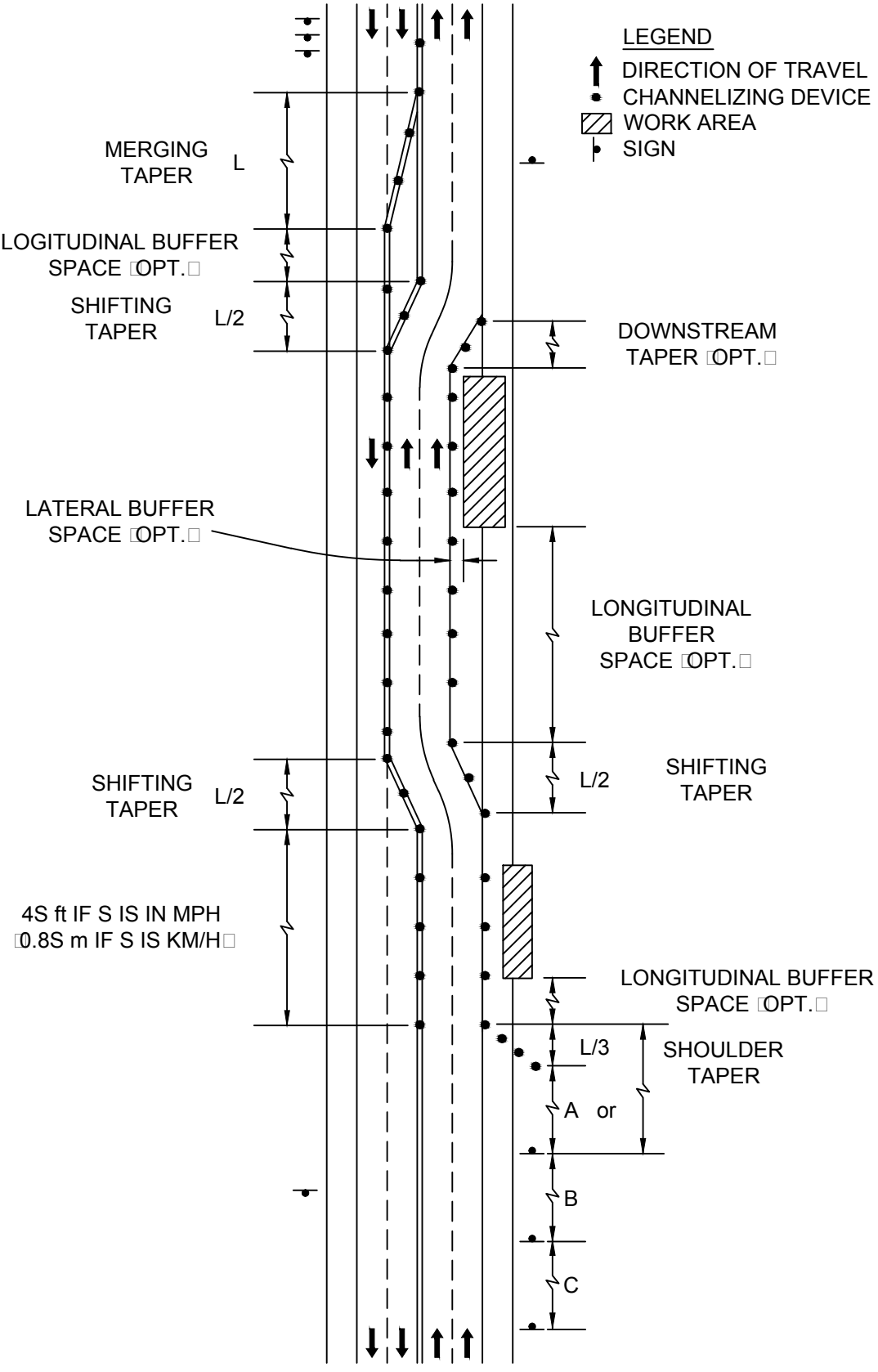
massDOT Massachusetts Department of Transportation Highway Division

Standard
Details and Drawings
for the
Development of
Temporary Traffic Control Plans

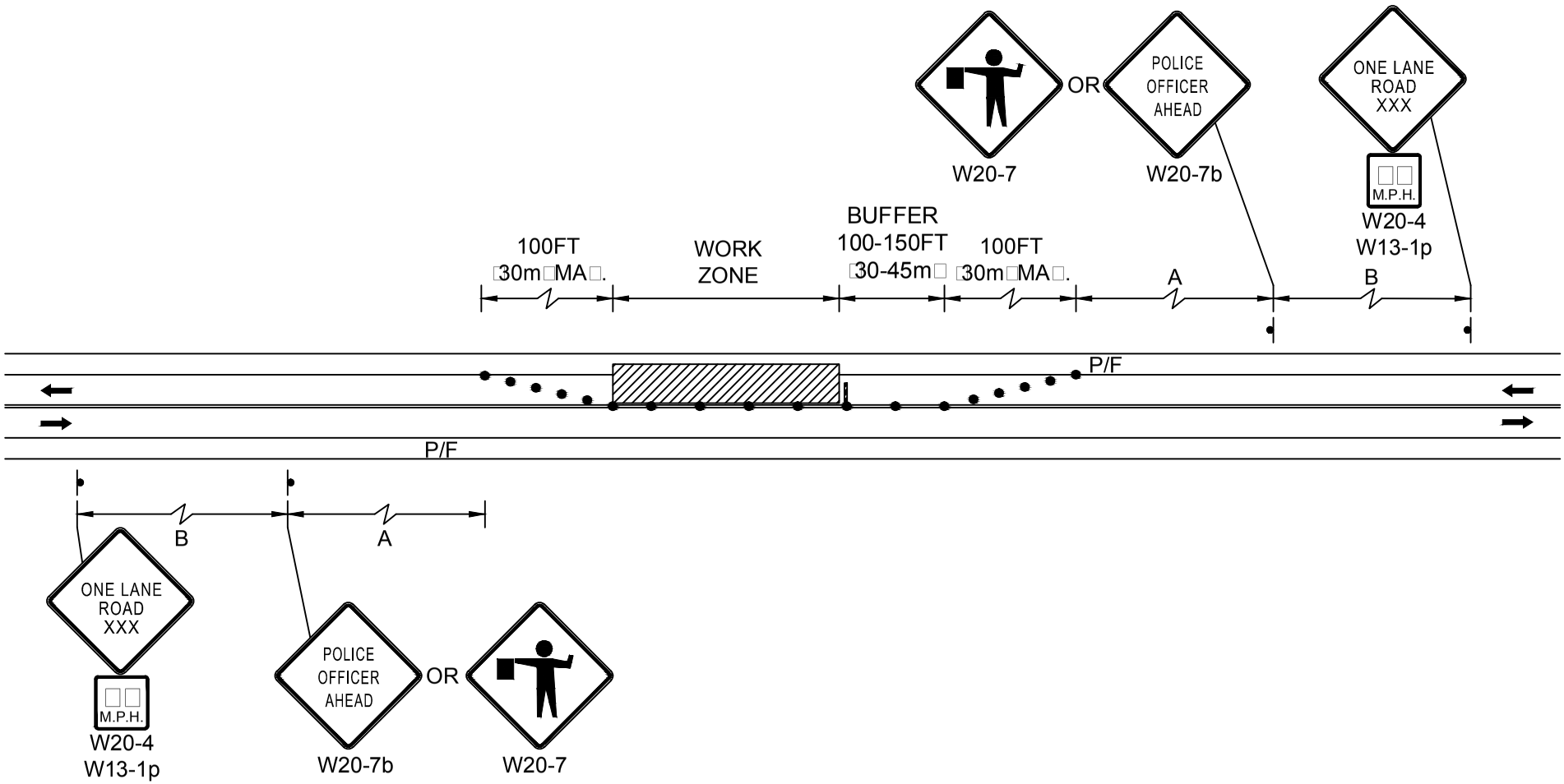
FIGURE GEN-4

COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL (TTC) ZONE

NOT TO SCALE



MassDOT Massachusetts Department of Transportation Highway Division	Standard Details and Drawings for the Development of Temporary Traffic Control Plans	FIGURE GEN-5 TYPES OF TAPERS AND BUFFER SPACES NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division	Standard Details and Drawings for the Development of Temporary Traffic Control Plans	FIGURE TLR-5 TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC NOT TO SCALE

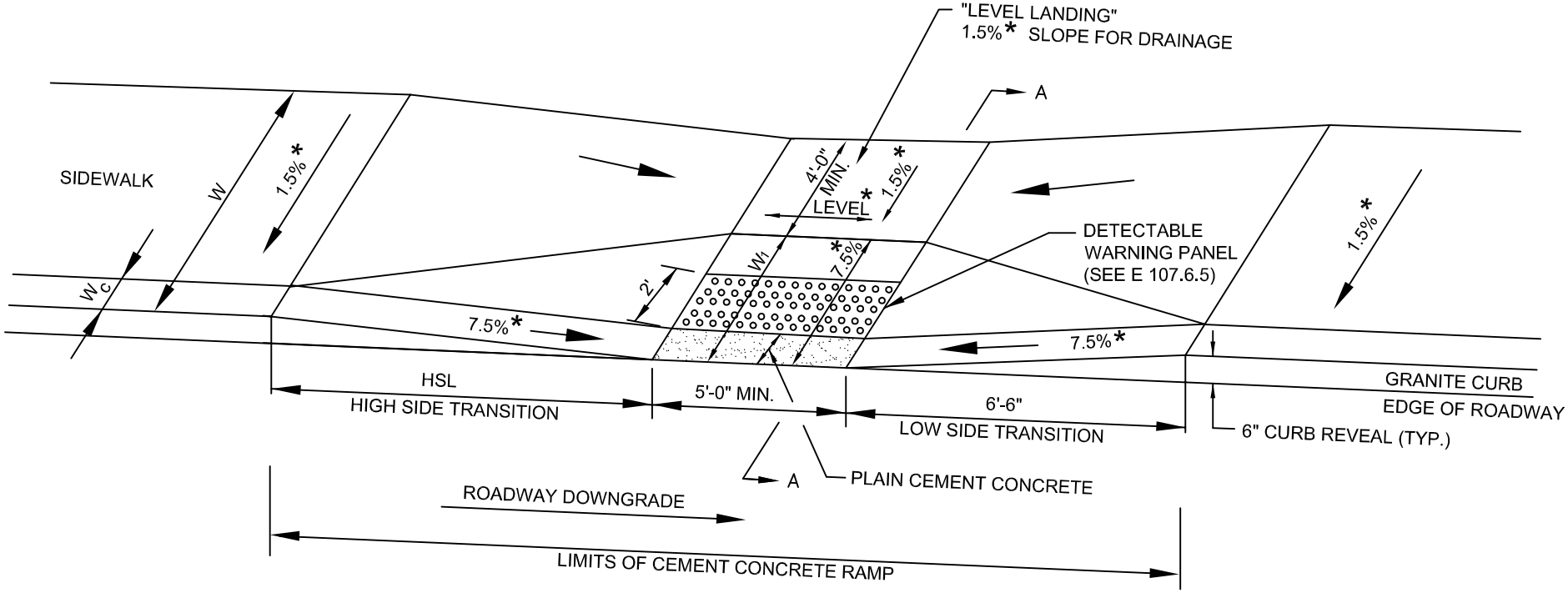
APPENDIX E

MASSDOT SIDEWALK AND WHEELCHAIR DETAILS

CONSTRUCTION STANDARDS

massDOT Massachusetts Department of Transportation Highway Division

WHEELCHAIR RAMPS
LESS THAN 12'-4" SIDEWALK



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)

W = SIDEWALK WIDTH

W_c = CURB WIDTH

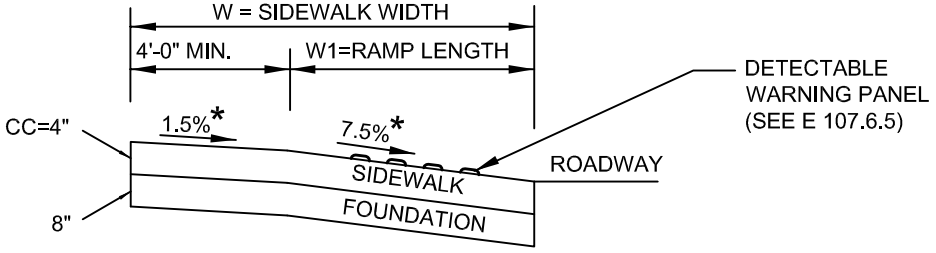
W_1 = PERPENDICULAR RAMP LENGTH

CC = CEMENT CONCRETE

* = TOLERANCE FOR CONSTRUCTION ±0.5%

USABLE SIDEWALK WIDTH PER AAB = W-Wc

RAMP LENGTH, W1 = W-4'-0" Min



SECTION A-A

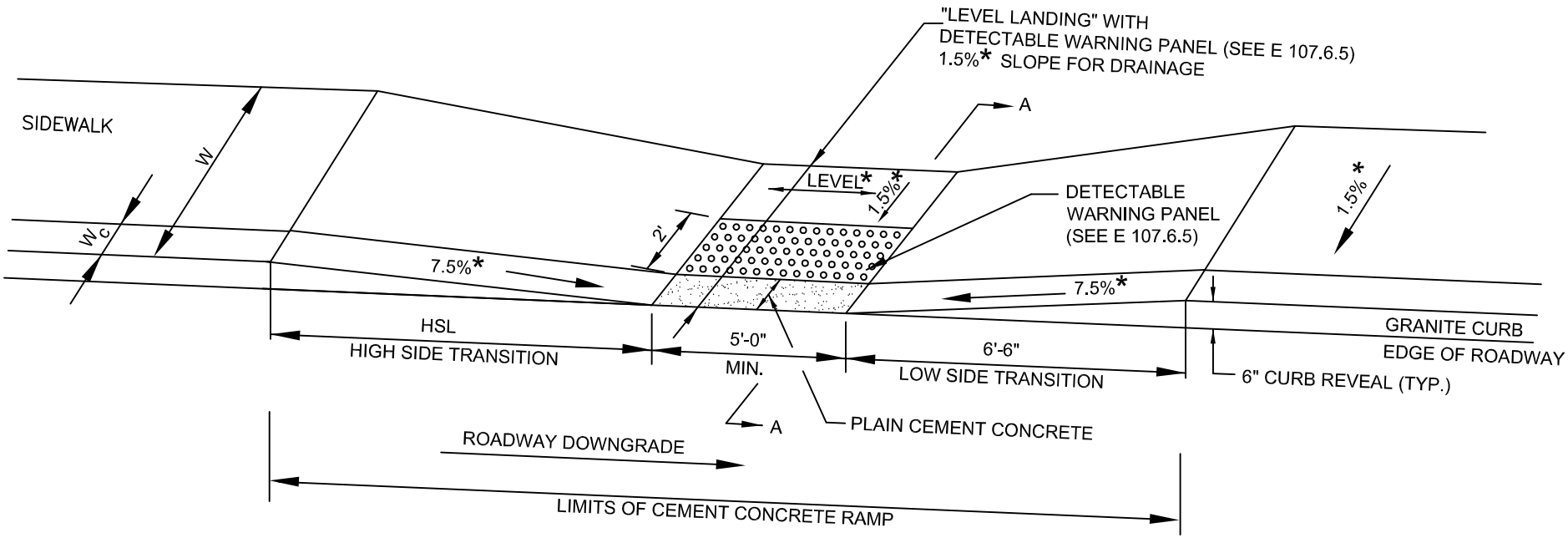
DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.2.0

CONSTRUCTION STANDARDS

massDOT Massachusetts Department of Transportation Highway Division

WHEELCHAIR RAMP ON NARROW SIDEWALK WITH DETECTABLE WARNING PANEL



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)

W = SIDEWALK WIDTH

W_C = CURB WIDTH

CC = CEMENT CONCRETE

* = TOLERANCE FOR CONSTRUCTION ±0.5%

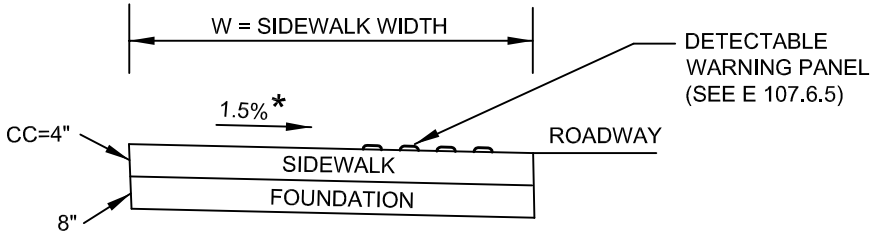
USABLE SIDEWALK WIDTH PER AAB = W-Wc

USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'0"

SEE E 107.6.5 FOR DETAILS OF DETECTABLE WARNING PANEL

NOTE:

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS



SECTION A-A

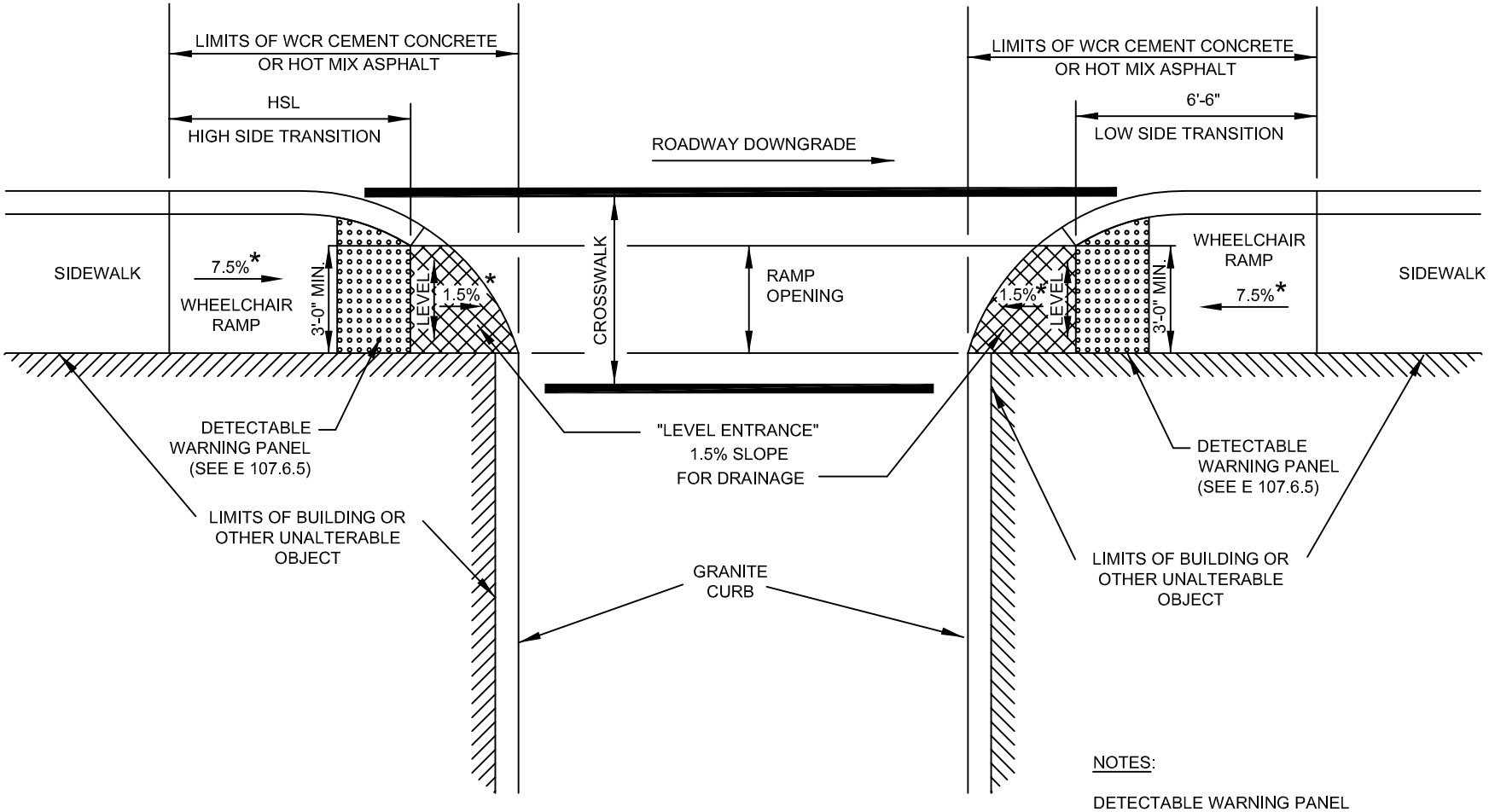
DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.2.1

massDOT Highway Division
Massachusetts Department of Transportation

CONSTRUCTION STANDARDS

WHEELCHAIR RAMP FOR ONE CONTINUOUS DIRECTION OF PEDESTRIAN TRAVEL



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH
(SEE E 107.9.0)

* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

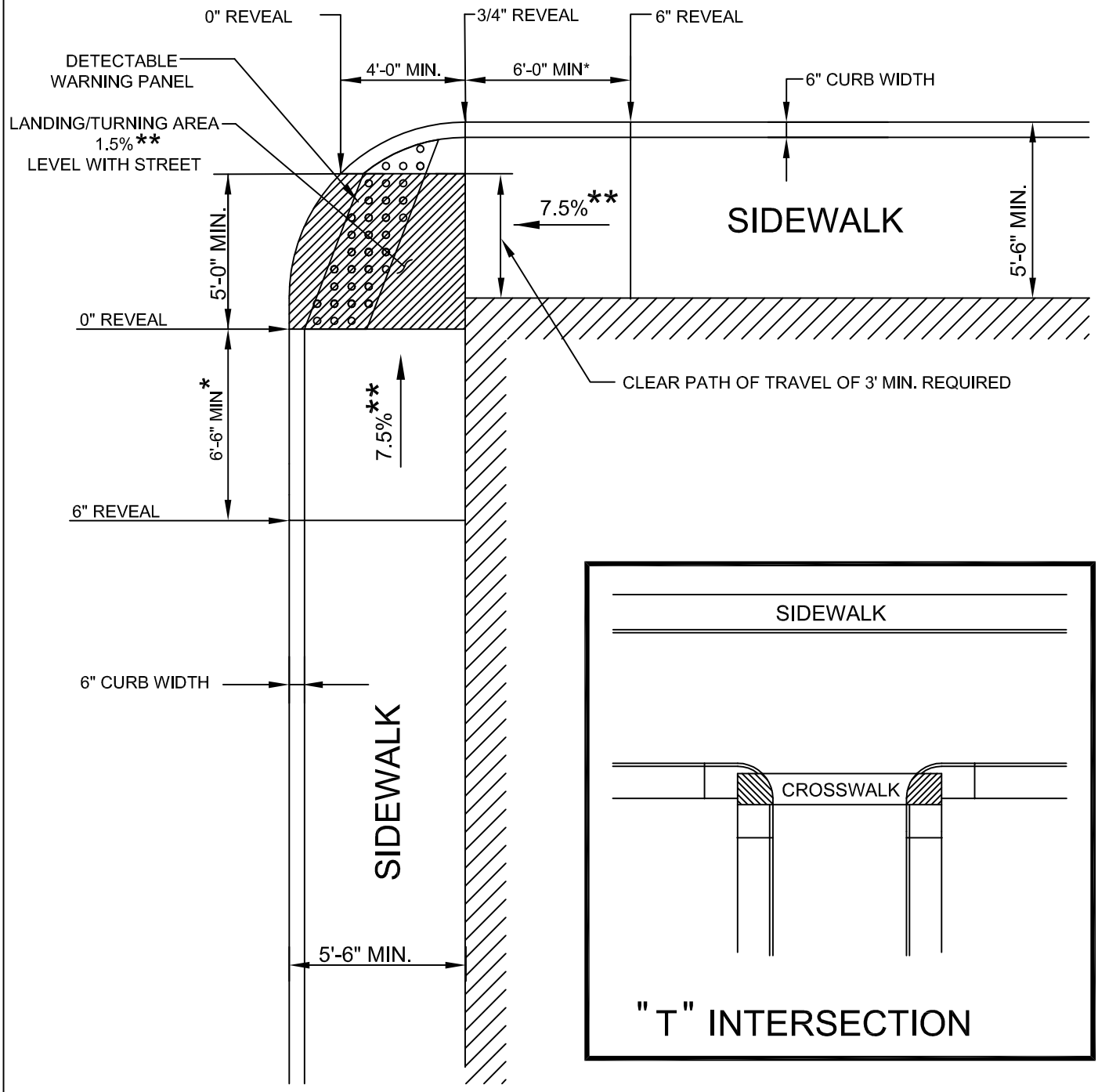
DETECTABLE WARNING PANEL
LOCATED NOT LESS THAN 6" OR MORE THAN 24" FROM ROADWAY EDGE (GUTTER LINE). TRUNCATED DOMES TO BE ALIGNED WITH DIRECTION OF TRAVEL.

FOR DETAILS OF TRUNCATED DOMES SEE DRAWING E 107.6.5.

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.

DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.6.0



LEGEND

BUILDING OR OTHER UNALTERABLE CONDITION

* TRANSITION LENGTH SHOWN IS MINIMUM. (SEE E 107.9.0)

** TOLERANCE FOR CONSTRUCTION ±0.5%

NOTE:

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS

massDOT Massachusetts Department of Transportation Highway Division

CONSTRUCTION STANDARDS

"T" INTERSECTION WHEELCHAIR RAMP

DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.6.4

LEGEND

* = TOLERANCE FOR CONSTRUCTION ±0.5%

** = SEE E 107.9.0 FOR TRANSITION LENGTH

massDOT Massachusetts Department of Transportation Highway Division

CONSTRUCTION STANDARDS

WHEELCHAIR RAMP WITH LANDSCAPING STRIP

DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.6.9

CONSTRUCTION STANDARDS

massDOT Massachusetts Department of Transportation Highway Division

CURB TRANSITION LENGTH FOR WHEELCHAIR RAMPS

ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" Max

NOTE:

* BASED ON A DESIGN SLOPE OF 7.5% AND A REVEAL OF 6".

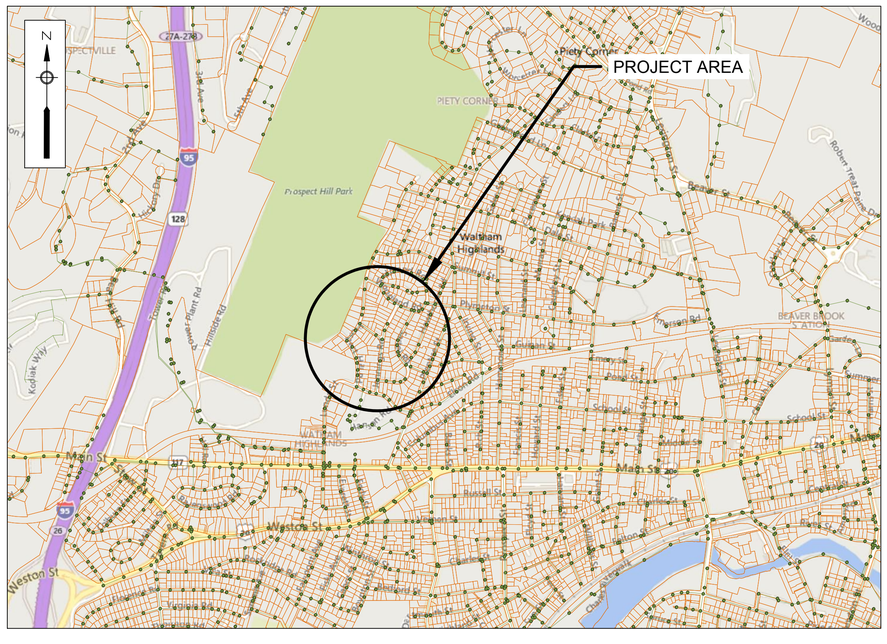
DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.9.0

DRAWINGS

JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

MAY 2019



LOCUS MAP
1"= 1000'

LIST OF DRAWINGS

G-1 GENERAL NOTES AND LEGEND

C-1 JENNINGS ROAD
EXISTING CONDITIONS
STA 0+00 TO STA 5+20

C-2 JENNINGS ROAD
EXISTING CONDITIONS
STA 5+20 TO STA 10+80

C-3 WOODLAND ROAD
EXISTING CONDITIONS
STA 0+00 TO STA 4+00

C-4 WOODLAND ROAD
EXISTING CONDITIONS
STA 4+00 TO STA 7+00

C-5 PROSPECT HILL ROAD
EXISTING CONDITION
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C-6 JENNINGS ROAD
SEWER AND DRAIN REPLACEMENT
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C-7 JENNINGS ROAD
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CD-2 CIVIL DETAILS II

CD-3 CIVIL DETAILS III

ENGINEERING DEPARTMENT

STEPHEN A. CASAZZA, P.E. CITY ENGINEER

COMMONWEALTH OF MASSACHUSETTS
RYAN J. PAUL
CIVIL
No. 51127
REGISTERED PROFESSIONAL ENGINEER
5/14/19

INCORPORATED A TOWN 1738
WALTHAM
INCORPORATED A CITY 1884

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GENERAL NOTES:

1. BASE MAP INFORMATION IS A COMPILATION OF GROUND SURVEY PREPARED BY MILLENIUM ENGINEERING, INC. IN JANUARY 2018 AND WALTHAM RECORD DRAWING INFORMATION. ELEVATION REFERENCES ARE NAVD88. HORIZONTAL COORDINATE SYSTEM DATUM UTILIZED IS MASSACHUSETTS STATE PLANE, NAD83, US SURVEY FEET.
2. IN AREAS WHERE CONSTRUCTION ACTIVITIES ARE ANTICIPATED TO OCCUR WITHIN PRIVATE PROPERTY, PROPERTY LINE LOCATIONS ARE TO BE REVIEWED WITH THE CITY OF WALTHAM PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.
3. ALL EXISTING UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL NOTIFY DIG SAFE AT LEAST 72 HOURS IN ADVANCE, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO ANY EXCAVATION.
4. DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSIONS AND STATIONING SHALL PREVAIL. REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
5. THE CONTRACTOR SHALL RESTORE ALL PUBLIC AND PRIVATE PROPERTY TO ITS PRE-CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE OWNER.
6. ALL EXISTING STORM DRAIN, SEWER, AND WATER MAIN LINES ENCOUNTERED DURING CONSTRUCTION ARE TO REMAIN IN SERVICE UNLESS OTHERWISE NOTED. THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER SHALL REPAIR ANY EXISTING SEWERS, STORM DRAIN LINES, WATER LINES OR CULVERTS, COMPLETE FROM STRUCTURE TO STRUCTURE, DAMAGED DURING CONSTRUCTION.
7. IN THOSE INSTANCES WHERE POWER OR TELEPHONE POLE SUPPORT IS REQUIRED, THE CONTRACTOR SHALL PROVIDE A MINIMUM 48-HOUR NOTIFICATION TO THE RESPECTIVE UTILITY COMPANY. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR TEMPORARY BRACING OF UTILITIES.
8. ALL STRUCTURES AND PIPELINES LOCATED ADJACENT TO THE TRENCH EXCAVATION SHALL BE PROTECTED AND FIRMLY SUPPORTED BY THE CONTRACTOR UNTIL THE TRENCH IS BACKFILLED. DAMAGE TO ANY SUCH STRUCTURE CAUSED BY, OR RESULTING FROM, THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER. ALL UTILITIES REQUIRING REPAIR, RELOCATION, OR ADJUSTMENT AS A RESULT OF THE PROJECT SHALL BE COORDINATED THROUGH THE RESPECTIVE UTILITY AND THE OWNER.
9. THE CONTRACTOR IS TO TAKE SPECIAL CARE NOT TO DAMAGE TREES, BUSHES, PLANTS, PARKING METERS, FLOWERS, STONEWALLS, FENCES, ETC. WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED. CONTRACTOR SHALL REPLACE ALL DAMAGED ITEMS AT NO ADDITIONAL COST TO OWNER.
10. THE CONTRACTOR SHALL REMOVE AND REPLACE NEW, OR REPAIR, ALL CURBS, SIDEWALKS, PAVEMENT AND OTHER ITEMS DAMAGED BY HIS CONSTRUCTION ACTIVITIES TO AT LEAST THEIR ORIGINAL CONDITION, AND TO THE SATISFACTION OF THE OWNER AND ENGINEER AT NO ADDITIONAL COST THE THE OWNER.
11. ANY TRAFFIC SIGNAL EQUIPMENT (LIGHTS, CONDUITS, LOOP DETECTORS) DISTURBED SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AS DIRECTED BY THE OWNER OR ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
12. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TRAFFIC CONTROL DEVICES AS DESCRIBED IN THE DESIGN SPECIFICATIONS AND DRAWINGS AND IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
13. THE CONTRACTOR SHALL BE REQUIRED TO FURNISH AND MAINTAIN A TELEPHONE NUMBER WHERE THE CONTRACTOR CAN BE REACHED 24 HOURS A DAY, 7 DAYS A WEEK.
14. THE LOCATION AND LIMITS OF ALL ON-SITE WORK AND STORAGE AREAS SHALL BE REVIEWED/COORDINATED WITH, AND ACCEPTABLE TO THE CITY OF WALTHAM AND THE ENGINEER. THE CONTRACTOR SHALL LIMIT HIS ACTIVITIES TO THESE AREAS. THE CITY CANNOT GUARANTEE ONSITE STORAGE.
15. THE CONTRACTOR SHALL IDENTIFY AND OBTAIN ALL NECESSARY PERMITS FOR WORK IN ROADWAYS. THE CONTRACTOR IS RESPONSIBLE FOR CONFORMING TO ALL PERMITS AS AN INTEGRAL PART OF HIS WORK.
16. THE CONTRACTOR SHALL HANDLE AND DISPOSE OF GROUNDWATER, WHERE ENCOUNTERED, IN AN APPROVED MANNER. DURING ANY DEWATERING, THE CONTRACTOR SHALL USE STONE AROUND THE SUCTION END TO MINIMIZE DISCHARGE OF TRENCH MATERIALS. THE DISCHARGED WATER SHALL PASS THROUGH FILTER FABRIC. FLOW FROM DEWATERING ACTIVITIES SHALL NOT BE DISCHARGED TO SANITARY SEWERS.
17. THE CONTRACTOR SHALL SAW CUT ALL PAVEMENT TO ITS TOTAL DEPTH IN THE PROCESS OF INSTALLING NEW UTILITIES IN ALL PAVED AREAS INCLUDING STREETS, DRIVEWAYS, AND SIDEWALKS.
18. TEST PITS TO LOCATE EXISTING UTILITIES MAY BE ORDERED BY THE ENGINEER TO DETERMINE WHETHER TO RAISE OR LOWER THE PROPOSED UTILITIES TO CLEAR EXISTING UTILITIES OR MEET EXISTING PIPE INVERTS. THE CONTRACTOR SHALL NOTIFY DIG SAFE AT LEAST 72 HOURS IN ADVANCE, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO ANY EXCAVATION.
19. OPEN TRENCHES MUST BE CLOSED BY BACKFILLING OR PLATING AT THE END OF EACH WORKDAY.
20. THE CONTRACTOR SHALL MILL KEYWAY FOR OVERLAY WHERE SHOWN AND AT ALL BITUMINOUS CEMENT DRIVEWAYS WITHIN THE PROJECT AREA.
21. SILT SACKS SHALL BE FURNISHED, INSTALLED, AND MAINTAINED IN ALL CATCH BASINS WITHIN THE PROJECT AREA AND WHERE CONSTRUCTION SEDIMENT MAY FLOW TO OUTSIDE THE PROJECT AREA. DEBRIS COLLECTED IN SILT SACKS SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF-SITE ON A WEEKLY BASIS OR WITHIN 24 HOURS OF A STORM THROUGHOUT THE PROJECT DURATION. UPON COMPLETION OF THE PROJECT AND AS DIRECTED BY THE ENGINEER, THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND LEGALLY DISPOSING OF THE SILT SACKS AND DEBRIS OFF-SITE, AND REMOVAL OF CONSTRUCTION DEBRIS WITHIN THE DRAINAGE SYSTEM.

SEWER CONSTRUCTION NOTES:

1. SEWER TRENCHES MAY BE EXCAVATED WIDER THAN THE PAY LIMIT. ANY SUCH ADDITIONAL EXCAVATION AND TRENCH PAVEMENT SHALL BE AT NO ADDITIONAL COST TO THE OWNER AND SHALL NOT BE MEASURED FOR PAYMENT.
2. OPENINGS FOR SEWER PIPE IN PRECAST MANHOLE BASES SHALL BE CAST IN THE REQUIRED LOCATIONS DURING MANHOLE MANUFACTURE. FIELD CUT OPENINGS WILL NOT BE PERMITTED.
3. FORM BRICK INVERTS IN MANHOLES WITH BRICK ON EDGE TO A DEPTH OF 0.8-FT INSIDE DIAMETER OF PIPE AND FORM A 1-INCH PER FOOT SLOPED BENCH WITH BRICK FLAT. INVERT SHALL BE SLOPED UNIFORMLY BETWEEN INLET AND OUTLET PIPE AND SHALL BE FORMED AND FILLED AS REQUIRED TO DIRECT THE FLOW AS INDICATED AND TO PREVENT DEPOSITION OF SOLIDS. BRICK INVERTS SHALL NOT BE BUILT ABOVE GRADE.
4. CALCULATION OF PIPE SLOPES IS BASED ON ELEVATION CHANGES DIVIDED BY THE DISTANCE BETWEEN THE OUTSIDE EDGES OF THE MANHOLE WALLS.
5. SEWER SERVICES SHALL MATCH THE EXISTING DIAMETER UNLESS OTHERWISE NOTED BY THE ENGINEER AND OWNER.
6. NEW SEWER SERVICE CONNECTIONS SHALL BE INSTALLED SUCH THAT THEY ARE BENEATH THE WATER MAIN AND WATER SERVICE CONNECTIONS.
7. SEWER BYPASS SHALL ONLY BE ALLOWED DURING CONSTRUCTION OPERATIONS AND SUPERVISED BY CONTRACTOR PERSONNEL CONTINUOUSLY WHILE OPERATING.
8. WASTE DISPOSAL ONLY WITH APPROVAL OF THE ENGINEER AND OWNER AND ACCORDING TO SPECIFICATIONS SECTIONS 02076, 02080, AND 02095.
10. SEE APPENDIX B OF THE SPECIFICATIONS FOR CCTV REPORTS.
11. SEE APPENDIX D OF THE SPECIFICATIONS FOR BORING LOGS
12. THE CONTRACTOR SHALL COMPLETE TEST PITS AS SHOWN ON THE PLAN AND AS REQUIRED BY THE ENGINEER TO VERIFY EXISTING UTILITY LOCATIONS. STRUCTURE SUBMITTALS WILL NOT BE APPROVED UNTIL EXISTING UTILITY LOCATIONS ARE VERIFIED.

DRAINAGE CONSTRUCTION NOTES:

1. DRAINAGE TRENCHES MAY BE EXCAVATED WIDER THAN THE PAY LIMIT. ANY SUCH ADDITIONAL EXCAVATION SHALL BE AT NO ADDITIONAL COST TO THE OWNER AND SHALL NOT BE MEASURED FOR PAYMENT. THIS INCLUDES BUT IS NOT LIMITED TO PAVING, PROCESSED GRAVEL, LANDSCAPING, BACKFILL, ETC.
2. OPENINGS FOR PIPE IN PRECAST MANHOLE BASES SHALL BE CAST IN THE REQUIRED LOCATIONS DURING MANHOLE MANUFACTURE. FIELD CUT OPENINGS WILL NOT BE PERMITTED UNLESS APPROVED BY THE ENGINEER.
3. NEW STORM DRAINS SHALL BE INSTALLED AT THE MINIMUM DEPTH FROM FINISH GRADE TO TOP OF PIPE AS SHOWN ON THE DRAWINGS, WHERE NECESSARY.
4. SEE APPENDIX B OF THE SPECIFICATIONS FOR CCTV REPORTS.
5. SEE APPENDIX D OF THE SPECIFICATIONS FOR BORING LOGS.
12. THE CONTRACTOR SHALL COMPLETE TEST PITS AS SHOWN ON THE PLAN AND AS REQUIRED BY THE ENGINEER TO VERIFY EXISTING UTILITY LOCATIONS. STRUCTURE SUBMITTALS WILL NOT BE APPROVED UNTIL EXISTING UTILITY LOCATIONS ARE VERIFIED.

LEGEND

ABBREVIATIONS

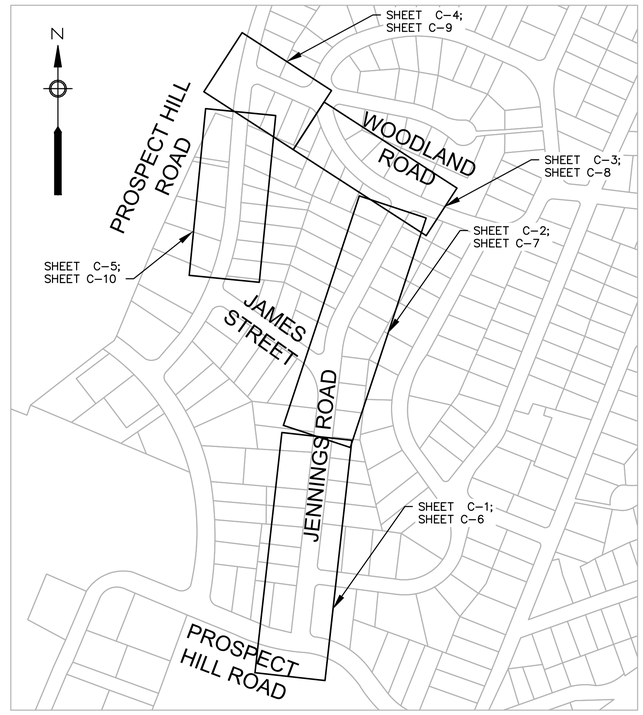
AC	ASBESTOS CEMENT
CI	CAST IRON
RC	REINFORCED CONCRETE
PVC	POLYVINYL CHLORIDE
CS	COATED STEEL
VC	VITRIFIED CLAY
CMP	CORRUGATED METAL PIPE
CPE	CORRUGATED POLYETHYLENE
W	WATER
CB	CATCH BASIN
DMH	DRAIN MANHOLE
SMH	SEWER MANHOLE
EOP	EDGE OF PAVEMENT
OHW	OVERHEAD WIRE
UP	UTILITY POLE
TP	TELEPHONE POLE

EXISTING

HYDRANT
CATCH BASIN
DRAIN MANHOLE
SEWER MANHOLE
WATER VALVE
GAS VALVE
WATER SHUTOFF
GRANITE CURB
EDGE OF PAVEMENT
PROPERTY LINE
WOOD FENCE
UTILITY POLE
WATER MAIN
DRAIN LINE
OVERHEAD WIRE
SEWER MAIN
STONE WALL
DECIDUOUS TREE
CHAINLINK FENCE
B-* BORING
ELECTRICAL BOX
MAILBOX

PROPOSED

SEWER
SEWER SERVICE LATERAL
DRAIN
DRAIN REHABILITATION
WATER
TP TEST PIT
SEWER MANHOLE
WATER SHUTOFF



KEY SHEET

SCALE: 1" = 200'

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RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS
5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	MAY 2019
Job No.	253-1702
Designed by	RJP/SLC
Drawn by	SLC
Checked by	PCM
Approved by	RJP

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JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

GENERAL NOTES AND LEGEND

FOR CONSTRUCTION

Sheet No.
G-1

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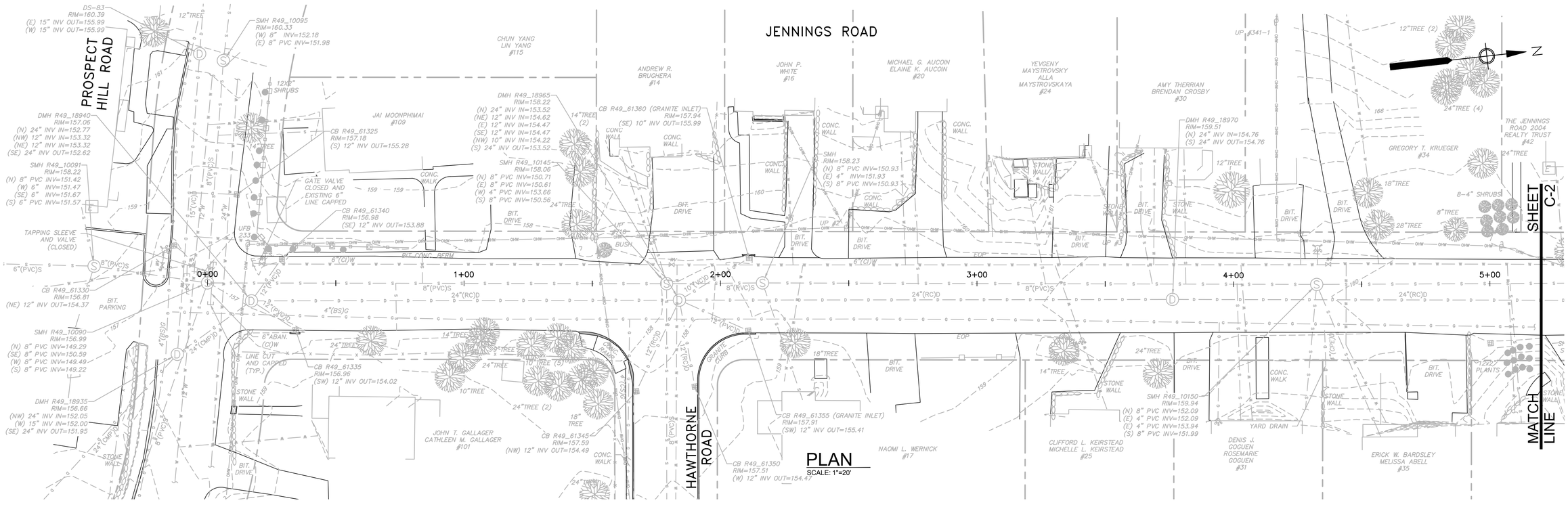

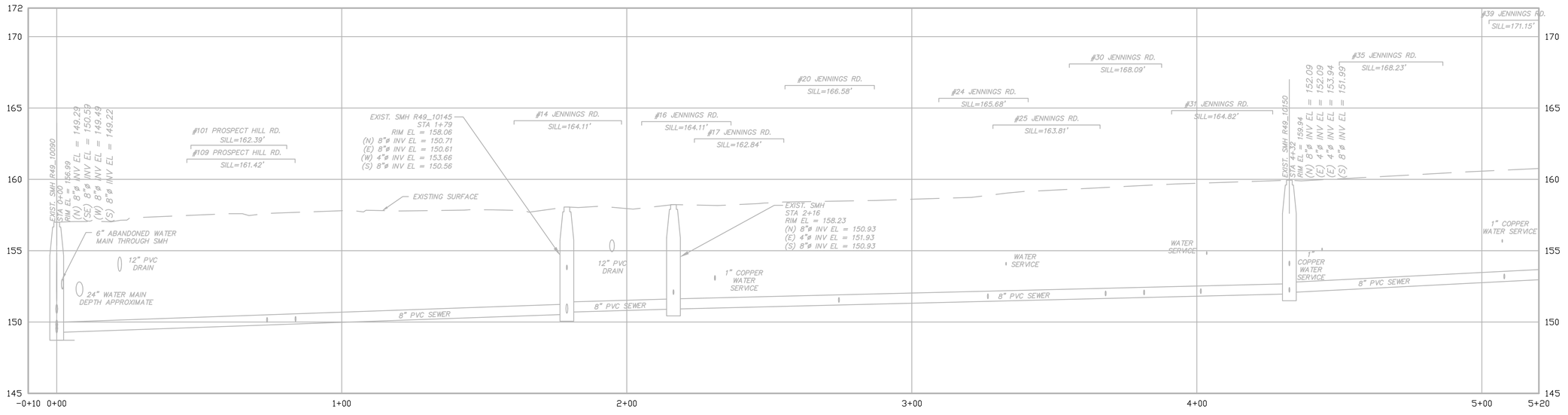

PROFILE

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

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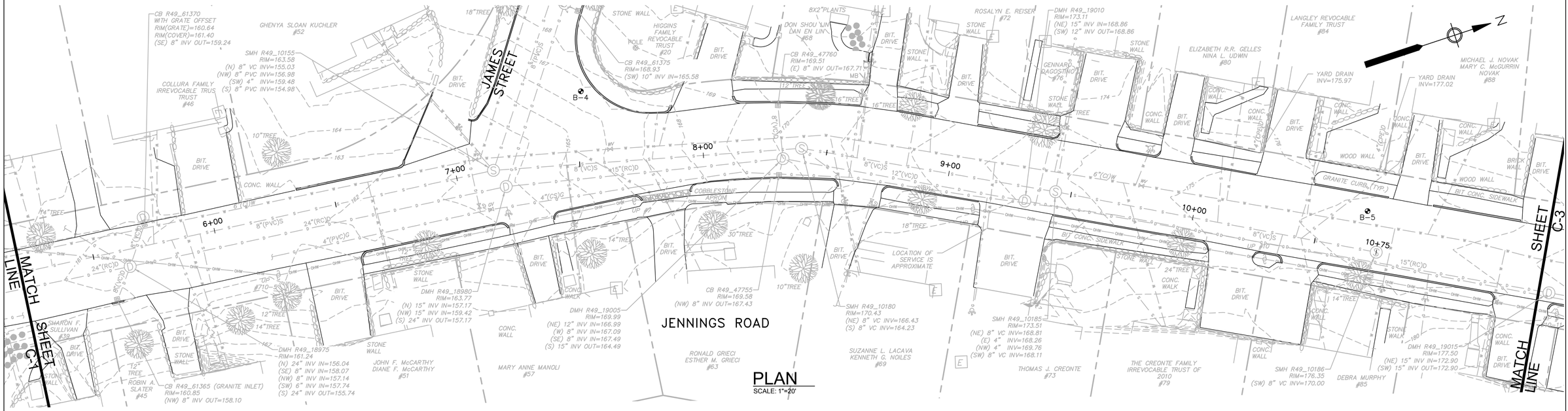
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

