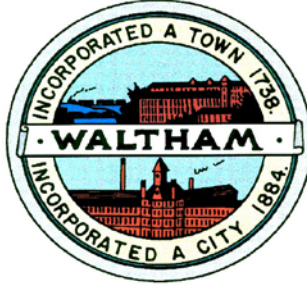


# *The City of Waltham*



**In Accordance with the Rule of M.G.L.  
Ch. 30b Par. 5**

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

**CHRISTOPHER RD. & MONTCLAIR AVE.  
WATER MAIN PROJECTS**

**The GENERAL BID is due: Friday June 29, 2018 at 10:00 am**

**PRE BID Meeting and Briefing on Site: Thursday June 21, 2018 at 10:00 am**

*Meet in the Auditorium of 119 School Street*

**LAST DAY FOR WRITTEN QUESTIONS: 12 Noon Friday June 22, 2018  
(To [Jpedulla@city.waltham.ma.us](mailto:Jpedulla@city.waltham.ma.us))**

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D	Montclair Avenue Water Main Replacement Contract Drawings

SECTION 00010

INVITATION TO BID

**Christopher Road Water Main Replacement Project**

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the **Christopher Road Water Main Replacement Project** will be received by Joseph Pedulla, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **10:00 a.m., June 29, 2018** at which time and place all bids will be publicly opened and bids read aloud. Bids submitted after this time will not be accepted. The project involves the following major items:

1. The installation of approximately 320 linear feet of 8" Class 56 CLDI water main, fittings, fire hydrant, water services and other related water system work on Christopher Road.
2. Removal, disposal and abandonment of existing water mains, water services and appurtenances.
3. Installation of temporary bypass water system.
4. Reclamation and paving including driveway aprons to Right-of-Way along a portion of Christopher Road.

**Pre-Bid Meeting: 10.00 AM Thursday June 21, 2018.** Meet in the Auditorium of 119 School Street.

**Last day for Questions: 12 Noon Friday June 22, 2018** via email only to [jpedulla@city.waltham.ma.us](mailto:jpedulla@city.waltham.ma.us)

Contract Documents may be obtained by visiting the City's web site at [www.city.waltham.ma.us/bids](http://www.city.waltham.ma.us/bids).

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

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

SECTION 00010

INVITATION TO BID

**Montclair Avenue Water Main Replacement Project**

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the Montclair **Avenue Water Main Replacement Project** will be received by Joseph Pedulla, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **10:00 a.m., June 29, 2018** at which time and place all bids will be publicly opened and bids read aloud. Bids submitted after this time will not be accepted. The project involves the following major items:

1. The installation of approximately 1,040 linear feet of 8" and 350 linear feet of 12" Class 56 CLDI water main, fittings, fire hydrant, water services and other related water system work on Montclair Avenue.
2. Removal, disposal and abandonment of existing water mains, water services and appurtenances.
3. Installation of temporary bypass water system.
4. Full width mill and overlay of roadway.

**Pre-Bid Meeting: 10.00 AM Thursday June 21, 2018.** Meet in the Auditorium of 119 School Street.

**Last day for Questions: 12 Noon Friday June 22, 2018** via email only to [jpedulla@city.waltham.ma.us](mailto:jpedulla@city.waltham.ma.us)

Contract Documents may be obtained by visiting the City's web site at [www.city.waltham.ma.us/bids](http://www.city.waltham.ma.us/bids).

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

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

END OF SECTION

SECTION 00100

INSTRUCTIONS AND INFORMATION FOR BIDDERS

PART 1      GENERAL

- 1.01      SCOPE OF WORK
- 1.02      EXAMINATION
- 1.03      QUESTIONS
- 1.04      OMISSIONS AND DISCREPANCIES
- 1.05      BIDDER'S QUALIFICATIONS
- 1.06      INFORMATION NOT GUARANTEED
- 1.07      SUBSTITUTION
- 1.08      BIDS
- 1.09      ITEMS, INDETERMINATE ITEMS, AND COMPARISON OF BIDS
- 1.10      TIME FOR COMPLETION
- 1.11      BID SECURITY
- 1.12      SUBCONTRACTORS
- 1.13      FORMS TO BE COMPLETED FOR BIDDING
- 1.14      BONDS
- 1.15      EXECUTION OF CONTRACT
- 1.16      INSURANCE CERTIFICATES
- 1.17      BID ITEM BREAKDOWN
- 1.18      LIQUIDATED DAMAGES
- 1.19      SALES AND USE TAXES
- 1.20      BID SUBMISSION
- 1.21      WITHDRAWAL OF BIDS
- 1.22      WAGE RATES
- 1.23      INFORMAL BIDS
- 1.24      RIGHT TO REJECT BIDS
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- 1.26      MANUFACTURER'S EXPERIENCE
- 1.27      ALTERNATES
- 1.28      MBE/WBE PARTICIPATION –**NOT REQUIRED IN THIS BID/CONTRACT**
- 1.29      BITUMINOUS CONCRETE PRICE ADJUSTMENT CLAUSE
- 1.30      CONTRACTOR'S CERTIFICATION

PART I      GENERAL

- 1.01      SCOPE OF WORK
  - A.      The location, general characteristics and principal details of the work are indicated on the set of accompanying drawings, titled "**Christopher Road Water Main Replacement, City of Waltham, Massachusetts.**" and "**Montclair Avenue Water main Replacement, City of Waltham, Massachusetts.**"
  - B.      The successful bidder shall furnish all materials, labor, tools, and equipment, and perform all work required for the completion of this Contract.