JENNINGS ROAD
EXISTING CONDITIONS
STA 0+00 TO STA 5+20

FOR CONSTRUCTION

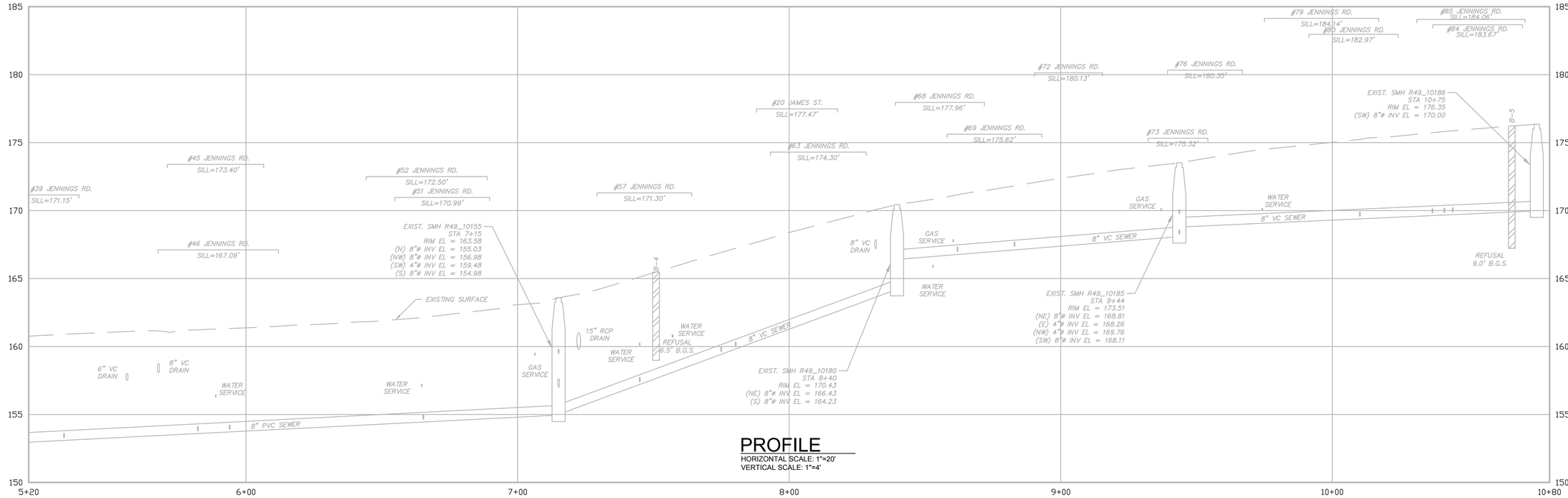
Sheet No.
C-1

Drawing file: I:\Waltham\253\DDE Program Coordinator\253-1702.01-Jennings Road Design\03 Drawings\Base\Jennings Road E isting Conditions.dwg Plot Date: May 16,2019-7:57am



PLAN

SCALE: 1"=20'



PROFILE

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

Drawing file: I:\Waltham 253\IDDE Program Coordinator\253-1702.01-Jennings Road Design\03 Drawings\Base\Jennings Road E isting Conditions.dwg Plot Date: May 16,2019-7:58am

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COMMONWEALTH OF MASSACHUSETTS RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER 5/14/19

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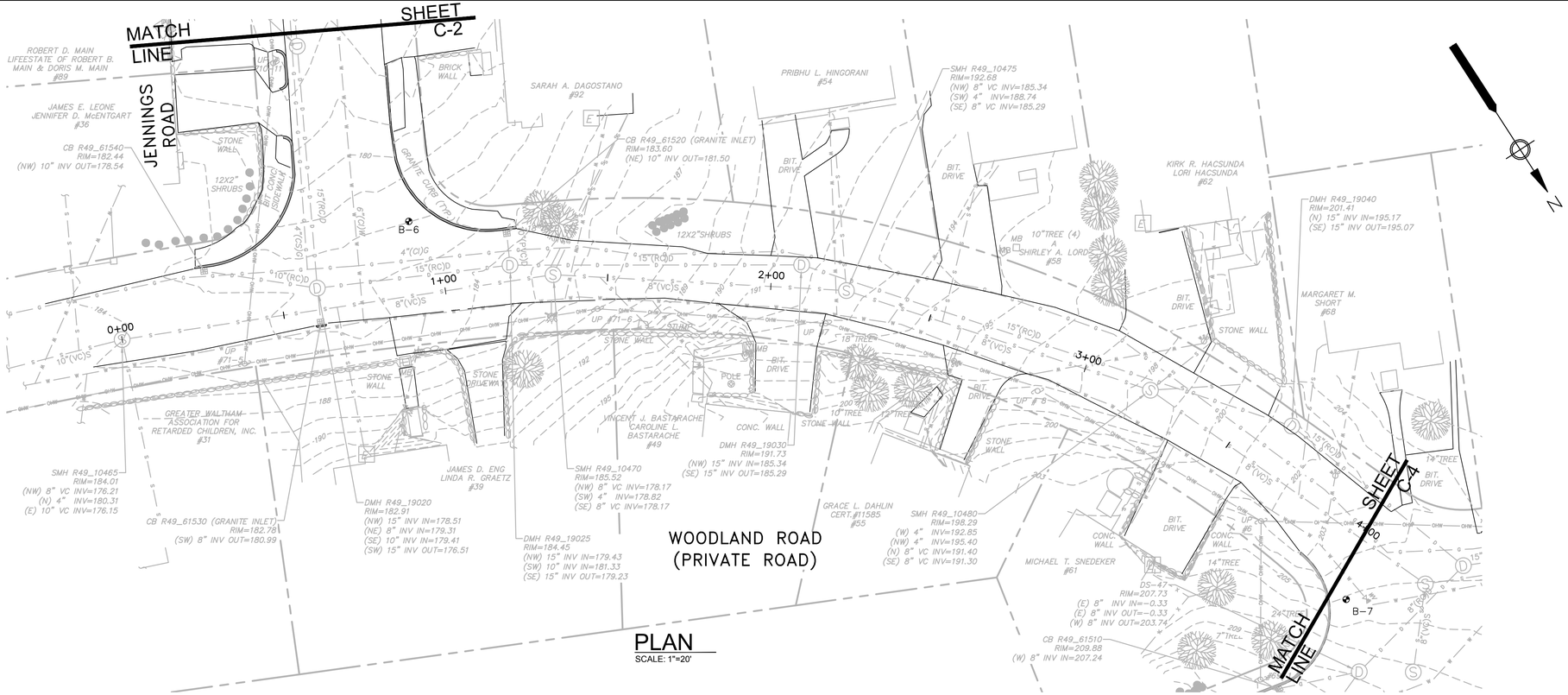
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

JENNINGS ROAD
EXISTING CONDITIONS
STA 5+20 TO STA 10+80

FOR CONSTRUCTION

Sheet No.

C-2



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WALTHAM — INCORPORATED A TOWN 1738 — INCORPORATED A CITY 1884

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COMMONWEALTH OF MASSACHUSETTS
RYAN J. PAUL
CIVIL
No. 51127
REGISTERED PROFESSIONAL ENGINEER
5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
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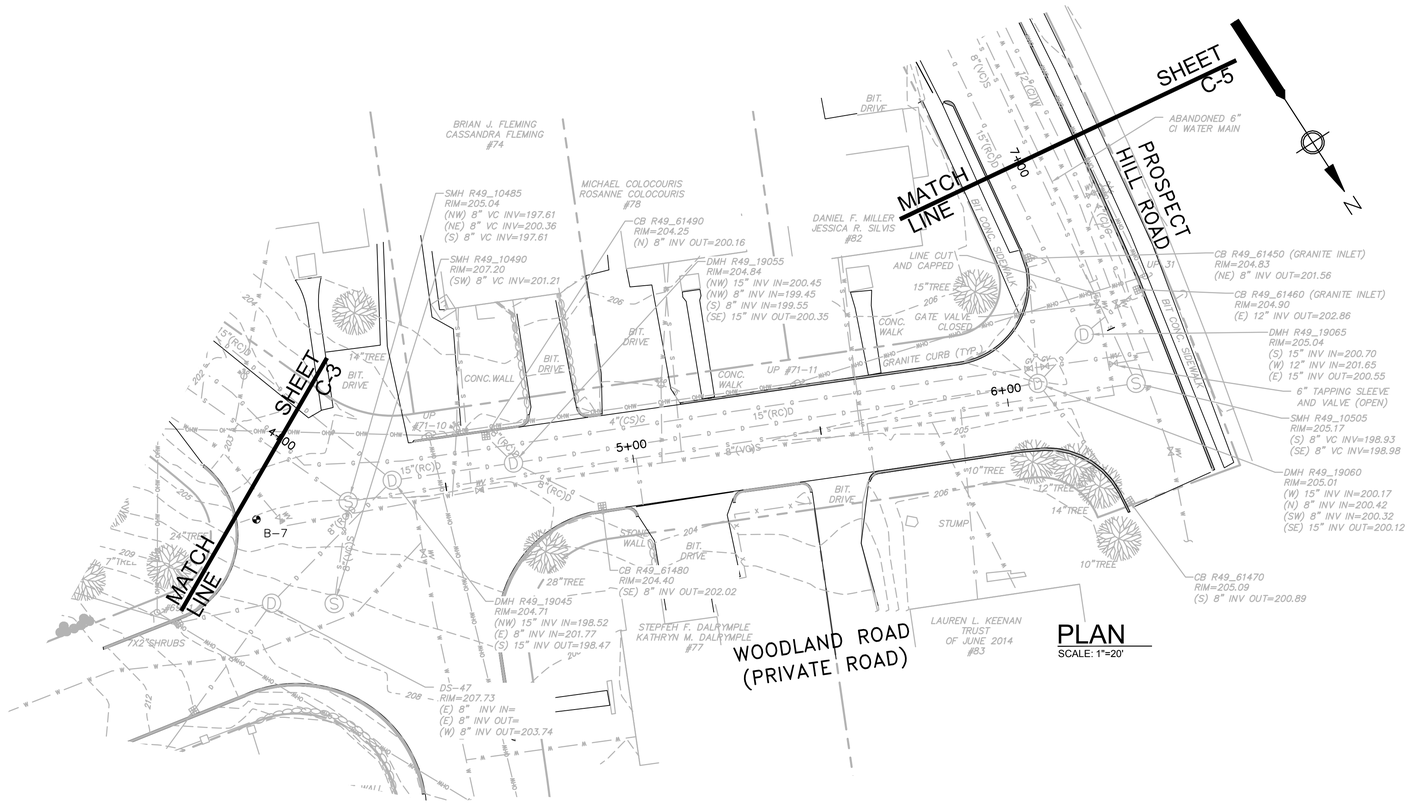
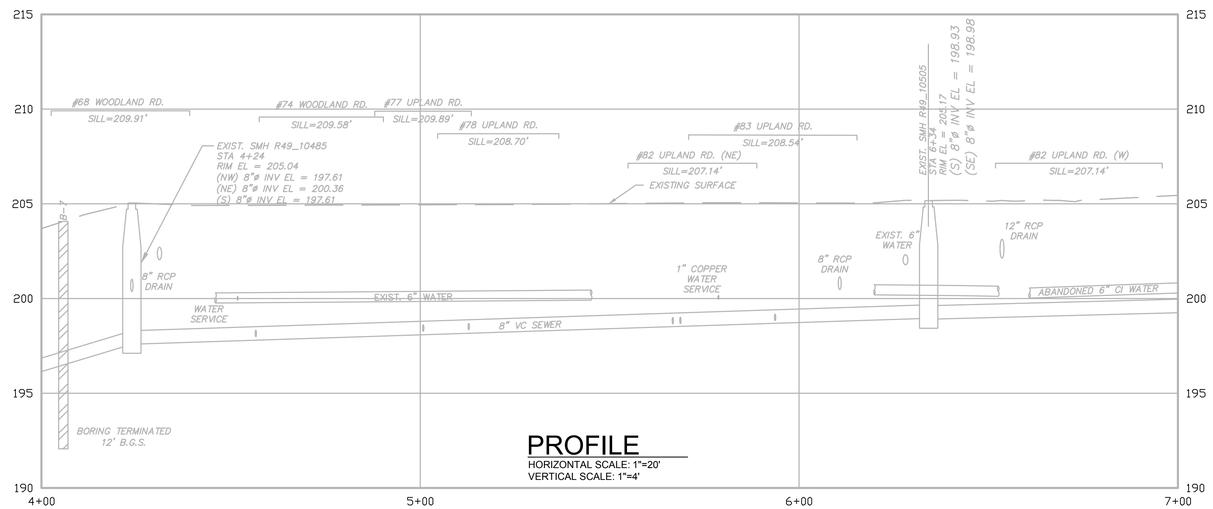
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

WOODLAND ROAD
EXISTING CONDITIONS
STA 0+00 TO STA 4+00

FOR CONSTRUCTION

Sheet No.
C-3





PROFILE
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

Drawing file: I:\Waltham\253\IDE Program Coordinator\253-1702.01-Jennings Road Design\03 Drawings\Base\Jennings Road E□isting Conditions.dwg Plot Date: May 16,2019-7:58am

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No. 51127
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
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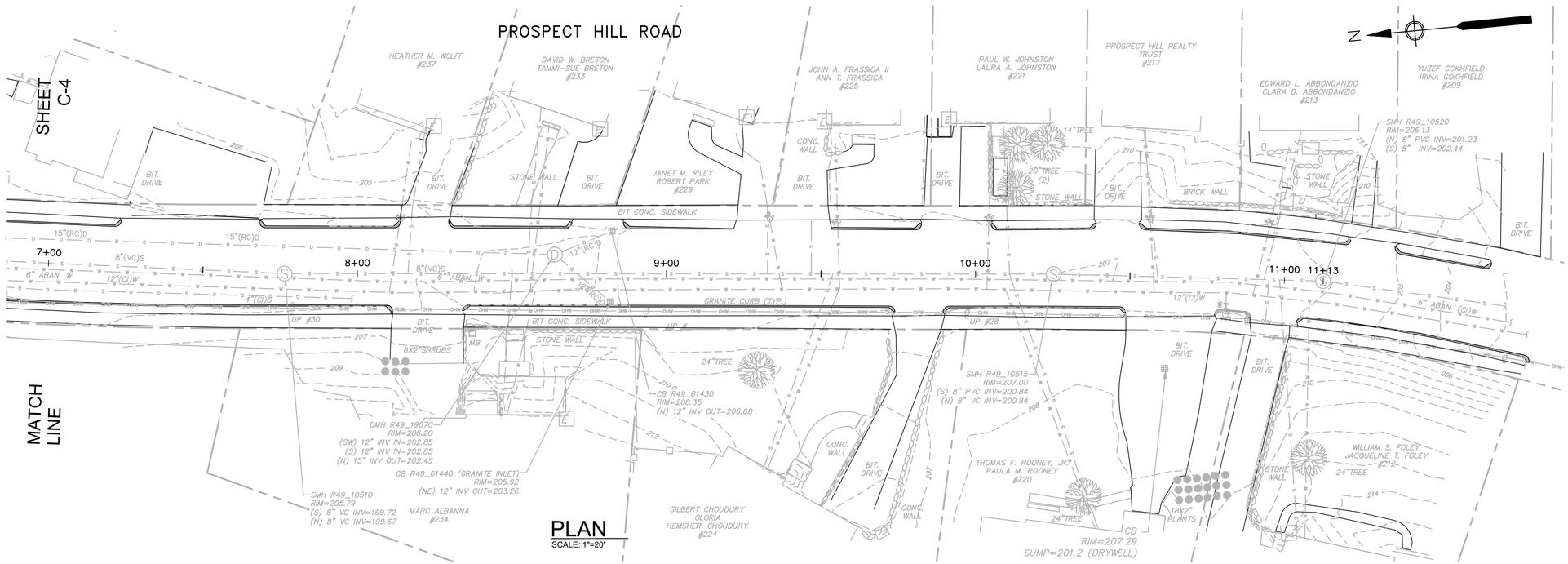
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

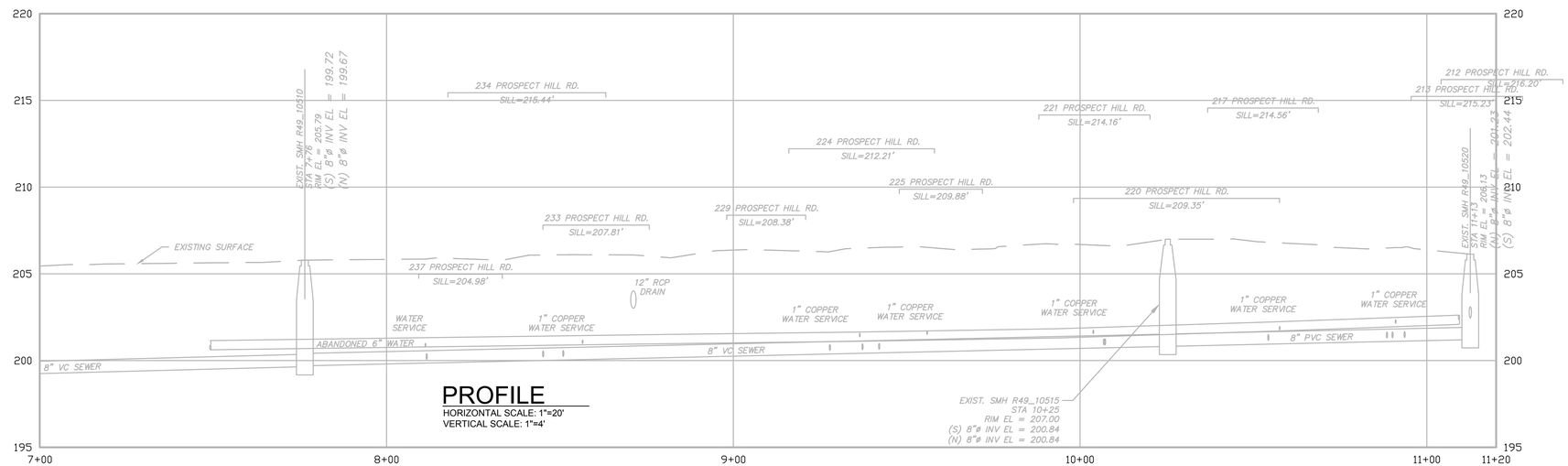
WOODLAND ROAD
E□ISTING CONDITIONS
STA 4+00 TO STA 7+00

FOR CONSTRUCTION

Sheet No.
C-4



PLAN
SCALE: 1"=20'



PROFILE
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

Drawing file: I:\Waltham 2530\DDE Program Coordinator\253-1702.01-Jennings Road Design\03 Drawings\Base\Jennings Road E□isting Conditions.dwg Plot Date: May 16,2019-7:58am

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RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER — 5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
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Designed by	RJP/SLC
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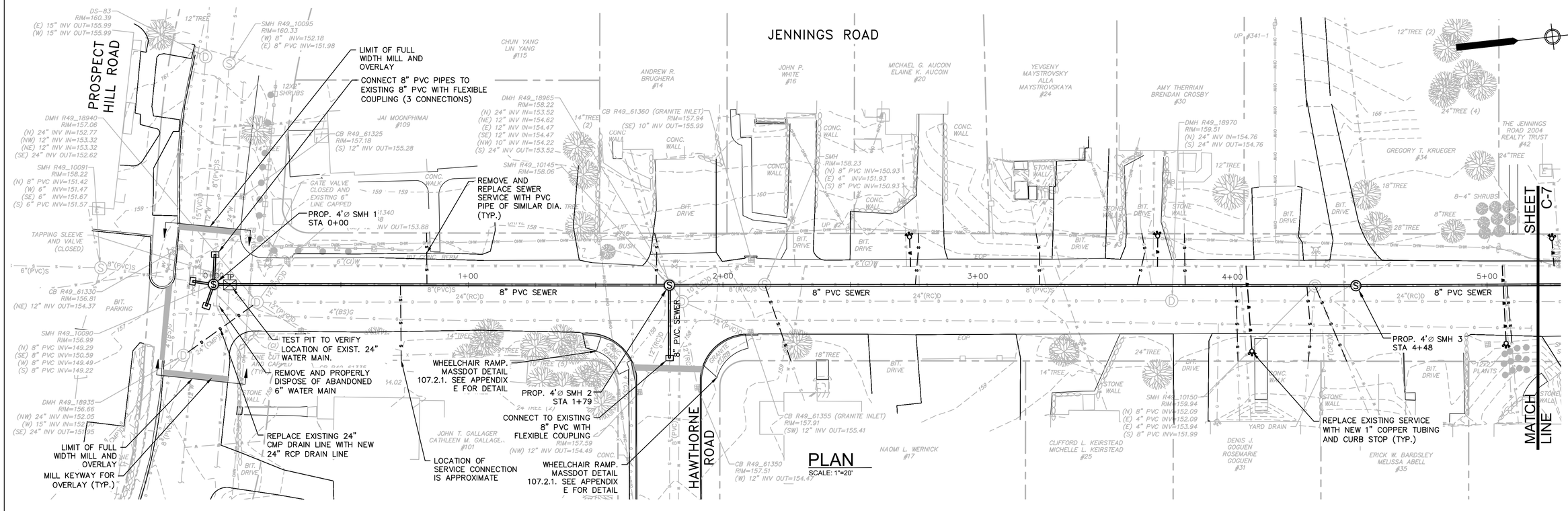
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

PROSPECT HILL ROAD
E□ISTING CONDITIONS
STA 7+00 TO STA 11+20

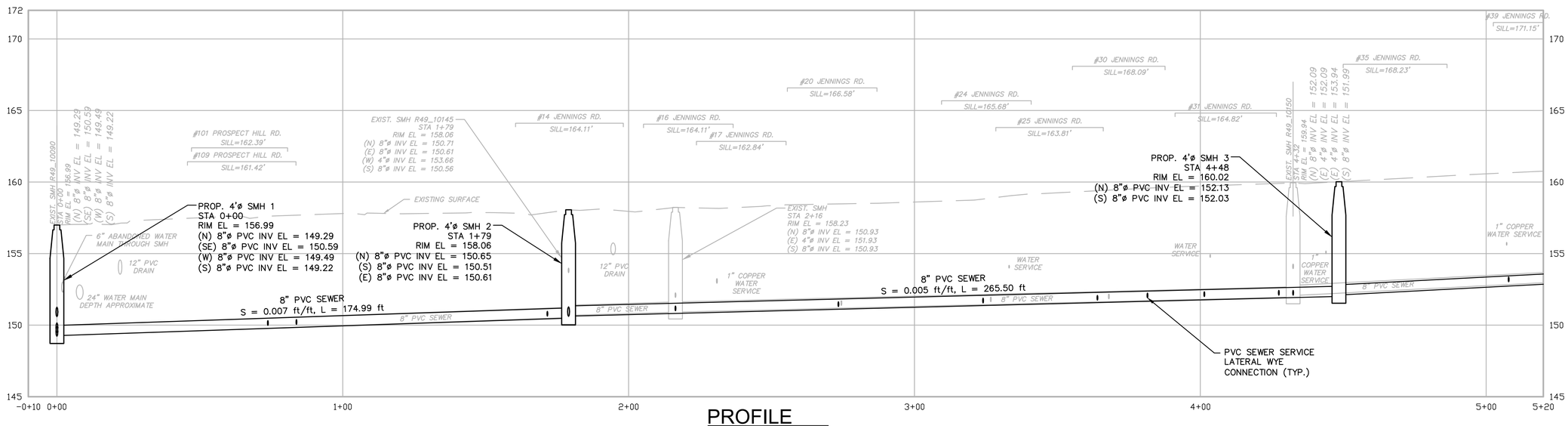
FOR CONSTRUCTION

Sheet No.
C-5



NOTES:

1. WATER MAIN AND SERVICE ELEVATIONS ARE SHOWN AS APPROXIMATE.
2. GAS MAIN AND SERVICE ELEVATIONS ARE SHOWN AS APPROXIMATE. THE CONTRACTOR SHALL COORDINATE WITH THE GAS UTILITY FOR ACTUAL ELEVATIONS.
3. TEST PIT AT STA. 0+05 ON 24" WATER MAIN.
4. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL REMOVED EXISTING SEWER MANHOLES.
5. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL REMOVED EXISTING SEWER PIPE.



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RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	MAY 2019
Job No.	253-1702
Designed by	RJP/SLC
Drawn by	SLC
Checked by	PCM
Approved by	RJP

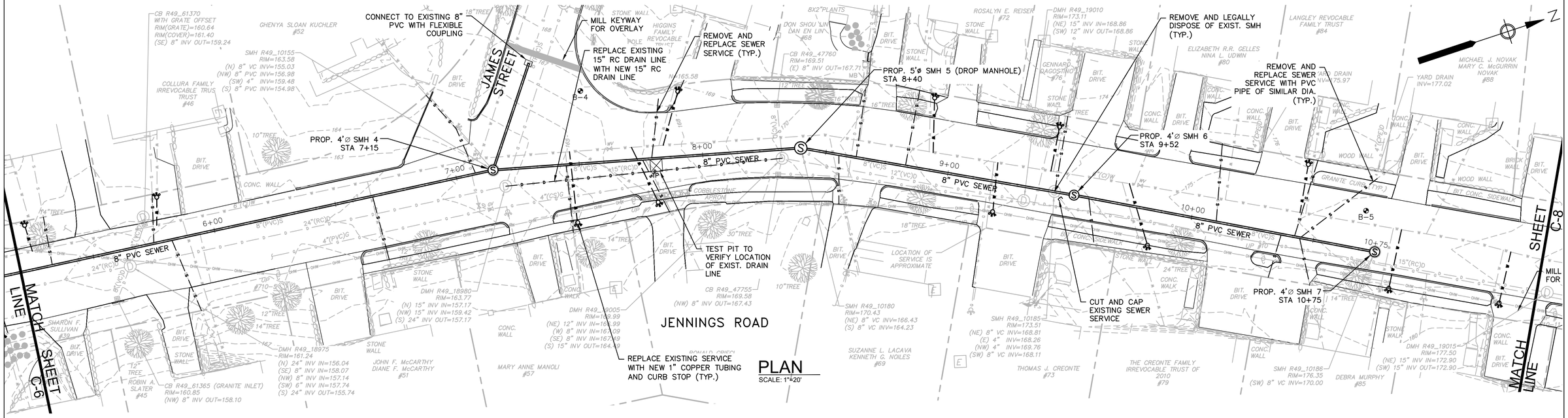
THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

JENNINGS ROAD
SEWER AND DRAIN REPLACEMENT
STA 0+00 TO STA 5+20

FOR CONSTRUCTION

Sheet No.
C-6



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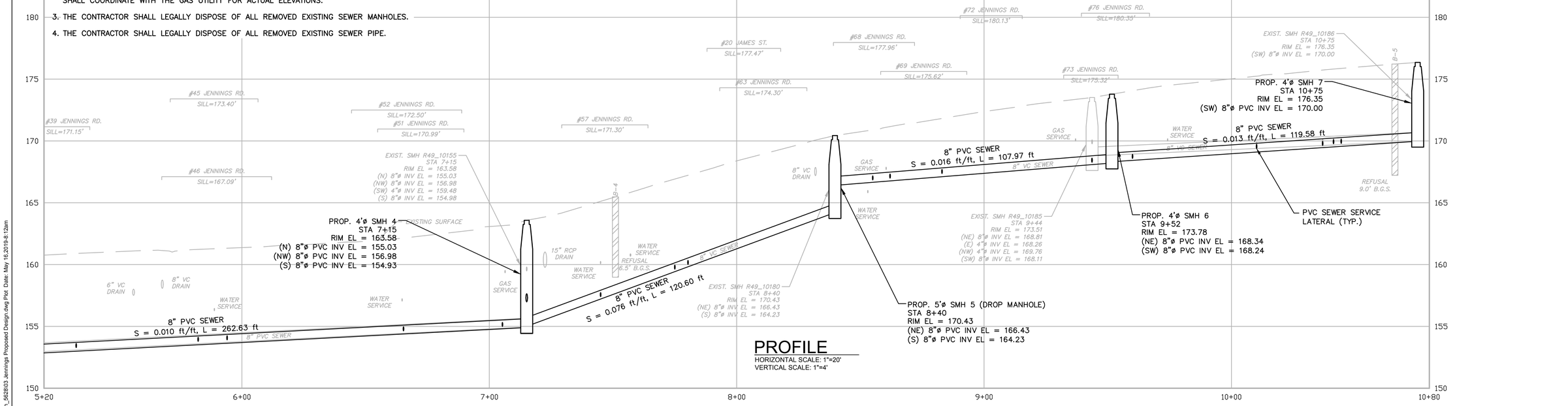

Drawing file: C:\Users\slcappdata\local\temp\AcPublish_5628\03.Jennings Proposed Design.dwg Plot Date: May 16,2019-8:12am

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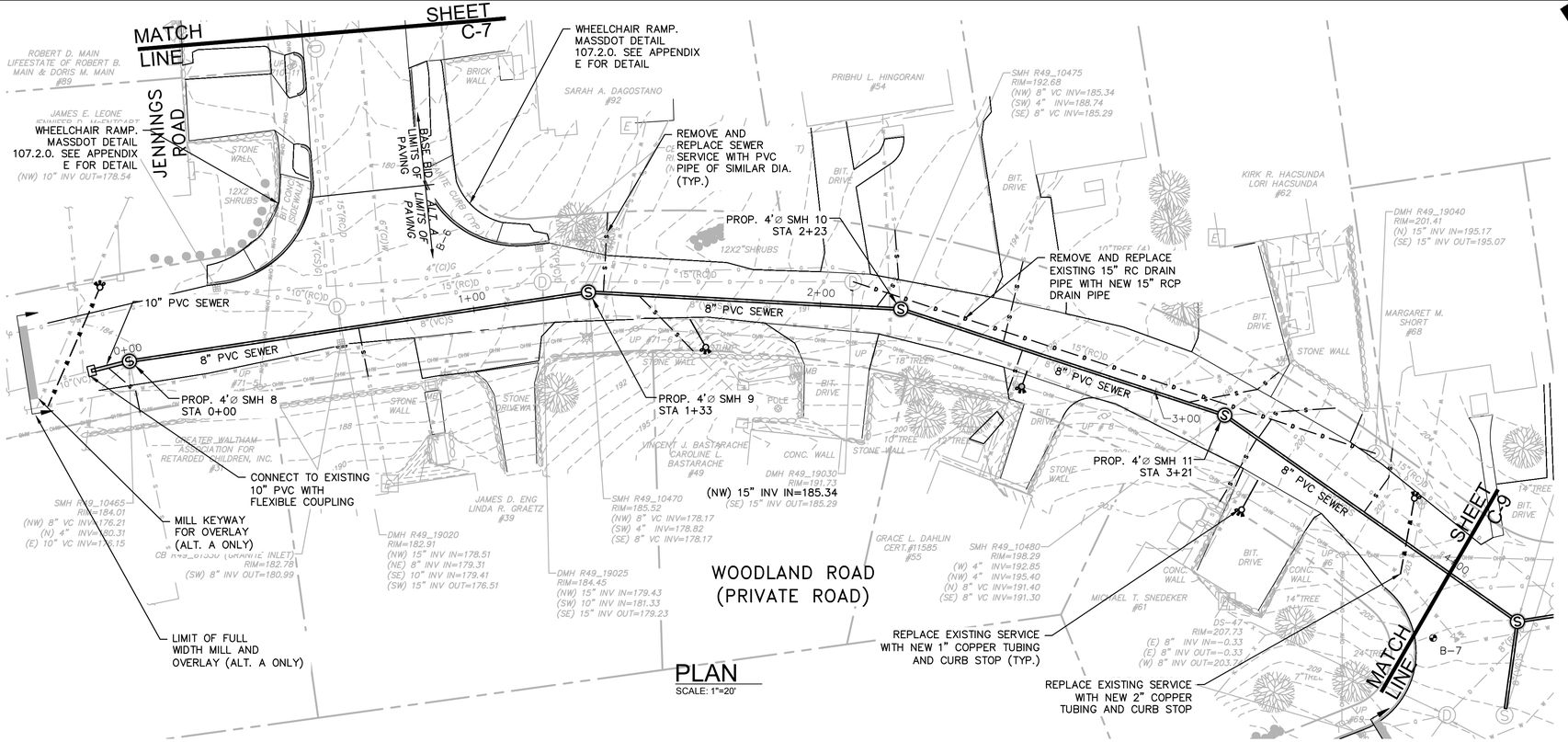
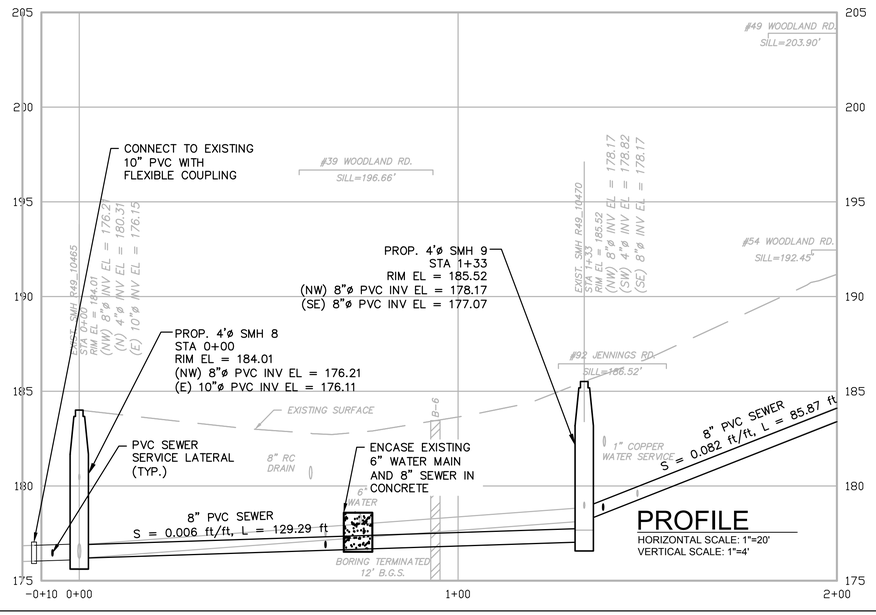
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

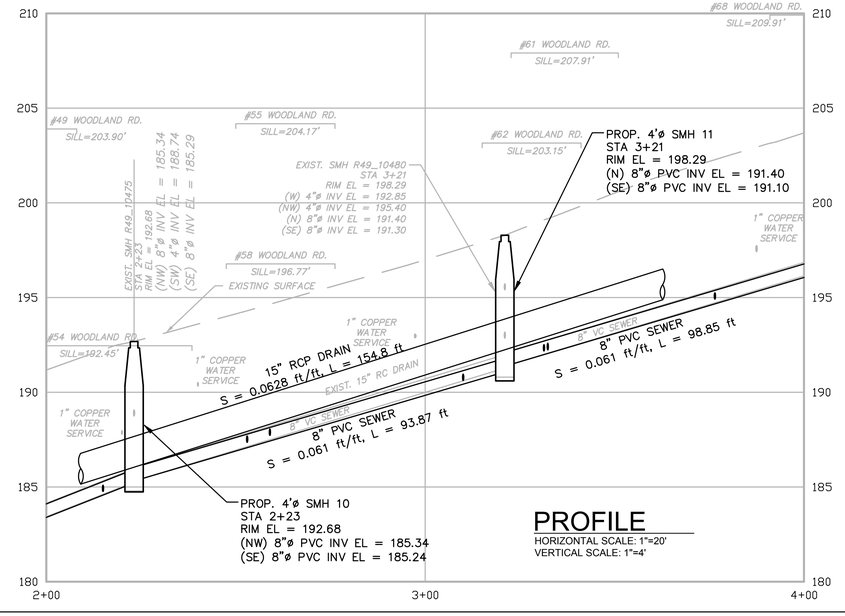
JENNINGS ROAD
SEWER AND DRAIN REPLACEMENT
STA 5+20 TO STA 10+80

FOR CONSTRUCTION

Sheet No.
C-7







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2. GAS MAIN AND SERVICE ELEVATIONS ARE SHOWN AS APPROXIMATE. THE CONTRACTOR SHALL COORDINATE WITH THE GAS UTILITY FOR ACTUAL ELEVATIONS.
3. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL REMOVED EXISTING SEWER MANHOLES.
4. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL REMOVED EXISTING SEWER PIPE.
5. UNDER THE BASE BID, TRENCHES ON WOODLAND ROAD WILL BE PAVED WITH PERMANENT PAVING. BID ALTERNATE A INCLUDES FULL WIDTH MILL AND OVERLAY OF WOODLAND ROAD.

Drawing file: C:\Users\slcappola\local\temp\AcPublish_5628\03 Jennings Proposed Design.dwg Plot Date: May 16,2019-8:12am

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RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
5/14/19

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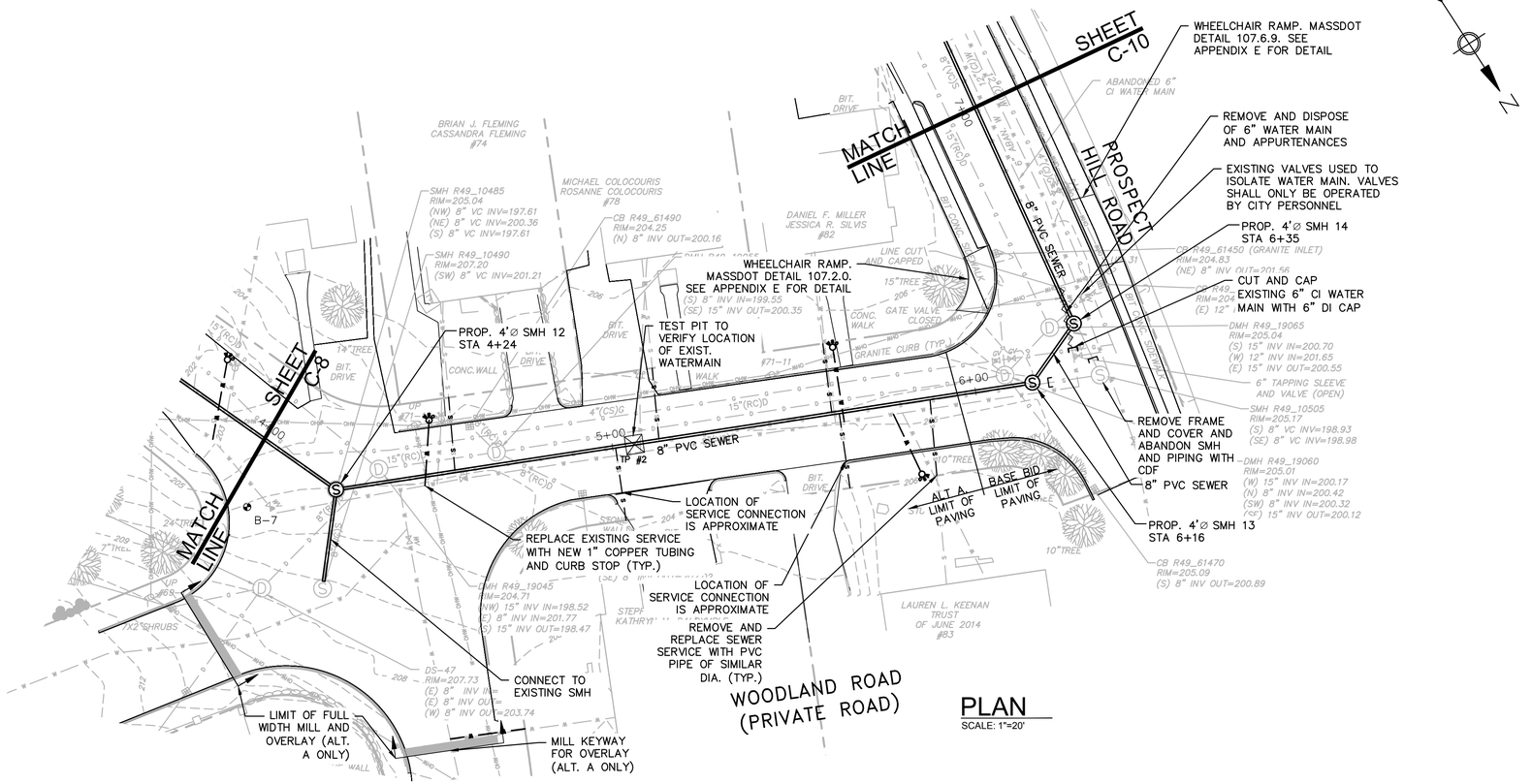
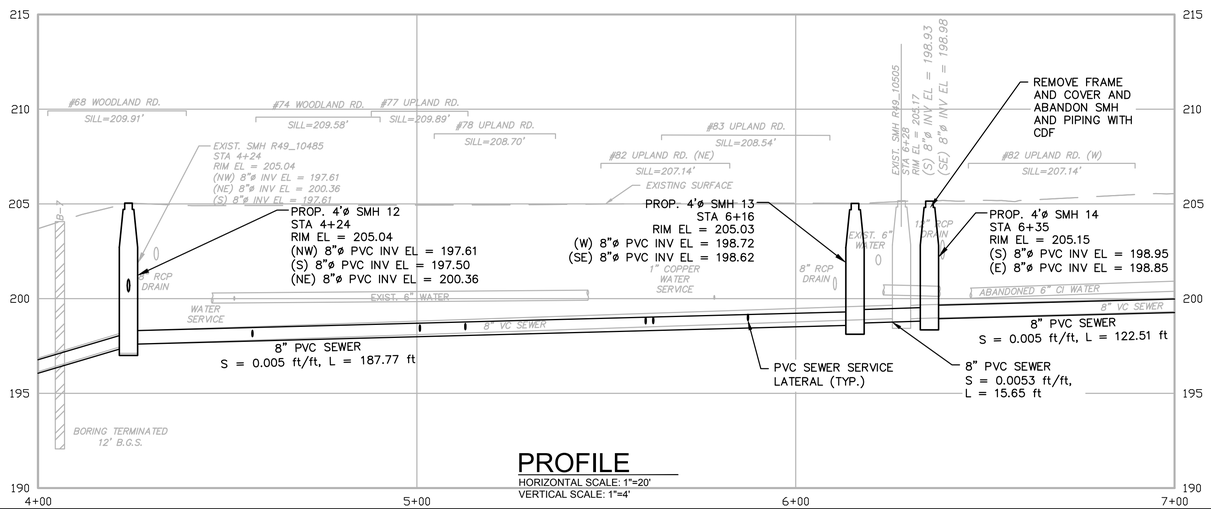
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

WOODLAND ROAD
SEWER AND DRAIN REPLACEMENT
STA 0+00 TO STA 4+00

FOR CONSTRUCTION

Sheet No.
C-8





PROFILE
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

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5. UNDER THE BASE BID, TRENCHES ON WOODLAND ROAD WILL BE PAVED WITH PERMANENT PAVING. BID ALTERNATE A INCLUDES FULL WIDTH MILL AND OVERLAY OF WOODLAND ROAD.

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COMMONWEALTH OF MASSACHUSETTS RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER 5/14/19

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Approved by	RJP

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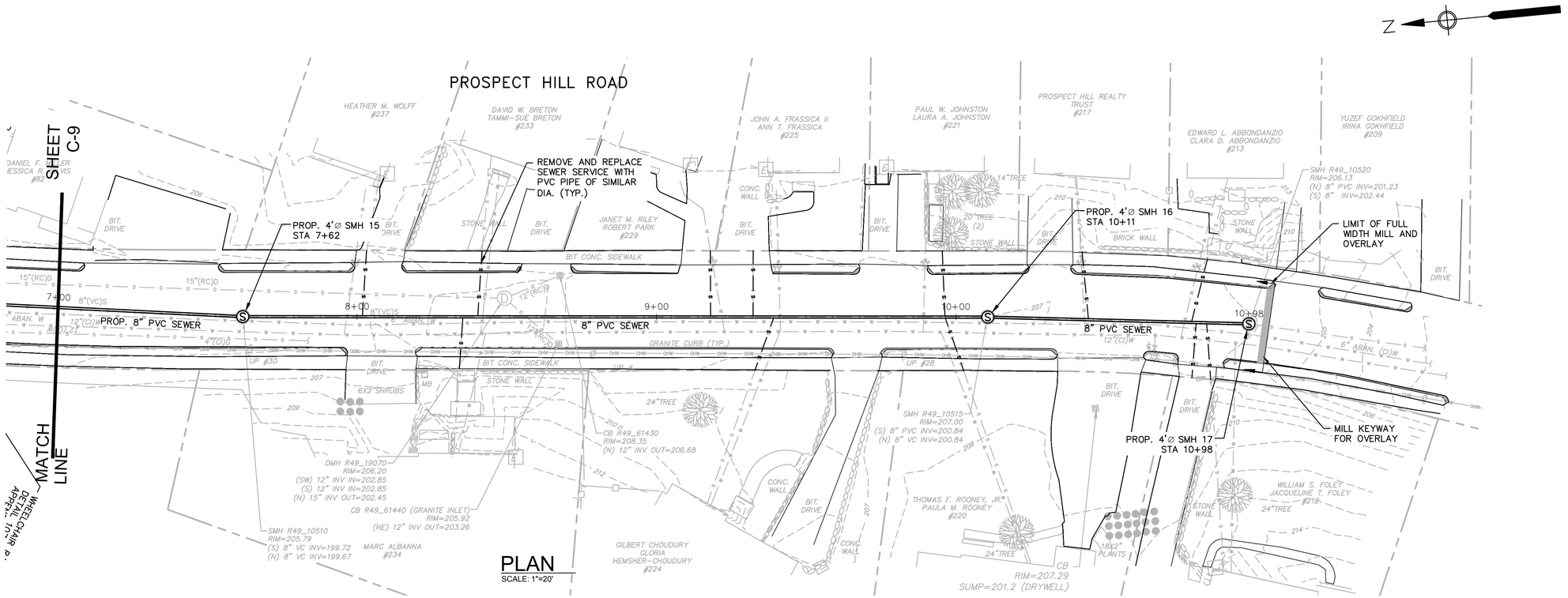
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

WOODLAND ROAD
SEWER REPLACEMENT
STA 4+00 TO STA 7+00

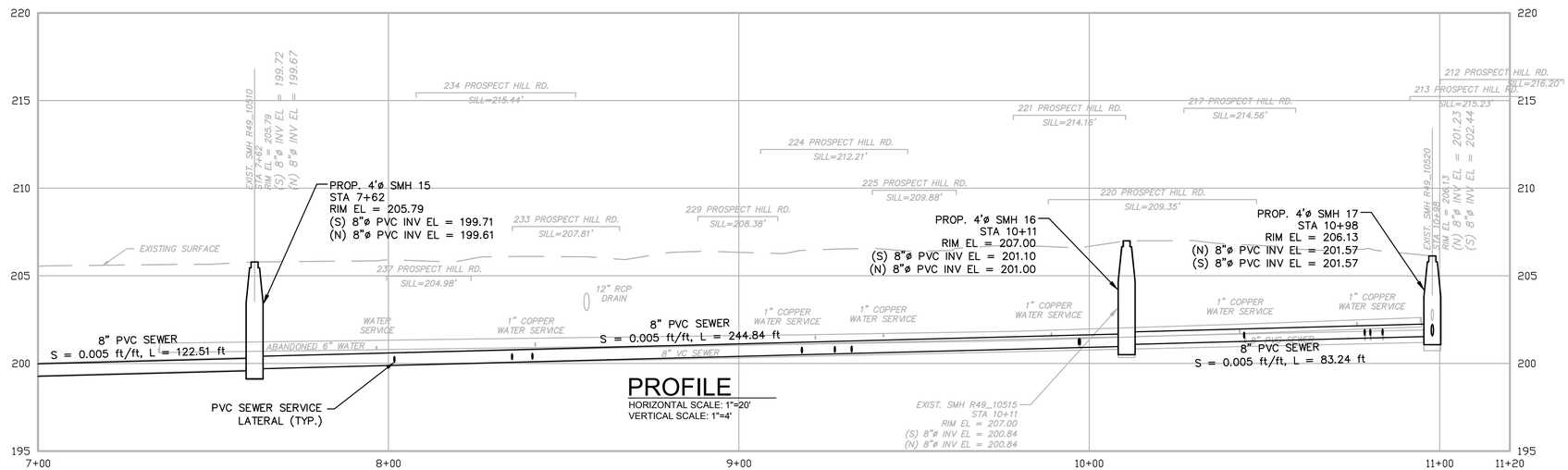
FOR CONSTRUCTION

Sheet No.
C-9

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_5628\03 Jennings Proposed Design.dwg Plot Date: May 16,2019-8:12am



PLAN
SCALE: 1"=20'



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Approved by	RJP

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JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

PROSPECT HILL ROAD
SEWER REPLACEMENT
STA 7+00 TO STA 11+20

FOR CONSTRUCTION

Sheet No.
C-10

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_5628\03.jennings Proposed Design.dwg Plot Date: May 16,2019-8:12am

PLAN
SCALE: 1"=60'

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_5628\03 Jennings Proposed Design.dwg Plot Date: May 16,2019-8:13am

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COMMONWEALTH OF MASSACHUSETTS
5/14/19

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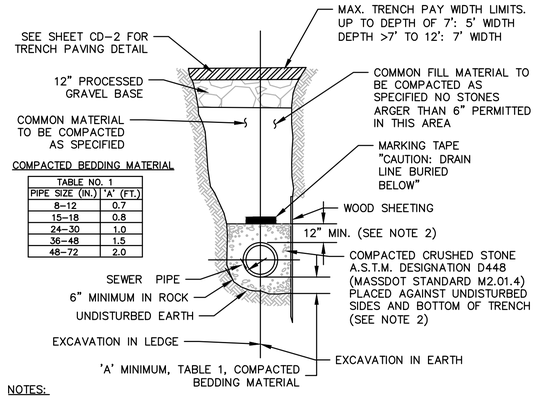
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

DRAIN REHABILITATION

FOR CONSTRUCTION

Sheet No.
C-11



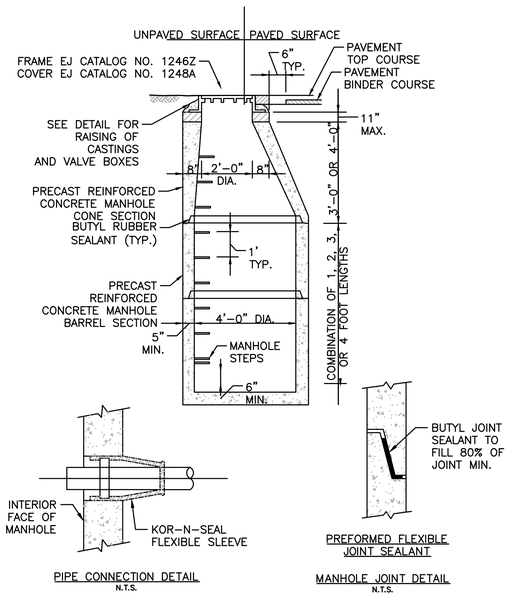
COMPACTED BEDDING MATERIAL

TABLE NO. 1	
PIPE SIZE (IN.)	'A' (FT.)
8–12	0.7
15–18	0.8
24–30	1.0
36–48	1.5
48–72	2.0

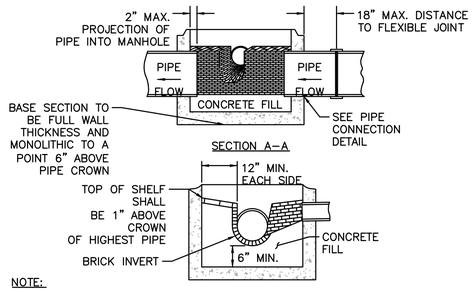
NOTES:

1. SHEETING, WHEN REQUIRED, IS TO BE CUT OFF AT LEAST 5 FEET BELOW ROADWAY GRADE AND A MINIMUM OF 1 FOOT ABOVE TOP OF PIPE. WOOD SHEETING DRIVEN BELOW MID–DIAMTETER OF THE PIPE SHALL BE LEFT IN PLACE. STEEL SHEETING DRIVEM BELOW MID–DIAMETER MAY BE WITHDRAWN IF APPROVED IN WRITING BY THE ENGINEER. FOR PVC PIPE, ALL SHEETING DRIVEN BELOW MID–DIAMTER SHALL BE LEFT IN PLACE.
2. WHEN APPROVED BY THE ENGINEER FOR PIPES OTHER THAN PVC, SELECTED GRAVEL FILL MATERIAL MAY BE USED FROM MID–DIAMETER OF PIPE TO 12" ABOVE TOP OF PIPE. NO STONES LARGER THAN 2" IN ANY DIMENSION WILL BE PERMITTED IN THIS AREA – MASSDOT DPW MATERIAL STANDARD M1.03.0.
3. TRENCHES LOCATED ON THE ROAD SHOULDER SHALL BE TREATED THE SAME AS OFF–ROAD EXCEPT FOR PAVING.
4. BEDDING MATERIAL FOR PVC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D2321 CLASS I OR CLASS II EMBEDMENT MATERIALS.
5. COMPACTION TESTING SHALL BE COMPLETED IN ACCORDANCE WITH THE ASTM D1557 METHOD C, UNLESS OTHERWISE WRITTEN IN THE SPECIFICATIONS OR DIRECTED BY THE ENGINEER

TYPICAL SEWER TRENCH
SCALE: N.T.S.

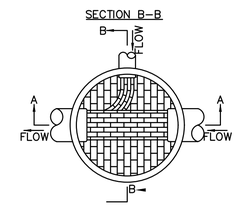


SEWER MANHOLE
SCALE: N.T.S.

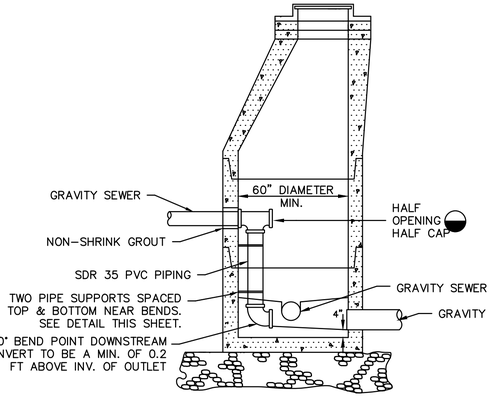


NOTE:

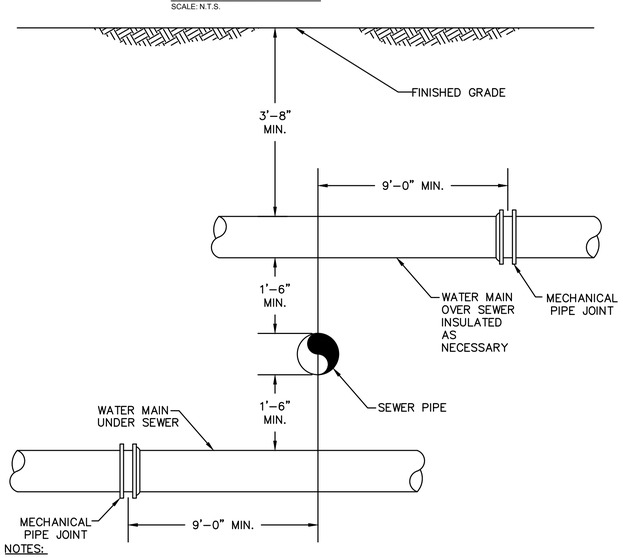
1. CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT. INVERT BRICKS SHALL BE LAID ON EDGE.
2. INVERT AND SHELF TO BE PLACED AFTER SUCCESSFUL VACUUM TEST.



SEWER INVERT
SCALE: N.T.S.



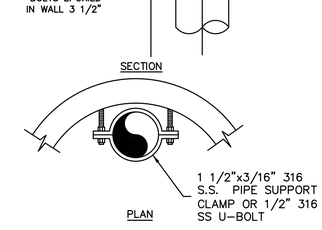
INSIDE DROP MANHOLE



NOTES:

1. SEWERS SHALL BE KEPT REMOTE FROM WATER SUPPLY PIPING AND STRUCTURES. WHEREVER FEASIBLE, SEWERS SHOULD BE LAID AT A MINIMUM HORIZONTAL DISTANCE OF 10 FEET FROM WATER MAINS. IF LOCAL CONDITIONS PREVENT THIS, THE WATER MAIN SHOULD BE LAID IN A SEPARATE TRENCH, AND THE ELEVATIONS OF THE CROWN OF THE SEWER PLACED AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN.
2. WHENEVER SEWERS MUST CROSS UNDER WATER MAINS, THE CROWN OF THE SEWER SHOULD BE PLACED A MINIMUM OF 18 INCHES BELOW THE INVERT OF THE WATER MAIN. IN ADDITION, THE WATER MAIN MUST BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOVE THE CROSSING. THE WATER PIPE SHALL HAVE MECHANICAL JOINTS FOR A MINIMUM DISTANCE OF 10 FEET ON EACH SIDE OF THE CROSSING.
3. WHEN IT IS IMPOSSIBLE TO OBTAIN HORIZONTAL OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER AND THE SEWER PIPING SHALL BE CONSTRUCTED SUCH THAT THE PIPE JOINTS ARE PLACED AS FAR AWAY FROM THE CROSSING AS POSSIBLE AND THE PIPE CROSSING SHALL BE ENCASED IN CONTROL DENSITY FILL FOR A DISTANCE OF 10 FEET ON ALL SIDES OF THE CROSSING.

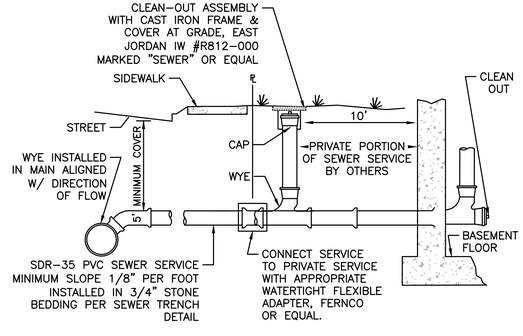
TYPICAL SEWER CROSSING
SCALE: N.T.S.



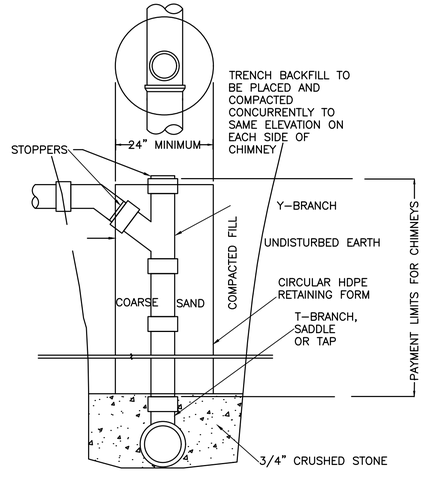
NOTES:

1. SEE MANHOLE DETAIL FOR ADDITIONAL DIMENSIONS, NOTES, AND INFORMATION.
2. THIS DETAIL IS ALSO TO BE USED FOR FORCE MAIN TIE–INS DEEPER THAN 8 FT.
3. USE WHEN INCOMING AND OUTGOING INVERTS DIFFER BY MORE THAN 2 FEET.
4. WHEN INCOMING INVERT WILL BE LESS THAN 2 FEET ABOVE OUTGOING INVERT, THE LINE SHALL COME IN AT THE MANHOLE INVERT.
5. ALL PIPE PENETRATIONS SHALL USE FLEXIBLE BOOT CONNECTIONS

TYPICAL INTERNAL DROP CONNECTION
SCALE: N.T.S.



NEW SEWER SERVICE
SCALE: N.T.S.



NOTE:

1. CHIMNEYS SHALL BE MEASURED ALONG THE CENTERLINE OF THE PIPE IN THE VERTICAL AXIS FROM THE CENTERLINE OF MAIN TO THE TOP OF CAP. PAYMENT SHALL BE MADE UNDER THE CORRESPONDING PIPE ITEM PER LINEAR FOOT.

CHIMNEY
SCALE: N.T.S.

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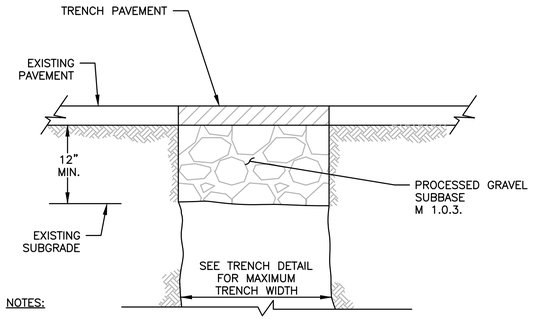
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

CIVIL DETAILS I

FOR CONSTRUCTION

Sheet No.

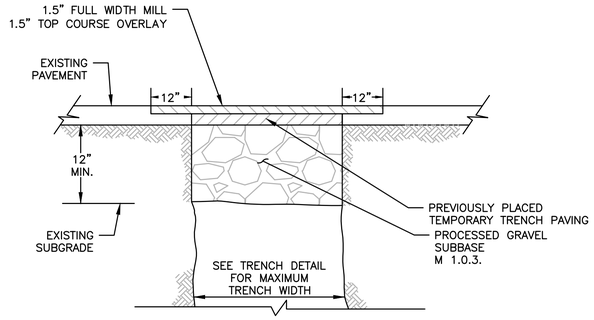
CD-1



NOTES:

1. TRENCH PAVEMENT: 4" OF HOT MIX ASPHALT BINDER TO BE USED AT THE END OF EACH WEEK TO STABILIZE TRENCHES. THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE FOR TRENCH PAVEMENT. THE CONTRACTOR SHALL MAINTAIN THE TRENCH PAVEMENT THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITY AT NOT ADDITIONAL COST TO THE CONTRACT.
2. ALL TRENCHES SHALL BE SAW CUT ONLY. NO OTHER METHOD OF CUTTING THE EXISTING PAVEMENT SHALL BE ACCEPTABLE.

TEMPORARY TRENCH PAVEMENT
SCALE: N.T.S.



PERMANENT TRENCH PAVEMENT
SCALE: N.T.S.

PAVEMENT NOTES:

PROPOSED PERMANENT TRENCH PAVEMENT (BASE BID – WOODLAND RD. ONLY)

MILLING: 1.5" MILLING

SURFACE: 1.5" HOT MIX ASPHALT TOP PLACED IN ONE LAYER

SUBBASE: EXISTING SUBBASE

PROPOSED TEMPORARY TRENCH PAVEMENT:

SURFACE: 4" HOT MIX ASPHALT BINDER PLACED IN TWO LAYERS.

SUBBASE: 12" PROCESSED GRAVEL (M1.03 MASSDOT STANDARD)

PROPOSED PERMANENT PAVEMENT

MILLING: 1.5" MILLING

SURFACE: 1.5" HOT MIX ASPHALT TOP PLACED IN ONE LAYER

SUBBASE: EXISTING SUBBASE

PROPOSED HOT MIX ASPHALT DRIVEWAY (AS NEEDED)

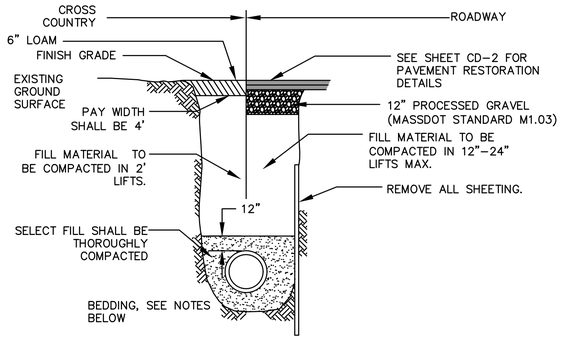
SURFACE: 3" HOT MIX ASPHALT PLACED IN TWO LAYERS, 1.5" TOP COURSE OVER 1.5" BINDER COURSE.

SUBBASE: 8" PROCESSED GRAVEL (M1.03 MASSDOT STANDARD)

PROPOSED CEMENT CONCRETE WALK/WHEELCHAIR RAMP (AS NEEDED)

SURFACE: 6" FIBER REINFORCED CONCRETE

SUBBASE 8" PROCESSED GRAVEL (M1.03 MASSDOT STANDARD)

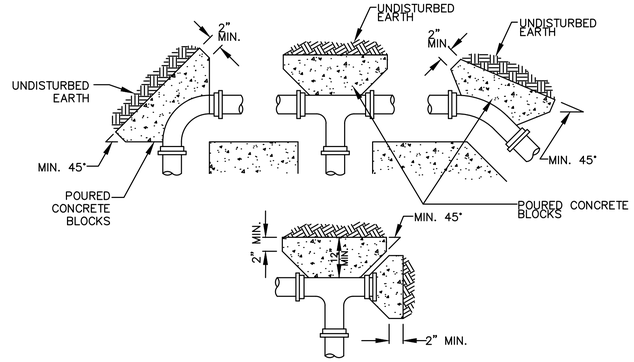


NOTE: 5'–0" MIN. COVER

NOTES:

1. CITY OF WALTHAM MAY REQUIRE FLOWABLE FILL AT ITS DISCRETION.
2. FOR LOCATIONS WHERE LEDGE IS NOT ENCOUNTERED IN TRENCH, PIPE CAN LAY ON UNDISTURBED EARTH, OR ON SAND BEDDING CONSISTENT WITH AWWA GUIDELINES.
3. FOR LOCATIONS WHERE LEDGE IS ENCOUNTERED, SAND BEDDING SHALL BE MINIMUM OF 12" THICK UNDER PIPE.
4. FILL MATERIAL SHALL BE COMPACTED TO 95% PROCTOR DENSITY.
5. COMPACTION TESTING SHALL BE COMPLETED IN ACCORDANCE WITH THE ASTM D1557 METHOD C, UNLESS OTHERWISE WRITTEN IN THE SPECIFICATIONS OR DIRECTED BY THE ENGINEER.

WATER MAIN TRENCH DETAIL
SCALE: N.T.S.

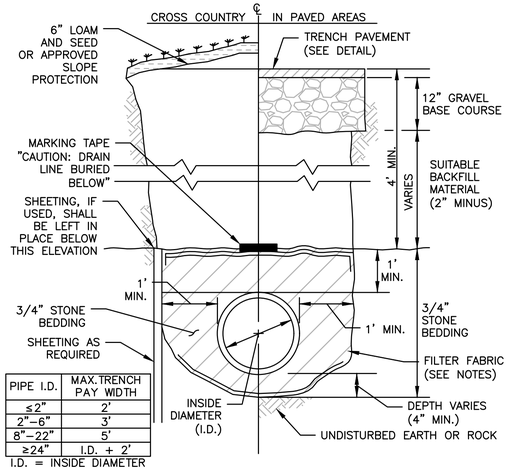


PLAN VIEWS

NOTES:

1. SPECIFIC THRUST BLOCK DESIGN SHALL CONFORM TO AWWA GUIDELINES.
2. PLACE 4 mil. POLYETHYLENE BETWEEN CONCRETE AND FITTING (CONCRETE SHALL NOT INTERFERE WITH JOINT).
3. MINIMUM CONCRETE THICKNESS SHALL BE 12 INCHES.
4. THRUST BLOCK ORIENTATION SHALL BE SUCH THAT THE CENTER OF THE FITTING CORRESPONDS WITH THE CENTER OF THE THRUST BLOCK.
5. THE MINIMUM ALLOWABLE ANGLE (EITHER VERTICAL OR HORIZONTAL) SHALL BE 45 DEGREES.

TYPICAL THRUST BLOCK DETAIL
SCALE: N.T.S.



PIPE I.D.	MAX. TRENCH PAY WIDTH
≤ 2"	2'
2"–6"	3'
8"–22"	5'
≥24"	I.D. + 2'

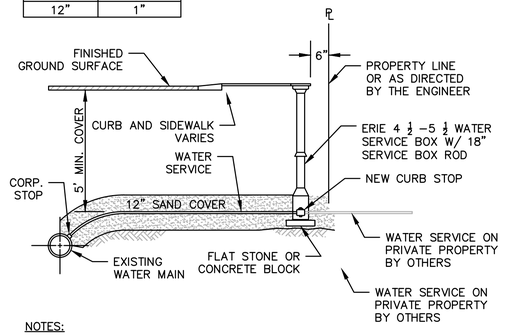
I.D. = INSIDE DIAMETER

NOTES:

1. REFER TO TRENCH PAVEMENT DETAIL FOR PAVEMENT PAYMENT WIDTHS.
2. WHEN EXCAVATION IS IN SILT AND / OR CLAY, AND BELOW GROUNDWATER TABLE, WRAP PIPE BEDDING WITH FILTER FABRIC. FILTER FABRIC SHALL HAVE A MIN. OF 2' OVERLAP.
5. COMPACTION TESTING SHALL BE COMPLETED IN ACCORDANCE WITH THE ASTM D1557 METHOD C, UNLESS OTHERWISE WRITTEN IN THE SPECIFICATIONS OR DIRECTED BY THE ENGINEER.

TYPICAL DRAIN TRENCH
SCALE: N.T.S.

WATER MAIN DIAMETER	MAXIMUM TAP DIAMETER
4"	1/2"
6"	3/4"
8"	1"
12"	1"



NOTES:

1. ALL WATER SERVICES SHALL BE 1" DIA. TYPE K COPPER TUBING UNLESS OTHERWISE NOTED. SERVICE SHALL BE ONE CONTINUOUS LENGTH FROM MAIN TO CURB STOP.
2. ALL WATER SERVICES SHALL BE REPLACED UP TO THE RIGHT OF WAY
3. WHERE THE SIZE OF THE CONNECTION EXCEEDS THAT GIVEN IN THE TABLE, THE CONNECTION SHALL BE MADE MEANS OF A TAPPED SADDLE OR TEE CONNECTION.
4. WHERE GATE BOX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO OPERATE VALVE WITH WRENCH.
5. REMOVE AND DISPOSED OF EXISTING PIPE AND GATE BOX.

WATER SERVICE
SCALE: N.T.S.

Drawing file: I:\Waltham.253\IDDE Program Coordinator\253-1702.01-Jennings Road Design\03 Drawings\04 Details.dwg Plot Date: May 16,2019-7:59am

WALTHAM · INCORPORATED A TOWN 1738 · INCORPORATED A CITY 1884 ·

Environmental Partners GROUP
A partnership for engineering solutions.

COMMONWEALTH OF MASSACHUSETTS · RYAN J. PAUL · CIVIL · No. 51127 · REGISTERED PROFESSIONAL ENGINEER · 5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	MAY 2019
Job No.	253-1702
Designed by	RJP/SLC
Drawn by	SLC
Checked by	PCM
Approved by	RJP

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

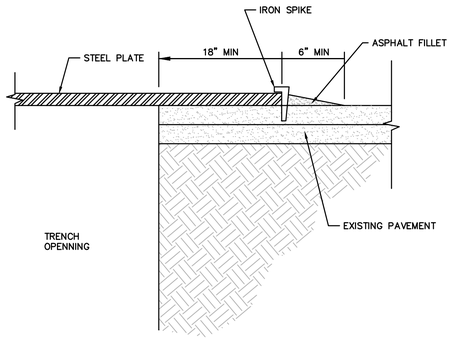
JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

CIVIL DETAILS II

FOR CONSTRUCTION

Sheet No.

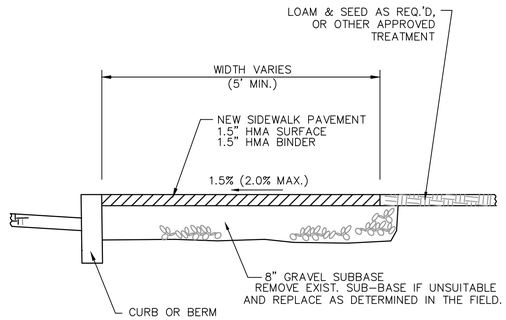
CD-2



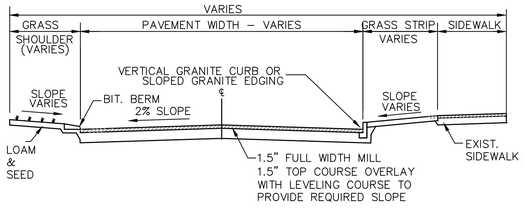
NOTES:

1. USE OF STEEL PLATES ALLOWED ON A CASE BY CASE BASIS, PENDING WRITTEN APPROVAL BY TOWN.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES OR CLAIMS RESULTING FROM THE USE OF STEEL PLATES.
3. MUTCD COMPLIANT RETROREFLECTIVE ORANGE CONSTRUCTION WARNING SIGNS (48"X48") WITH WORDING "STEEL PLATE AHEAD" SHALL BE INSTALLED IN ADVANCE OF STEEL PLATE INSTALLATION.
4. THE CONTRACTOR SHALL DESIGN AND UTILIZE STEEL PLATES OF ADEQUATE DIMMENSIONS AND THICKNESS FOR INTENDED USE AND VEHICLE LOADING. MAXIMUM ALLOWABLE DEFLECTION SHALL BE 0.025". IRON SPIKE FASTENERS SHALL BE INSTALLED AROUND THE PERIMETER OF THE STEEL PLATE.
5. SEE CONSTRUCTION STANDARDS SECTION 6.3 SPECIAL CONDITIONS FOR ADDITIONAL REQUIREMENTS.

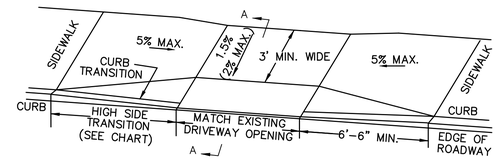
STEEL PLATE INSTALLATION
SCALE: N.T.S.



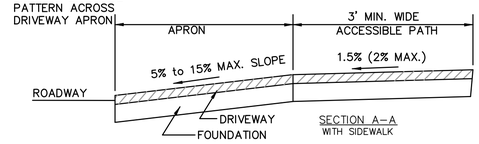
HOT MI□ ASPHALT SIDEWALK
SCALE: N.T.S.

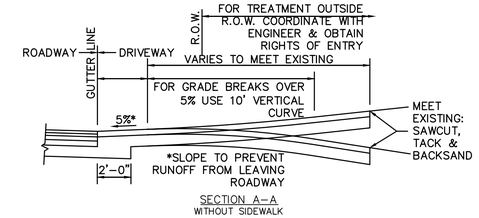


TYPICAL MILL AND OVERLAY CROSS SECTION
SCALE: N.T.S.

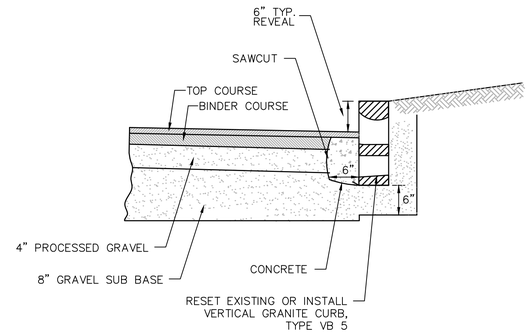


NOTE: MAINTAIN EXISTING DRAINAGE PATTERN ACROSS DRIVEWAY APRON





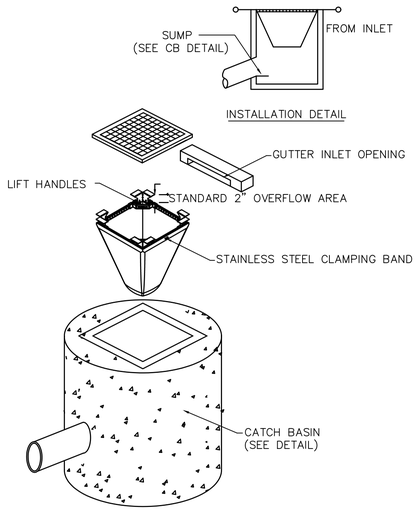
TYPICAL DRIVEWAY
SCALE: N.T.S.



NOTE:

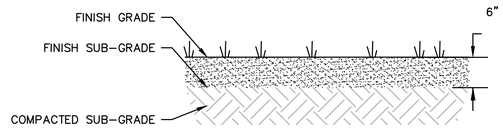
1. RECLAIMED ASPHALT PAVEMENT MATERIAL MAY BE SUBSTITUTED FOR PROCESSED GRAVEL SUB-BASE IF APPROVED BY THE ENGINEER.

VERTICAL GRANITE CURB
SCALE: N.T.S.



NOTE:
1. SILTSACKS SHALL BE FLEXSTORM CATCH-IT OR APPROVED EQUAL
2. SILTSACKS SHALL BE INSTALLED IN ALL CATCH BASIN UNTIL DRAINAGE AREA HAS BEEN FULLY STABILIZED.

SILT SACK
SCALE: N.T.S.



NOTES:

1. SEED MIX SHALL BE NEW ENGLAND CONSERVATION SEED MIX, FREE OF FERTILIZERS.
2. LOAM SHALL BE NATIVE TO LOCAL AREA AND OF LOW NITROGEN CONTENT.
3. INSTALL CURLEX CL EROSION CONTROL BLANKET AS MANUFACTURED BY AMERICAN EXCELSIOR COMPANY (OR APPROVED EQUAL) ON ALL LOAM AND SEEDED SLOPES 3:1 OR STEEPER.

LOAM AND SEED □DISTURBED AREAS□
SCALE: N.T.S.

Environmental Partners GROUP
A partnership for engineering solutions.

RYAN J. PAUL CIVIL No. 51127 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
5/14/19

MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	MAY 2019
Job No.	253-1702
Designed by	RJP/SLC
Drawn by	SLC
Checked by	PCM
Approved by	RJP

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

JENNINGS ROAD
SEWER REPLACEMENT AND DRAIN REHABILITATION
CITY OF WALTHAM, MASSACHUSETTS

CIVIL DETAILS III

FOR CONSTRUCTION

Sheet No.

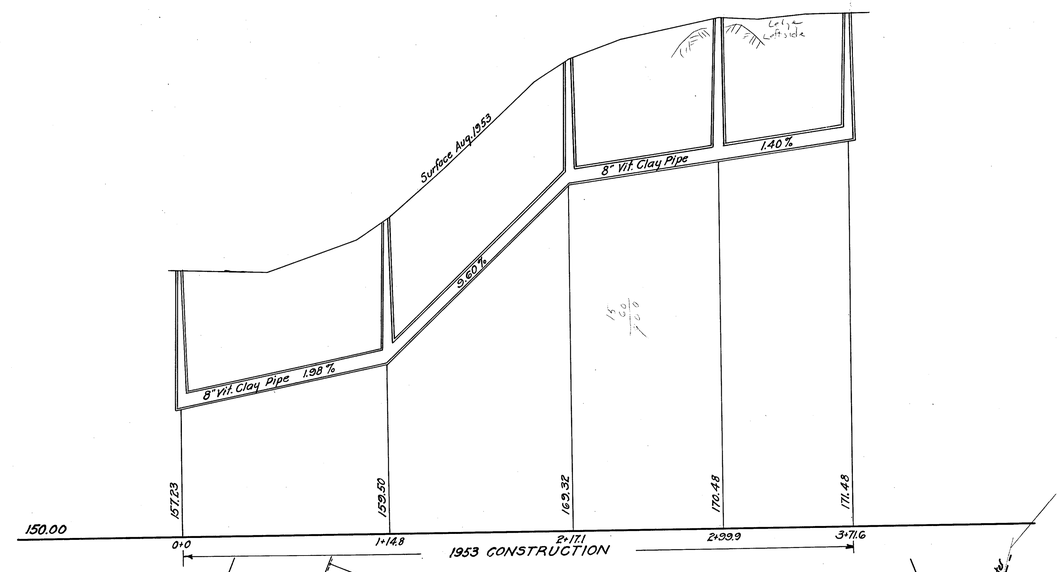
CD-3

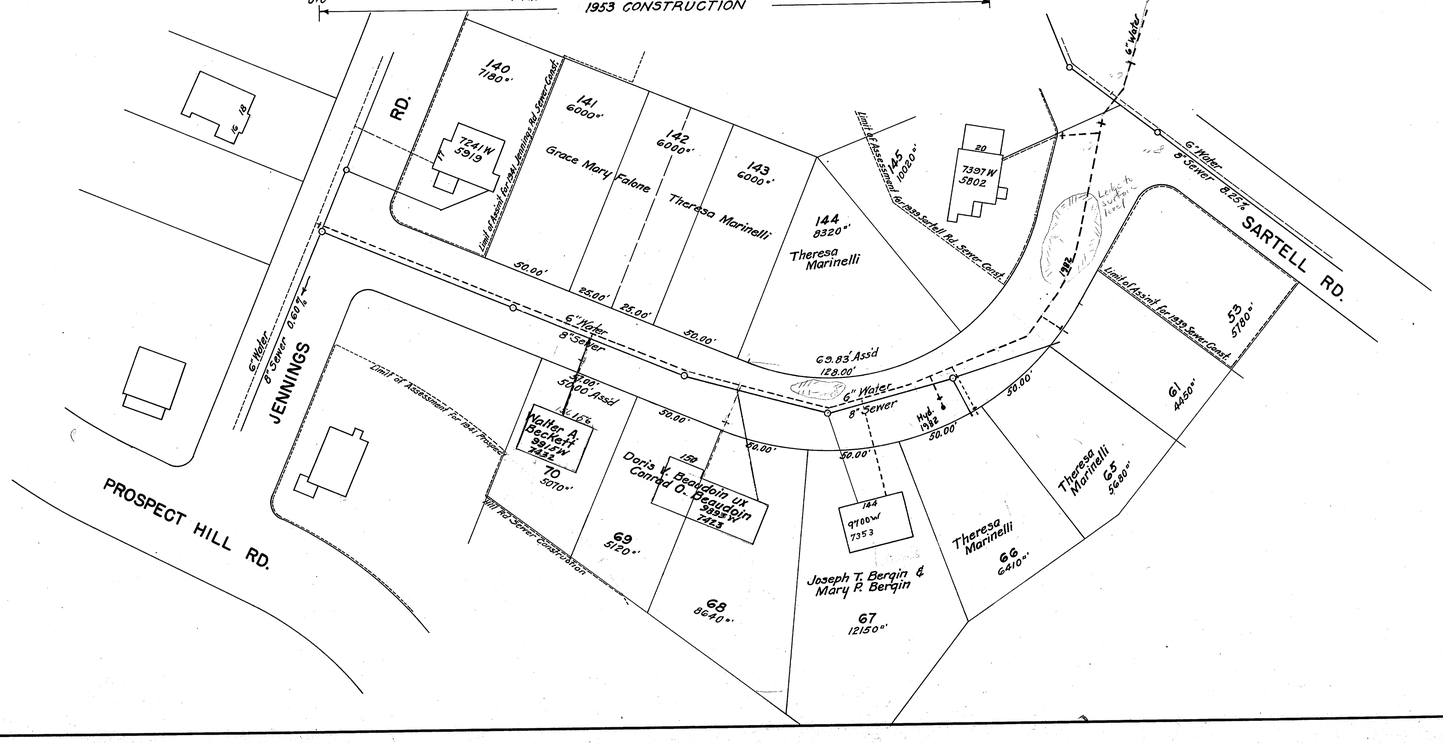
RECORD WATER, SEWER AND DRAIN PLANS

Hawthorne Road
Water & Sewer
Sartell Rd – Jennings Rd

HAWTHORNE ROAD

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH





HAWTHORNE ROAD SEWER
TABLE OF ASSESSMENT FOR 1953 CONSTRUCTION

CONSTRUCTION ORDER 17589 DATE OF APPROVAL JUNE 10, 1953
ASSESSMENT ORDER 17893 DATE OF APPROVAL JUNE 15, 1954
TOTAL COST $ 5447.27
AMOUNT ASSESSED $ 2079.32
ASSESSMENT $4.00 PER LINEAR FOOT OF FRONTAGE

OWNER	LOT NO.	HOUSE NO.	FRONTAGE	FRONTAGE ASSESSED	AMOUNT ASSESSED	REMARKS
NORTH SIDE						
Grace Mary Falone	141 & ½ 142		75.00	75.00	300.00	
Theresa Marinelli	½ 142		25.00	25.00	100.00	
Theresa Marinelli	143		50.00	50.00	200.00	
Theresa Marinelli	144		128.00	69.83	279.32	Area divided by greatest depth
SOUTH SIDE						
Theresa Marinelli	65		50.00	50.00	200.00	
Theresa Marinelli	66		50.00	50.00	200.00	
Joseph T. Bergin & Mary P. Bergin	67	144	50.00	50.00	200.00	
Doris V. Beaudoin ux Conrad O. Beaudoin	68		50.00	50.00	200.00	
Doris V. Beaudoin ux Conrad O. Beaudoin	69		50.00	50.00	200.00	
Walter A. Beckett	70		57.00	50.00	200.00	
TOTALS			585.00	579.83	2079.32	

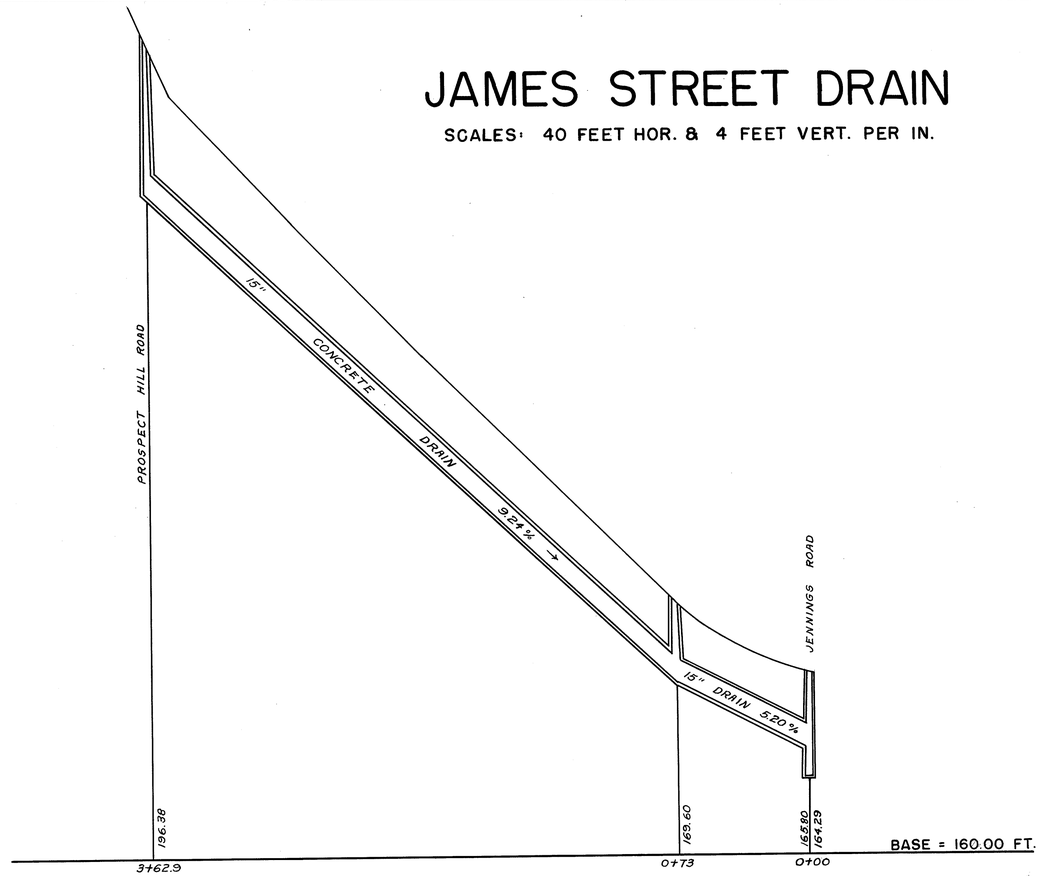
Herbert F. Howe — CITY ENGINEER
June 3, 1954 — DATE

HAWTHORNE RD. C

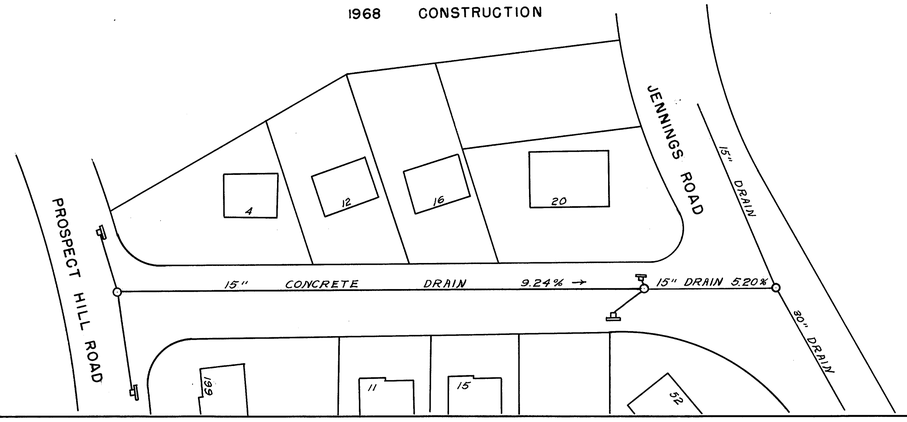
James Street
Drain
Prospect Hill Rd – Jennings Rd

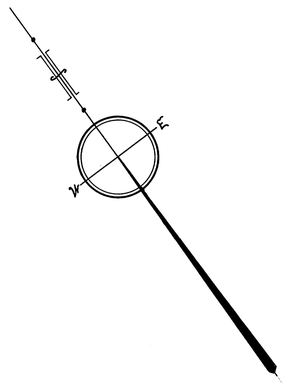
JAMES STREET DRAIN

SCALES: 40 FEET HOR. & 4 FEET VERT. PER IN.



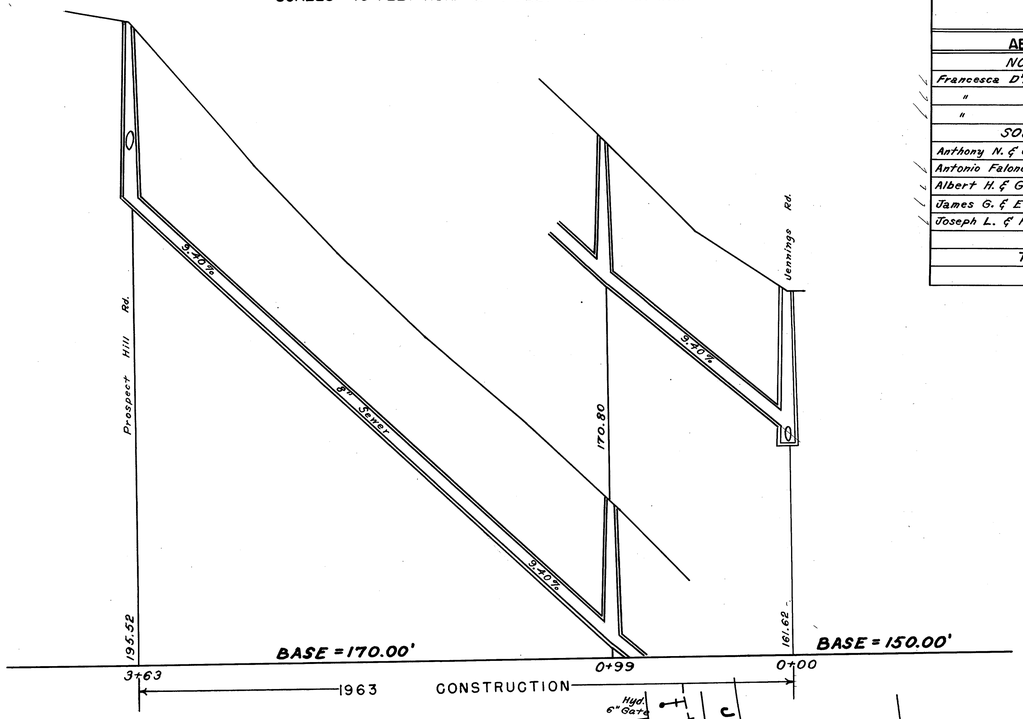
1968 CONSTRUCTION





JAMES STREET

SCALES: 40 FEET HOR. & 4 FEET VERT. PER INCH



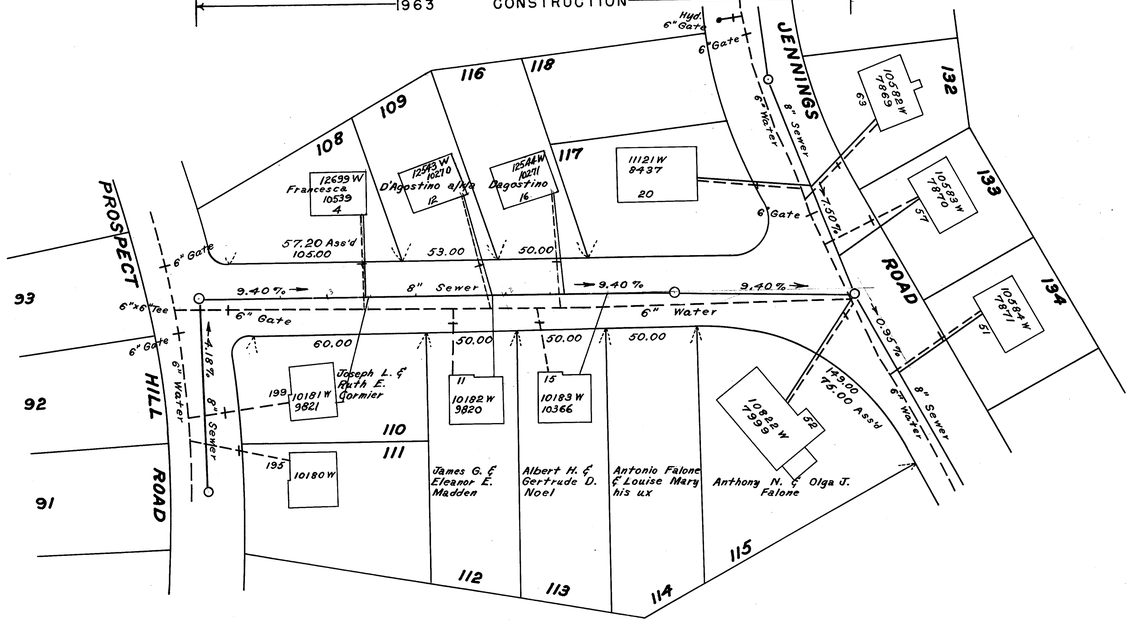


TABLE OF ASSESSMENTS FOR 1963 CONSTRUCTION

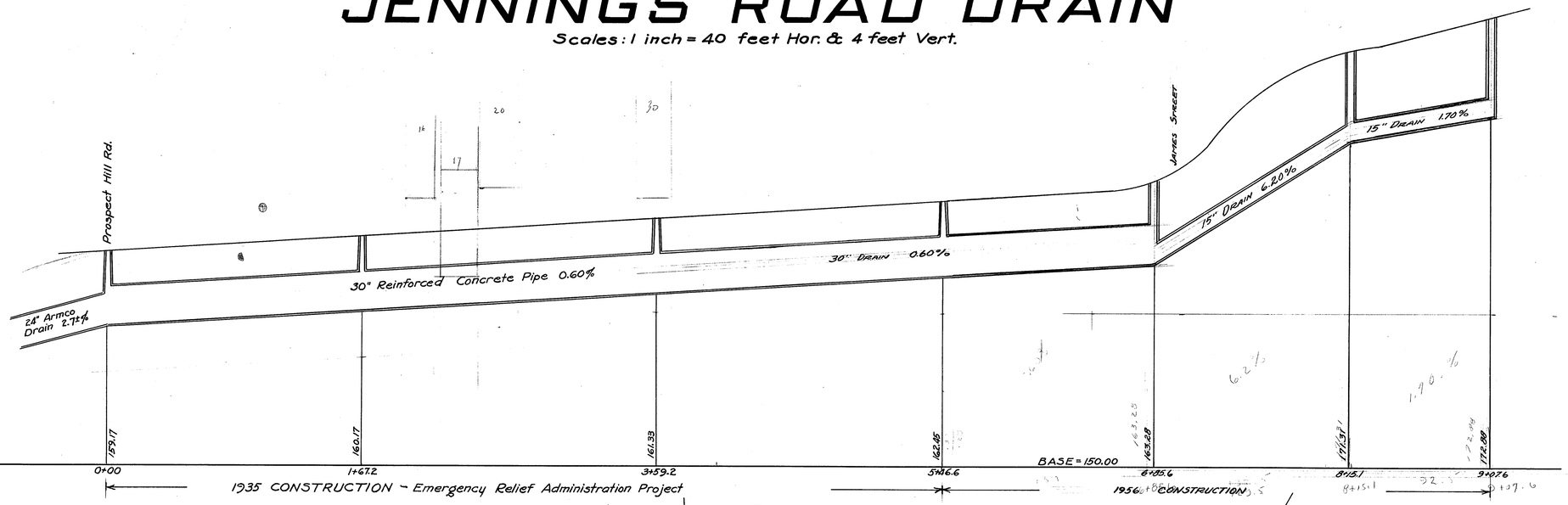
CONSTRUCTION ORDER 20796 DATE OF APPROVAL APRIL 24,1963
ASSESSMENT ORDER 21109 DATE OF APPROVAL APRIL 14, 1964
TOTAL COST 7285.17
AMOUNT ASSESSED $ 1780.80
ASSESSMENT $4.00 PER LINEAR FOOT OF FRONTAGE

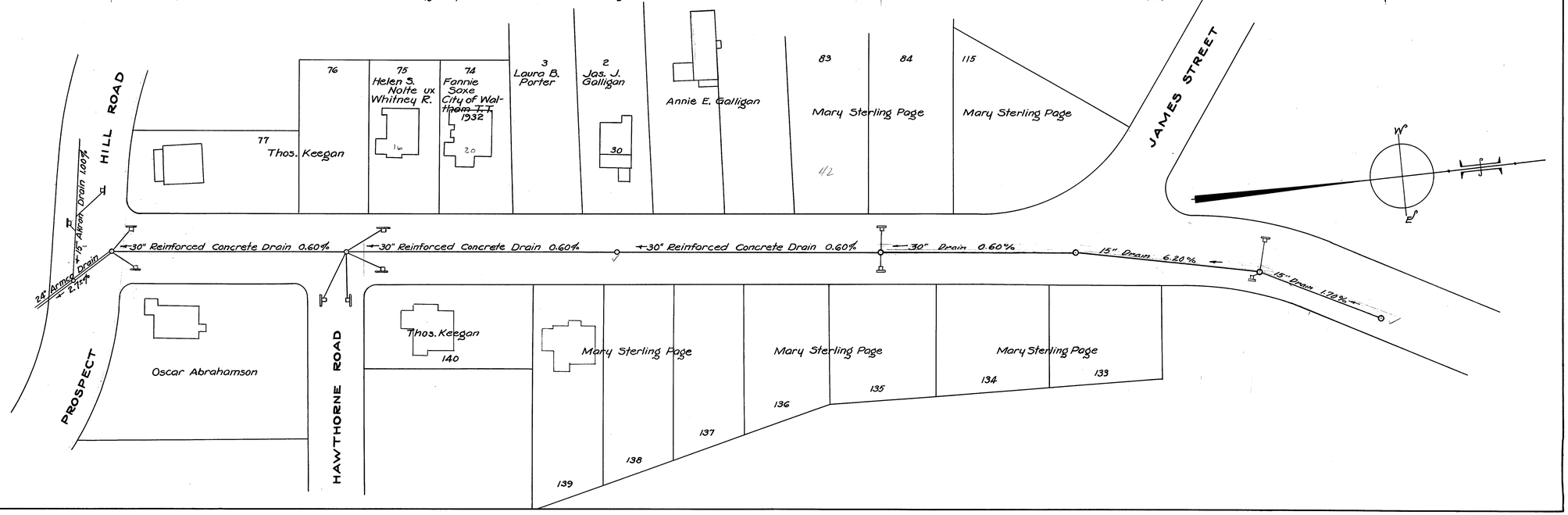
ABUTTER	LOT No.	HOUSE No.	FRONTAGE	FRONTAGE ASSESSED	AMOUNT	REMARKS
NORTH SIDE						
Francesca D'Agostino a/k/a Dagostino	108		105.00	57.20	228.80	Area ÷ 100
" " "	109		53.00	53.00	212.00	
" " "	116		50.00	50.00	200.00	
SOUTH SIDE						
Anthony N. & Olga J. Falone	115	53 Jennings Rd.	149.00	75.00	300.00	
Antonio Falone & Louise Mary his ux	114		50.00	50.00	200.00	
Albert H. & Gertrude D. Noel	113	15	50.00	50.00	200.00	
James G. & Eleanor E. Madden	112	11	50.00	50.00	200.00	
Joseph L. & Ruth E. Cormier	110	199 Prospect Hill Rd.	60.00	60.00	240.00	I.T. to Lot Line
TOTALS				445.20	1780.80	

Jennings Road
Drain
Prospect Hill Rd – James St

JENNINGS ROAD DRAIN

Scales: 1 inch = 40 feet Hor. & 4 feet Vert.

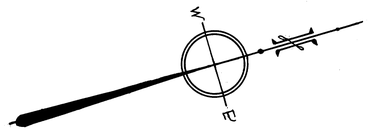


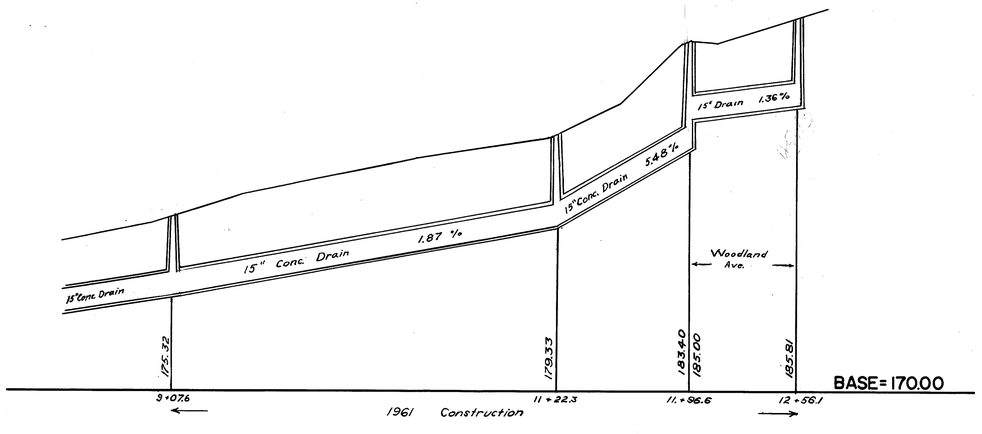


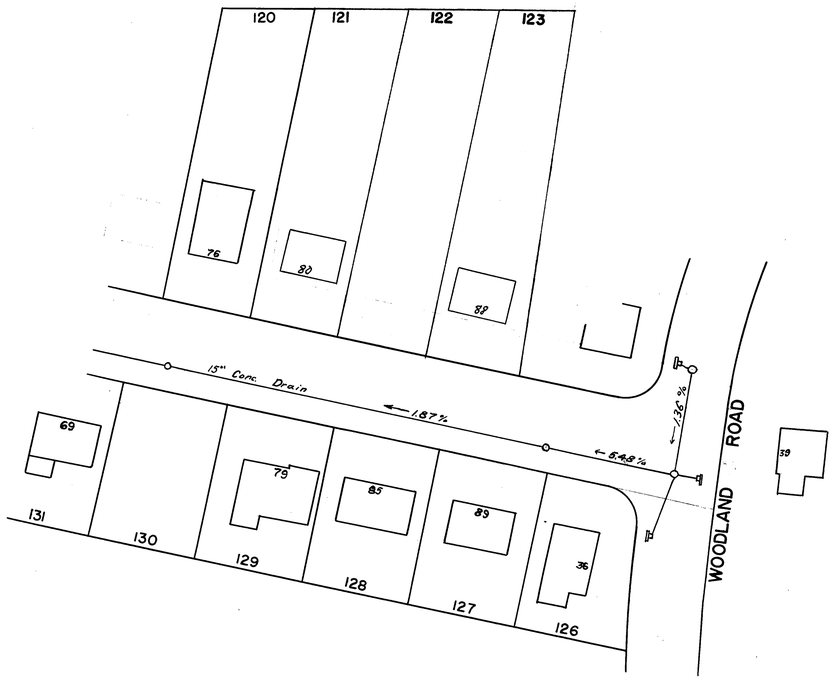
JENNINGS RD. DRAIN

JENNINGS ROAD DRAIN

SCALES: 1 INCH = 40 FT. HOR. & 4 FT. VERT.







JENNINGS ROAD

Scales: Hor. 1"=40', Vert. 1"=4'
March 1928

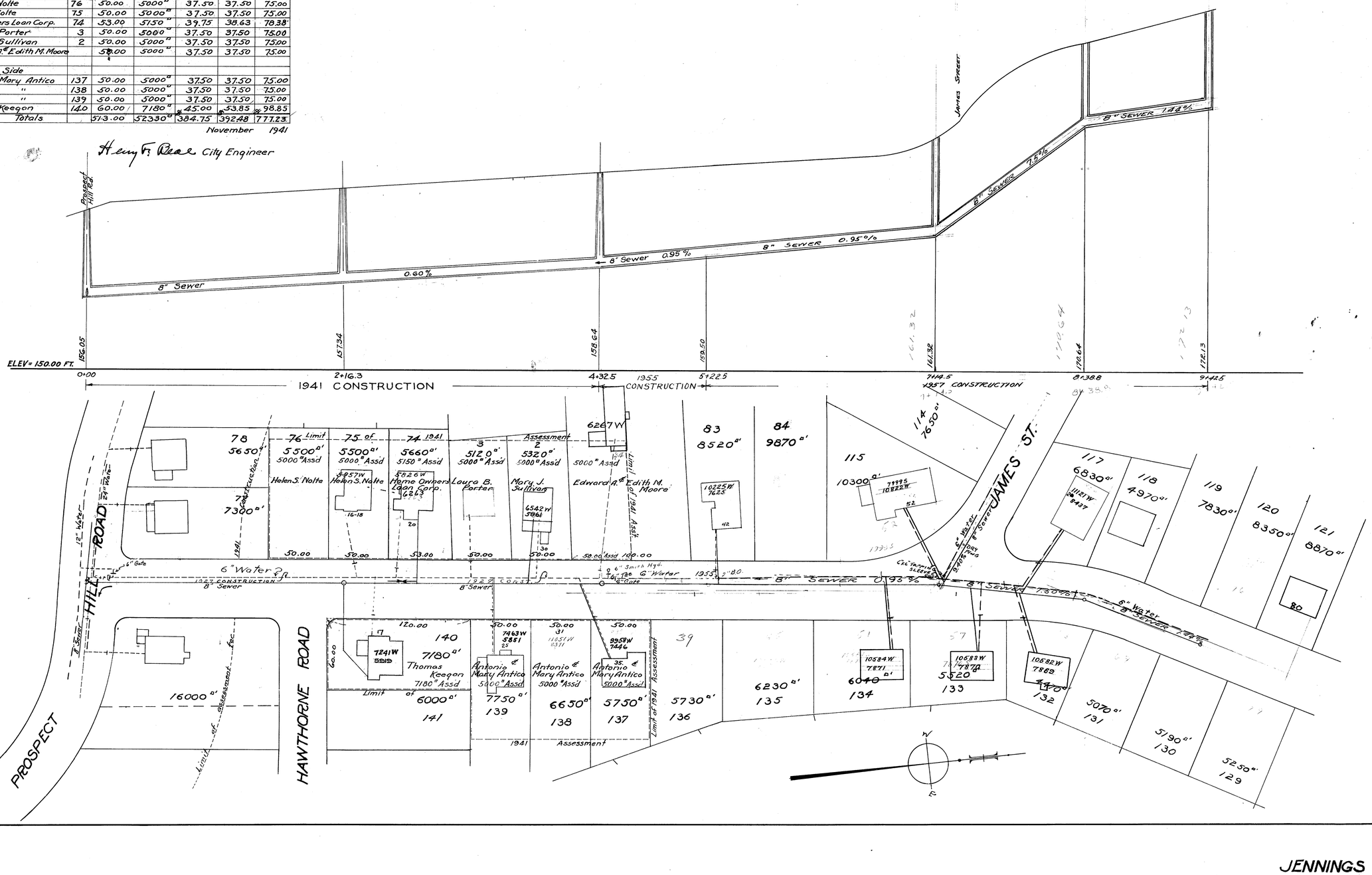
JENNINGS ROAD SEWER
TABLE OF ASSESSMENT FOR 1941 CONSTRUCTION

CONSTRUCTION ORDER # 14311 DATE OF APPROVAL JULY 29, 41
ASSESSMENT ORDER # 14430 DATE OF APPROVAL Nov 25/41
TOTAL COST $ 3,700.00
AMOUNT ASSESSED $ 777.23
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	Lot No.	Frontage	Area	Assessed on Frontage	Assessed on Area	Total
West Side				$	$	$
Helen S. Nolte	76	50.00	5000 □'	37.50	37.50	75.00
Helen S. Nolte	75	50.00	5000 □'	37.50	37.50	75.00
Home Owners Loan Corp.	74	53.00	5150 □'	39.75	38.63	78.38
Laura B. Porter	3	50.00	5000 □'	37.50	37.50	75.00
Mary J. Sullivan	2	50.00	5000 □'	37.50	37.50	75.00
Edward A. & Edith M. Moore		50.00	5000 □'	37.50	37.50	75.00
East Side						
Antonio & Mary Antico	137	50.00	5000 □'	37.50	37.50	75.00
" "	138	50.00	5000 □'	37.50	37.50	75.00
" "	139	50.00	5000 □'	37.50	37.50	75.00
Thomas Keegan	140	60.00	7180 □'	45.00	53.85	98.85
Totals		513.00	52330 □'	384.75	392.48	777.23

November 1941

Henry F. Reale City Engineer

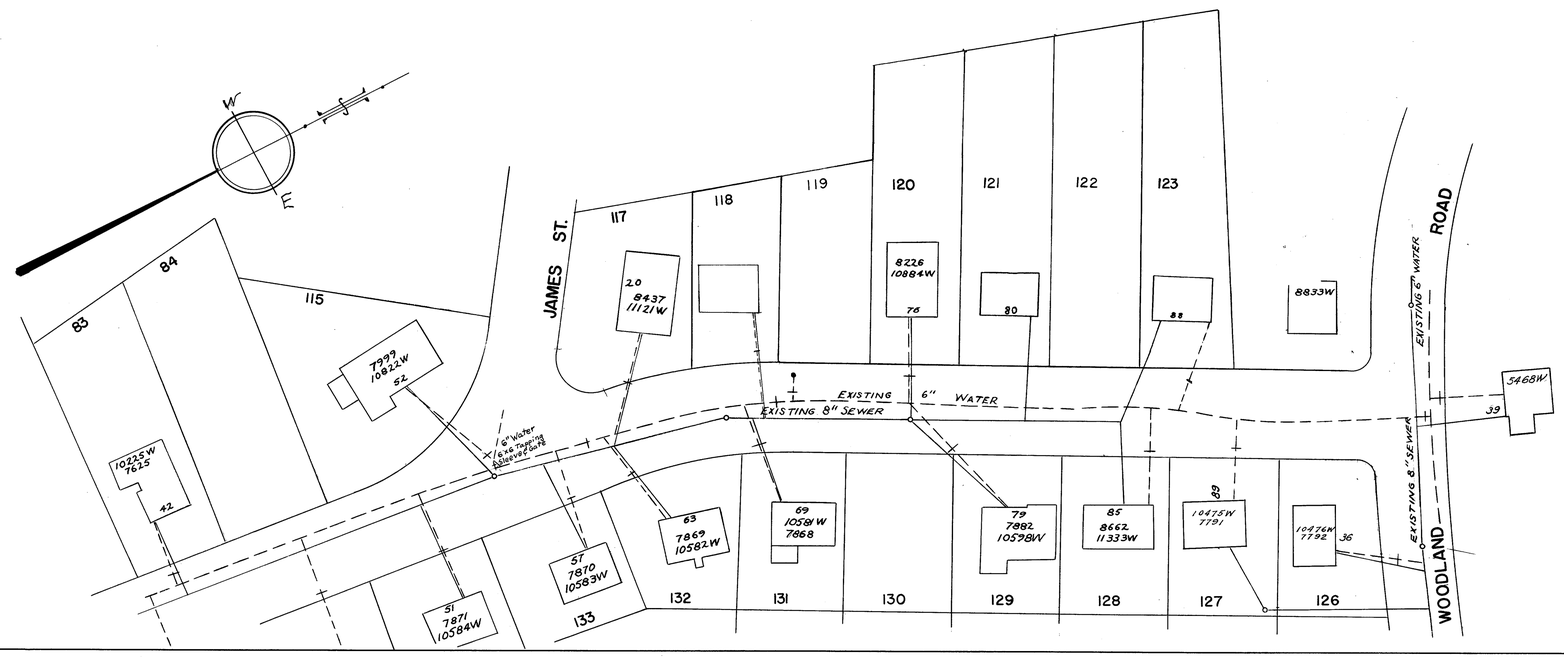


JENNINGS ROAD

Jennings Road
Water & Sewer
42 - # 89

JENNINGS ROAD

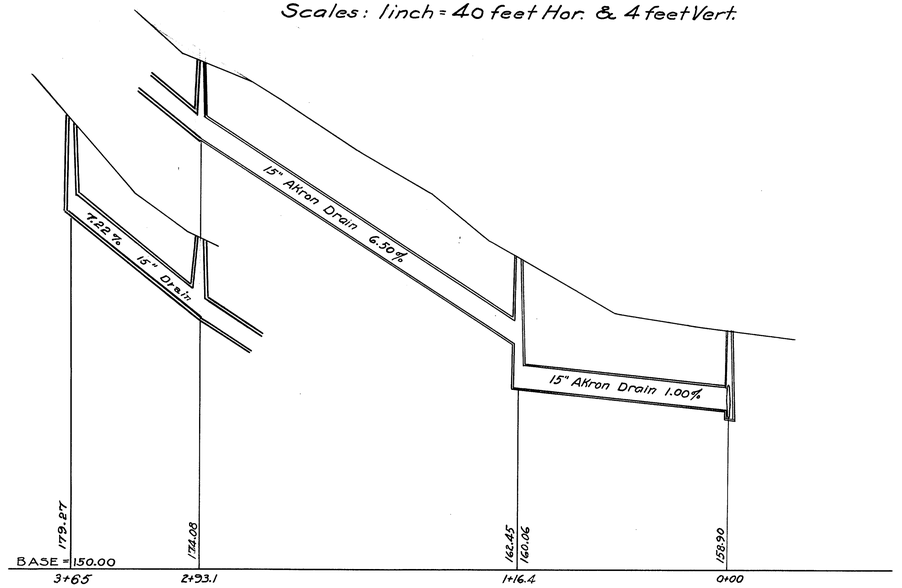
SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH



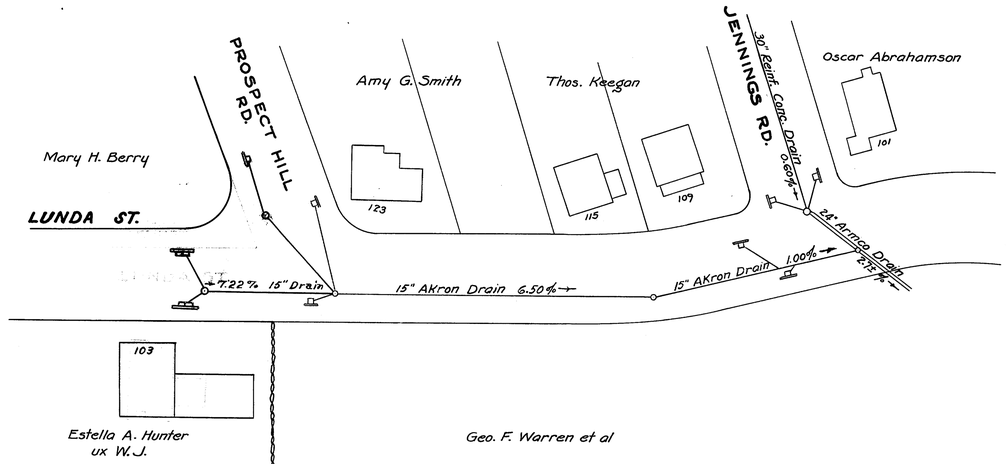
Prospect Hill Rd.
Drain / B
109 – # 123

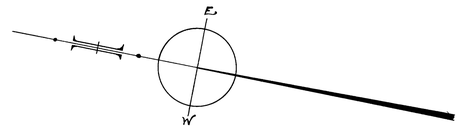
PROSPECT HILL RD. DRAIN

Scales: 1 inch = 40 feet Hor. & 4 feet Vert.



1935 CONSTRUCTION - Emergency Relief Administration Project

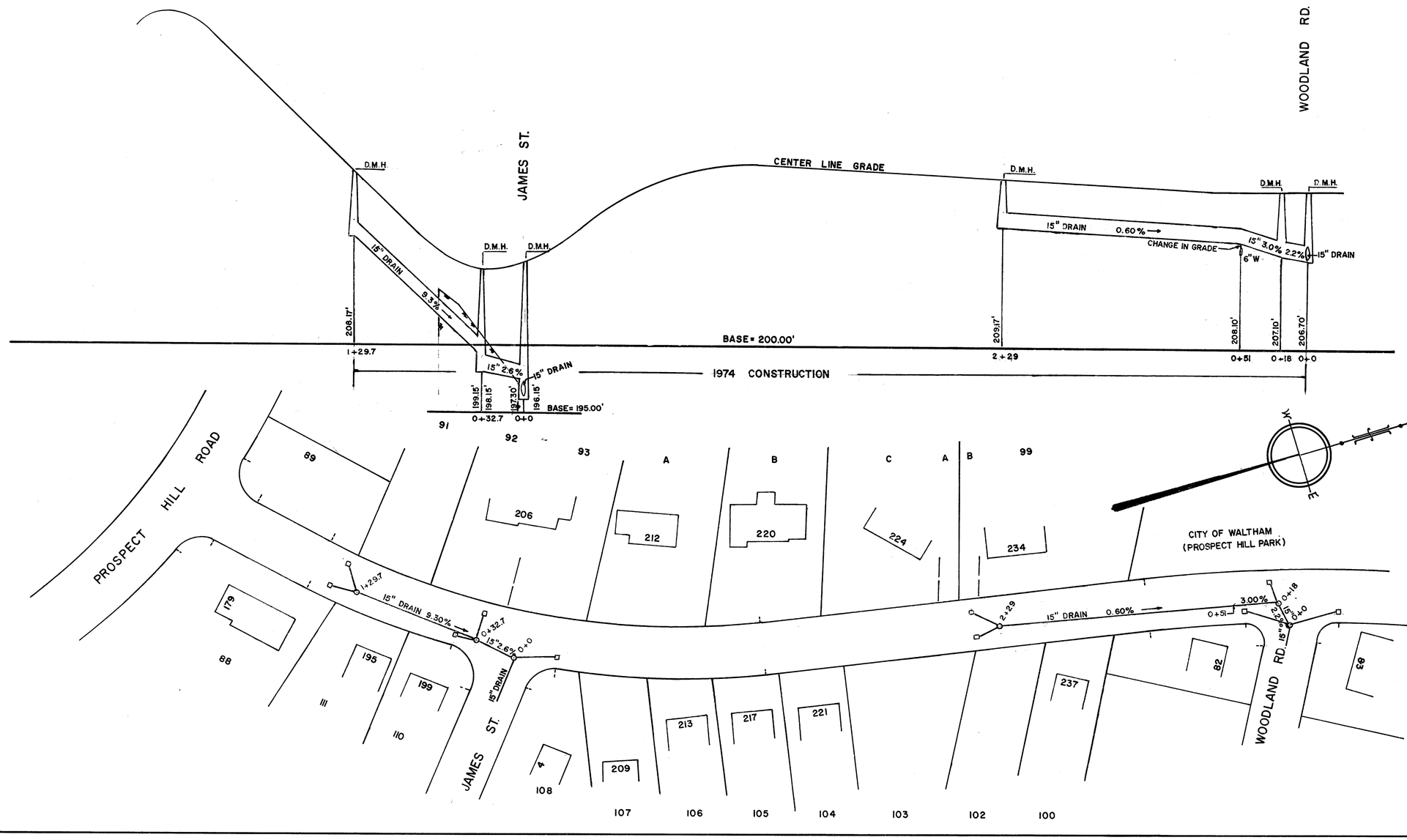




Prospect Hill Rd.
Drain / C
195 – Woodland Rd.

PROSPECT HILL ROAD DRAIN

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH



PROSPECT HILL ROAD DRAIN

Prospect Hill Rd
Water & Sewer
79 - # 123

PROSPECT HILL ROAD

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH

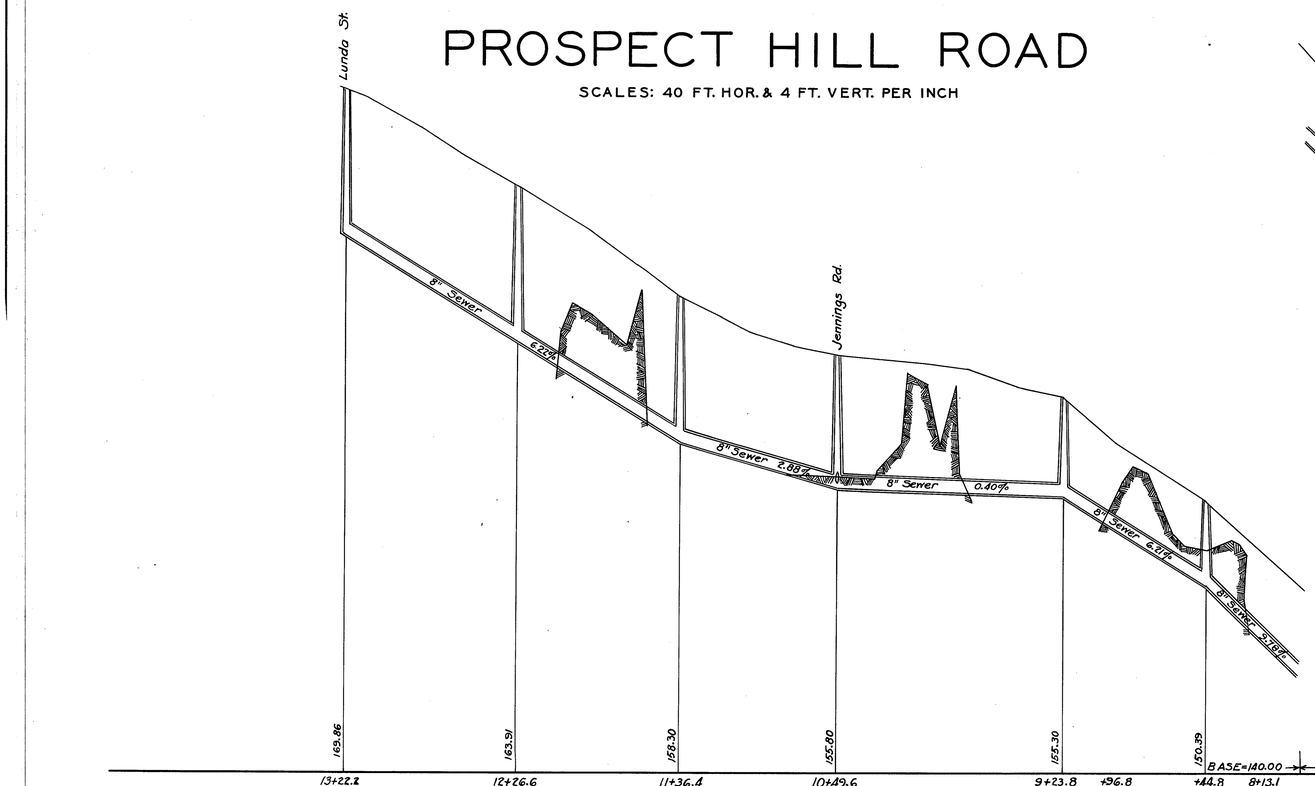
PROSPECT HILL RD. SEWER

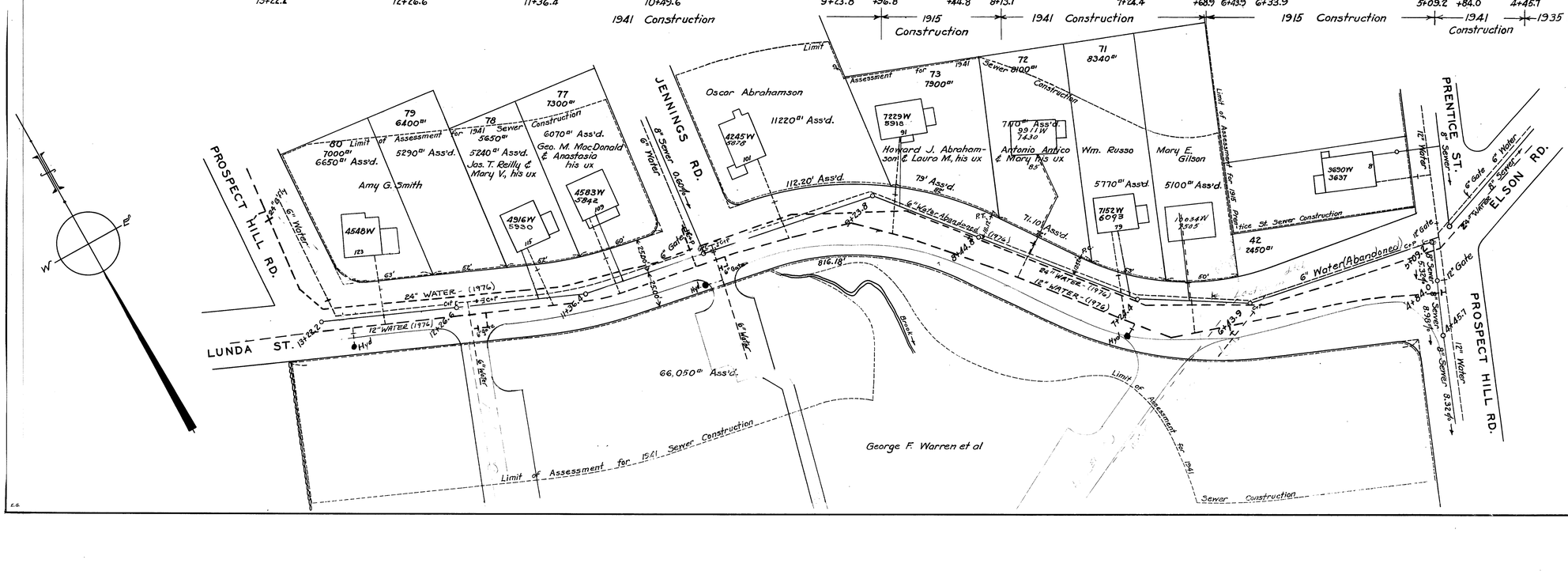
TABLE OF ASSESSMENT FOR 1941 CONSTRUCTION

CONSTRUCTION ORDER $14,273 DATE OF APPROVAL MAY 13, 1941
ASSESSMENT ORDER $14,422 DATE OF APPROVAL Nov 25/41
TOTAL COST $4400.00
AMOUNT ASSESSED $2004.36
ASSESSMENT ON FRONTAGE $0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $0.0075 PER SQUARE FOOT

OWNER	No	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
North Side:						
Amy G. Smith	80	63.00	6650	$ 47.25	$ 49.88	$ 97.13
Amy G. Smith	79	52.00	5290	39.00	39.67	78.67
Jas. T. Reilly & Mary V., his ux	78	52.00	5240	39.00	39.30	78.30
Geo. M. MacDonald & Anastasia, his ux	77	60.00	6070	45.00	45.52	90.52
Oscar Abrahamson		112.20	11220	84.15	84.15	168.30
Howard J. Abrahamson & Laura M. his ux	73	79.00	7900	59.25	59.25	118.50
Antonio Antico & Mary, his ux	72	71.10	7110	53.32	53.33	106.65
Wm. Russo	71	53.00	5770	39.75	43.28	83.03
Mary E. Gilson		50.00	5100	37.50	38.25	75.75
South Side:						
George F. Warren et al		816.18	66050	612.14	495.37	1107.51
Totals		1408.48	126400	$1056.36	$948.00	$2004.36

November 1941
Henry F. Beal, City Engineer





PROSPECT HILL RD.-B

PROSPECT HILL ROAD

SCALES: 40 FT. HOR. & 4 FT. VERT. PER INCH

PROSPECT HILL ROAD SEWER
TABLE OF ASSESSMENT FOR 1952 CONSTRUCTION

CONSTRUCTION ORDER 17253 DATE OF APPROVAL MAY 13, 1952
ASSESSMENT ORDER 17612 DATE OF APPROVAL JUNE 23, 1953
TOTAL COST $3606.64
AMOUNT ASSESSED $1114.23
ASSESSMENT ON FRONTAGE $0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	Lot No.	Ho. No.	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
West Side							
Walter A. Beckett	A	212	90.00	8650	67.50	64.88	132.38
" " "	B	220	90.00	8590	67.50	64.42	131.92
Arthur M. Jacobs	C&A	224	105.00	10313	78.75	77.35	156.10
	D						
Walter A. Beckett	99+B	234	130.00	9461	97.50	70.96	168.46
East Side							
Vincenzo D'Agostino + Francesca his ux	100		53.00	5300	39.75	39.75	79.50
" " " " "	102		53.00	5300	39.75	39.75	79.50
Vincenzo D'Agostino + Francesco D'Agostino his ux	103		102.00	8450	76.50	63.37	139.87
" " " " " "	104		50.00	5000	37.50	37.50	75.00
" " " " " "	105		50.00	5000	37.50	37.50	75.00
" " " " " "	106		51.00	5100	38.25	38.25	76.50
			774.00	71,164	580.50	533.73	1114.23

Herbert F. Howe CITY ENGINEER
June 19, 1953 DATE

TABLE OF ASSESSMENTS FOR 1969 CONSTRUCTION

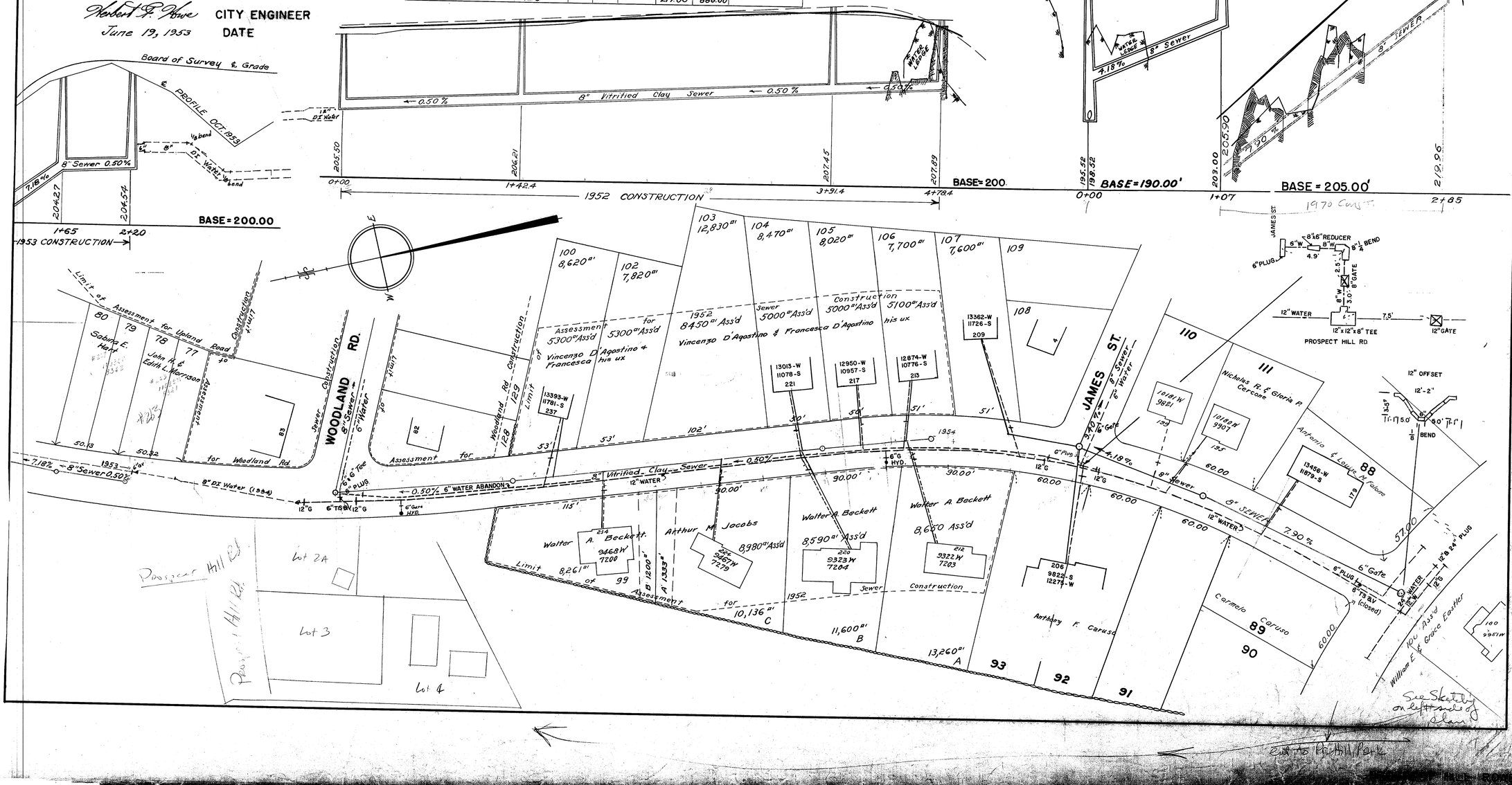
CONSTRUCTION ORDER 22530 DATE OF APPROVAL JULY 1, 1969
ASSESSMENT ORDER 22691 DATE OF APPROVAL MARCH 10, 1970
TOTAL COST $3,098.08
AMOUNT ASSESSED $868.00
ASSESSMENTS $4.00 PER LINEAR FOOT OF FRONTAGE

OWNER	LOT NO.	HOUSE NO.	FRONTAGE	FRONTAGE ASSESSED	AMOUNT	REMARKS
SOUTH SIDE						
William E. & Grace Eastler		100	367	100.00	@ 400.00	See Est. Assess.
WEST SIDE						
Carmelo Caruso	89		60	60.00	240.00	Short Side Lot Line To I.T.
EAST SIDE						
Antonio & Louise M. Falone	88		57	57.00	228.00	I.T. Short Side To Lot Line
TOTALS				217.00	@ 868.00	

TABLE OF ASSESSMENTS FOR 1963 CONSTRUCTION

CONSTRUCTION ORDER 20791 DATE OF APPROVAL APRIL 24, 1963
ASSESSMENT ORDER 21106 DATE OF APPROVAL APRIL 14, 1964
TOTAL COST $1599.26
AMOUNT ASSESSED $ 960.00
ASSESSMENT $4.00 PER LINEAR FOOT OF FRONTAGE

ABUTTER	Lot No.	House No.	FRONTAGE	FRONTAGE ASSESSED	AMOUNT	REMARKS
EAST SIDE						
Nicholas R. & Gloria P. Cerone	111	195	60.00	60.00	240.00	
WEST SIDE						
Anthony F. Caruso	91		60.00	60.00	240.00	
" " "	92		60.00	60.00	240.00	
" " "	93		60.00	60.00	240.00	
TOTALS				240.00	960.00	



Woodland Road
Water & Sewer
15 - # 78

WOODLAND ROAD SEWER
TABLE OF ASSESSMENT FOR 1949 CONSTRUCTION

CONSTRUCTION ORDER 16242 DATE OF APPROVAL OCT. 13, 1948
ASSESSMENT ORDER 16565 DATE OF APPROVAL DEC. 13, 1949
TOTAL COST $ 5567.76
AMOUNT ASSESSED $ 1092.38
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	NO.	LOT	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
South Side							
William Racine		126	54.0	3960	42.00	29.70	71.70
Vincenzo D'Agostino & Francesco, his ux		125	75.0	7500	56.25	56.25	112.50
"		124		6240		46.80	46.80
"		133	74.5	1020	55.87	7.65	63.52
"		101		3408		25.56	25.56
"		132	64.44	2640	48.33	19.80	68.13
"		131	50.50	4575	37.87	34.31	72.18
North Side							
William A. Racine		134	53.70	5370	40.27	40.27	80.54
"		135	69.38	4080	52.03	30.60	82.63
Antonio Di Giovanni & Mary		136	73.54	5405	55.16	40.54	95.70
"		137	60.03	5120	45.02	38.40	83.42
"	39	138	52.01	4774	37.51	35.80	73.31
Wilhelm A. Racine & Lucie H., his ux		139	50.02	4756	37.52	35.67	73.19
"	31	140	50.12	4637	37.59	34.78	72.37
"		141	59.30	4413	37.73	33.10	70.83
Totals			777.54	67,898	583.15	509.23	1092.38

Herbert F. Howe CITY ENGINEER
NOV. 15, 1949

WOODLAND RD.

Scales: 40 ft. Hor. & 4 ft. Vert. per inch.

WOODLAND ROAD SEWER
TABLE OF ASSESSMENT FOR 1951 CONSTRUCTION

CONSTRUCTION ORDER 17016 DATE OF APPROVAL JUNE 26, 1951
ASSESSMENT ORDER 17256 DATE OF APPROVAL MAY 13, 1952
TOTAL COST $890.69
AMOUNT ASSESSED $ 443.27
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

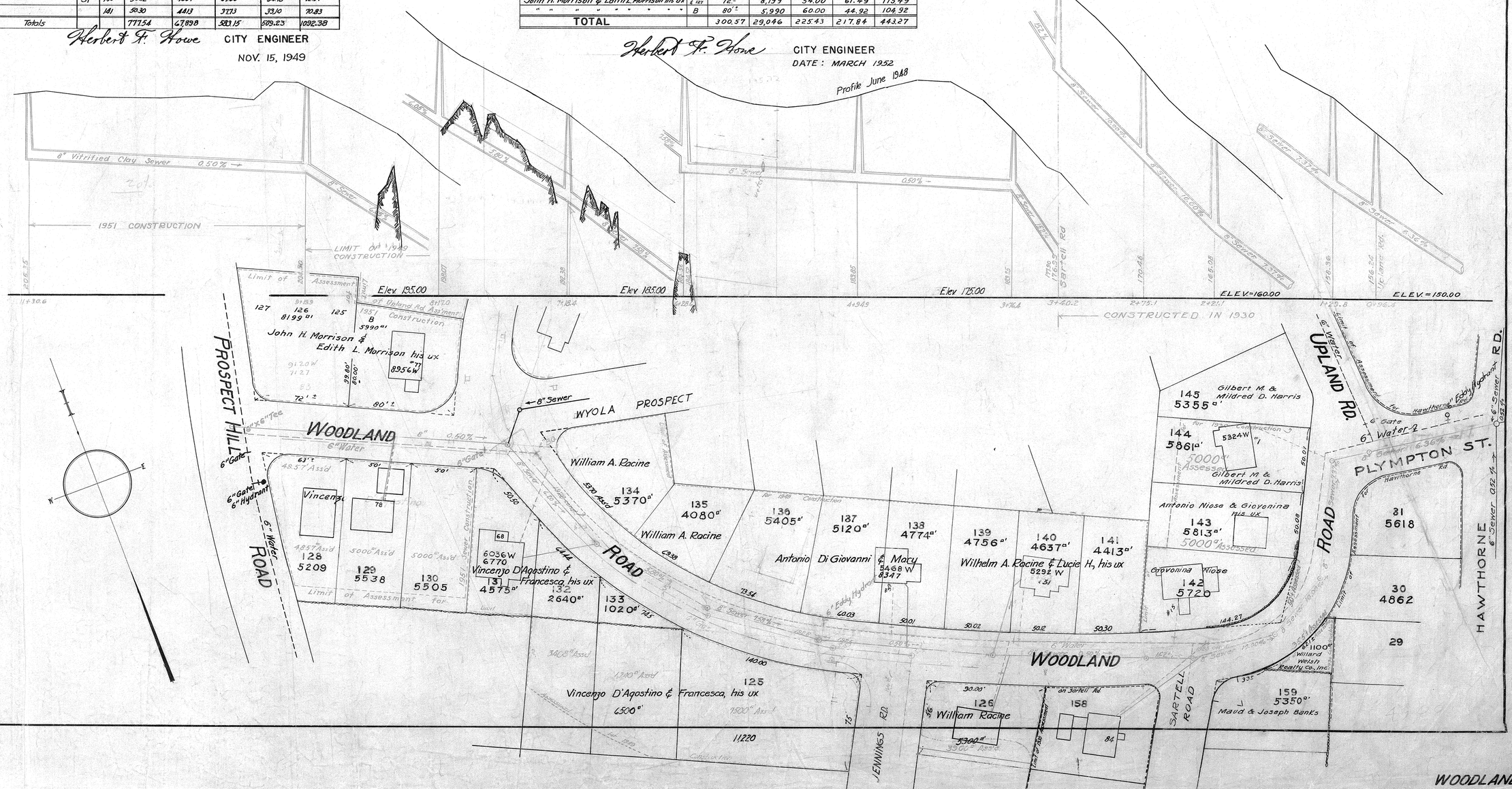
OWNER	LOT	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
SOUTH SIDE						
Vincenzo D'Agostino	130	50.00	5,000	37.50	37.50	75.00
" "	129	50.00	5,000	37.50	37.50	75.00
" "	128	48.57	4,857	36.43	36.43	72.86
NORTH SIDE						
John H. Morrison & Edith L. Morrison his ux	125 126 & 127	72.±	8,199	54.00	61.49	115.49
" " " " " " "	B	80.±	5,990	60.00	44.92	104.92
TOTAL		300.57	29,046	225.43	217.84	443.27

Herbert F. Howe CITY ENGINEER
DATE: MARCH 1952

TABLE OF ASSESSMENT FOR 1930 CONSTRUCTION

CONSTRUCTION ORDER # 11782 DATE OF APPROVAL AUG. 16, 1930
ASSESSMENT ORDER # 11945 DATE OF APPROVAL MAR. 27, 1931
TOTAL COST
AMOUNT ASSESSED $ 265.34
ASSESSMENT ON FRONTAGE AT $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA AT $ 0.0075 PER LINEAR FOOT

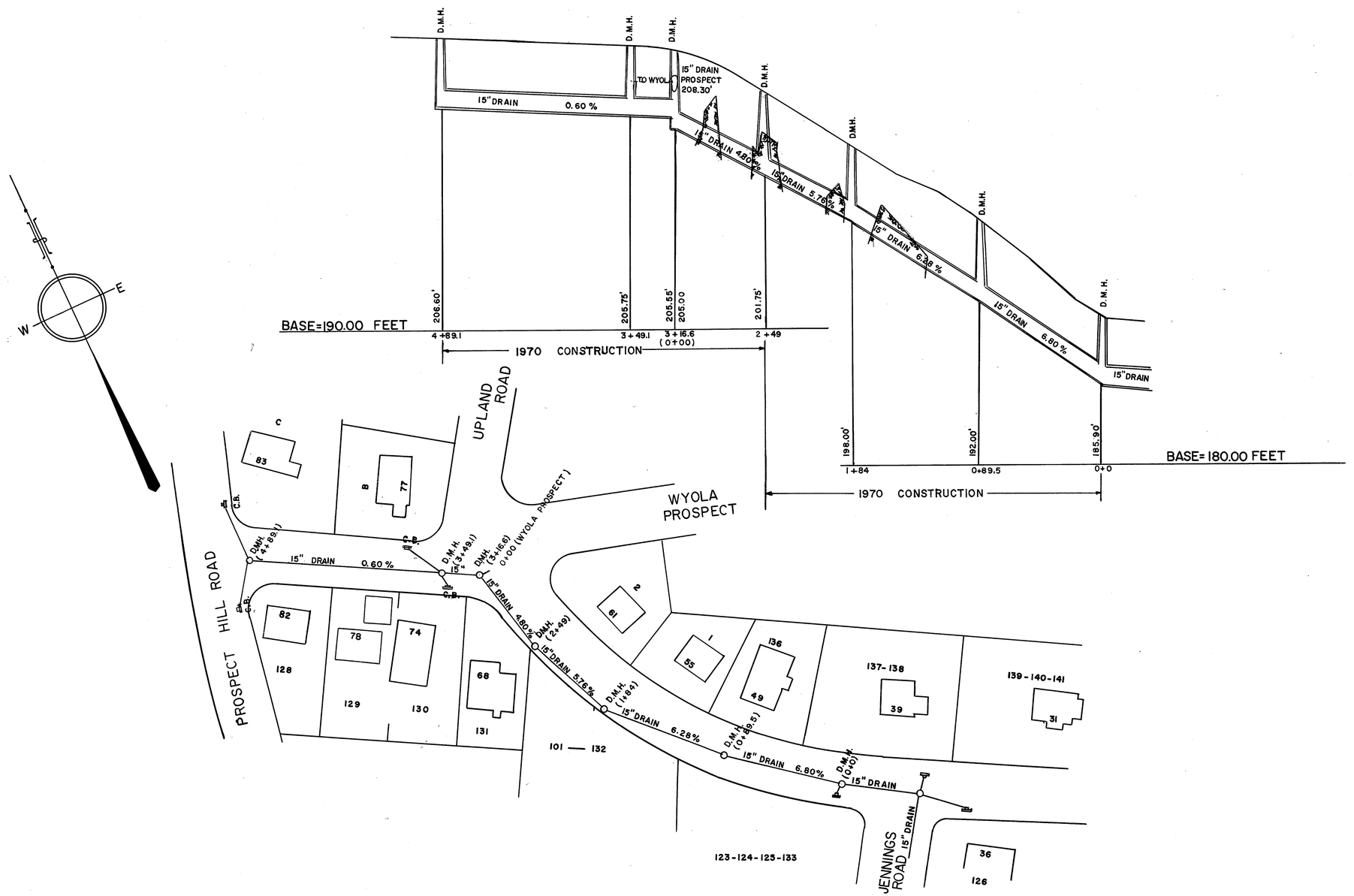
OWNER	Lot No.	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
West Side:						
Giovonina Niose	142	50.±	5720	37.50	42.90	80.40
Antonio Niose & Giovonina his ux	143	50.08	5000	37.56	37.50	75.06
Gilbert M. & Mildred D. Harris	144	50.01	5000	37.51	37.50	75.01
East Side:						
Willard Welsh Realty Co., Inc.		35.5	1100	26.62	8.25	34.87
Totals		185.59	16820	139.19	126.15	265.34



Woodland Rd. (A)
Drain
31 – # 83

WOODLAND ROAD DRAIN

SCALES: 1 INCH= 40 FEET HOR. & 4 FEET VERT.



Wyola Prospect
Water & Sewer
10 - # 31

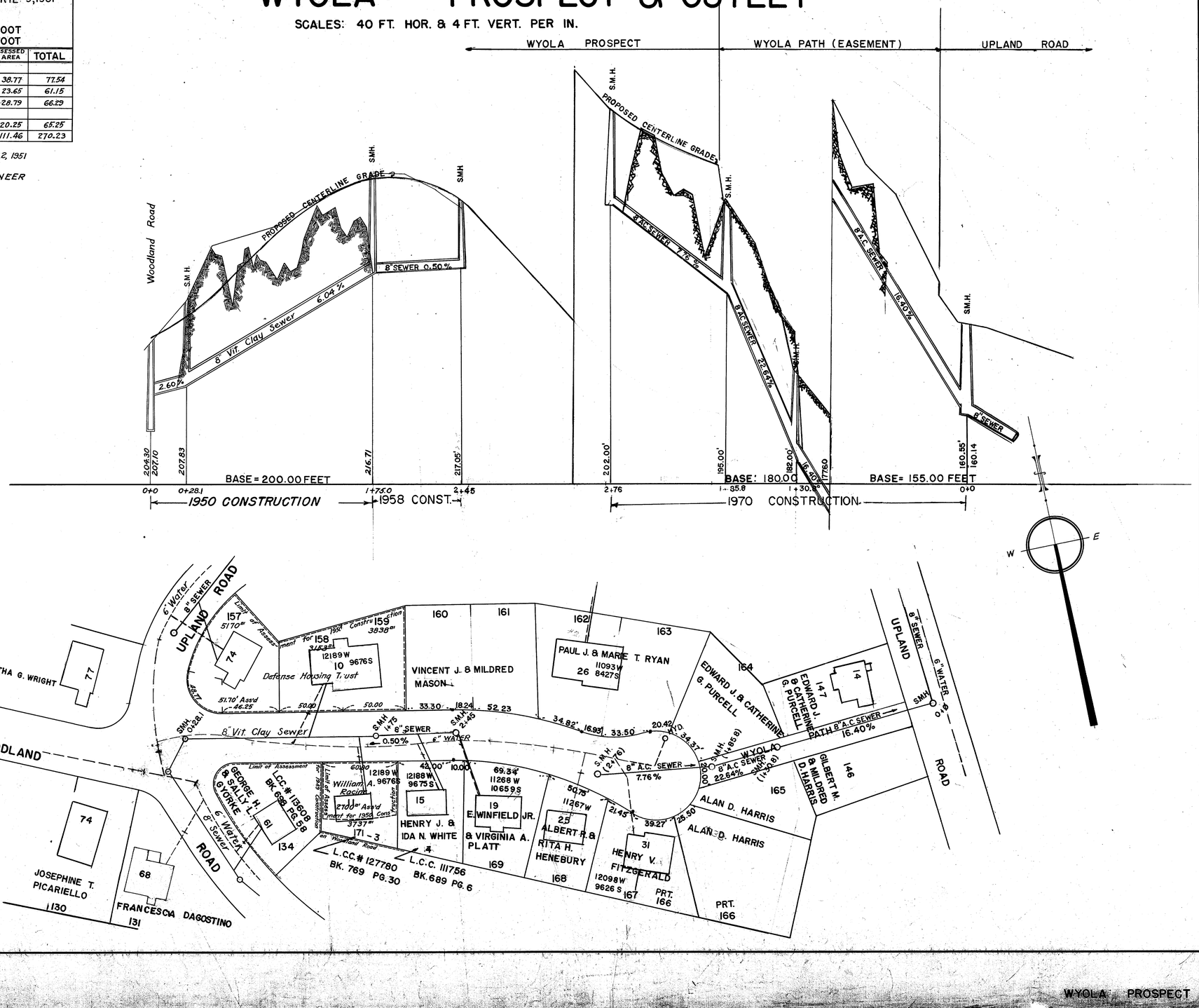
WYOLA PROSPECT SEWER
TABLE OF ASSESSMENT FOR 1950 CONSTRUCTION
CONSTRUCTION ORDER 16608 DATE OF APPROVAL FEB. 14, 1950
ASSESSMENT ORDER 16935 DATE OF APPROVAL APRIL 9, 1951
TOTAL COST $3265.01
AMOUNT ASSESSED $ 270.23
ASSESSMENT ON FRONTAGE $ 0.75 PER LINEAR FOOT
ASSESSMENT ON AREA $ 0.0075 PER SQUARE FOOT

OWNER	LOT	FRONTAGE	AREA	ASSESSED ON FRONTAGE	ASSESSED ON AREA	TOTAL
NORTH SIDE						
Dwe Housing Trust	157	51.70	5170	38.77	38.77	77.54
Dwe Housing Trust	158	50.00	3153	37.50	23.65	61.15
Dwe Housing Trust	159	50.00	3838	37.50	28.79	66.29
SOUTH SIDE						
Wm A. Racine	171	60.00	2700	45.00	20.25	65.25
TOTALS		211.70	14861	158.77	111.46	270.23

DATE April 2, 1951
Herbert F. Howe
CITY ENGINEER

WYOLA PROSPECT & OUTLET

SCALES: 40 FT. HOR. & 4 FT. VERT. PER IN.



WYOLA PROSPECT