- C. The word "Owner" as used herein shall mean the "**City of Waltham**", Massachusetts.

#### 1.02 EXAMINATION

- A. Bidders must examine each of the Contract Documents that form the Contract, and become thoroughly familiar with the Contract Documents. The Contract Documents shall in no way relieve any bidder from any obligation in respect to his bid.

#### 1.03 QUESTIONS

- A. No oral interpretation will be made to any bidder as to the meaning of any of the Contract Documents or be effective to modify any of the provisions of the Contract Documents. All questions shall be submitted in writing to the Engineer at least seven (7) days before the established date for bid opening. The Engineer will arrange an agenda, which shall become part of the Contract, all questions received as provided above, and his decision regarding each. At least five (5) days prior to the receipt of bids, the Engineer will send a copy of these addenda to each of those who has obtained a set of the Contract Documents.

#### 1.04 OMISSIONS AND DISCREPANCIES

- A. Should a bidder find discrepancies in and/or omissions from the Contract Documents, or should he be in doubt as to their meaning, he should at once notify the Engineer, who shall send a written instruction for clarification to all prospective bidders.

#### 1.05 BIDDER'S QUALIFICATIONS

- A. It is the purpose of the Owner not to award this Contract to any bidder who does not furnish satisfactory evidence that he has the ability and experience in this class of work and that he has sufficient capital to enable him to prosecute the work successfully and to complete it in the time named. The Owner's decision or judgment on these matters shall be final, conclusive, and binding.
- B. The Owner may take such investigations, as he deems necessary to determine the ability of the bidder to perform the work.
- C. No award will be made to any bidder who cannot meet all of the following requirements:
  - (1) He shall not have defaulted on any contract within three years prior to the bid date.
  - (2) He shall maintain a permanent place of business.
  - (3) He shall have adequate personnel and equipment to perform the work expeditiously.

- (4) He shall have suitable financial status to meet obligations incident to the work.
- (5) He shall be registered with the Secretary of State to do business in Massachusetts.
- (6) He shall not have failed to perform satisfactorily on contracts of similar nature.
- (7) He shall not have failed to complete previous contracts on time.

1.06 INFORMATION NOT GUARANTEED

- A. All information given on the drawings or in the Contract Documents relating to test pits, subsurface conditions, and existing pipes and other structures is from the best sources presently available to the Owner. All such information and the drawings of existing construction are furnished only for the information and convenience of bidders.
- B. It is agreed and understood that the Owner does not warrant or guarantee that the materials, pipes, or other structures encountered during construction will be the same as those indicated by the logs of test pits or by the information given on the drawings or in the Contract Documents.
- C. The bidder must satisfy himself regarding the character, quantities, and conditions of the various materials and the work to be done.
- D. It further is agreed and understood that the bidder or the Contractor will not use any of the information made available to him or obtained in any examination made by him in any manner as a basis or ground of a claim or demand of any nature against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information offered and the actual materials or structure encountered during the construction work, except as may otherwise be provided for in the Contract Documents.

1.07 SUBSTITUTION

- A. In the various detailed sections of the specifications where any item of equipment or product is specified by two or more manufacturer's names or trade names, with the addition of such expressions as "or approved equal", it is to be understood that equal quality equipment or products of either a manufacturer named or of a manufacturer not named, which meets the detailed requirements of the specifications is intended, subject to the approval of the Engineer as to the equality thereof. It is distinctly understood: (1) that the Engineer is to use his own judgment in determining whether or not any item of equipment or product proposed is equal in quality to that specified; (2) that the decision of the Engineer on all such questions of equality shall be final.
- B. If, subsequent to the award of the Contract, for the normally rare occurrences that it becomes necessary (because of delays in delivery, strikes, discontinuance of manufacture of items specified or the equal thereof) to use a different type than the

equipment or product specified, or the approved equal thereof, the Engineer in his discretion may authorize the use of such different type equipment or product. Each such different type item (and possibly changes in other parts of the work related to the item) may be the same, more or less, in cost, than the item specified. In his request for use of such different type item, the Contractor shall submit to the Engineer a complete description of the proposed item, including dimensions, operational characteristics, changes (if any) that will be required to other related parts of work, etc. He shall also submit to the Engineer in writing full information as to costs of the item specified, the cost of the different type item being proposed, as well as costs (additional or credits) of changes (if any) to any related parts of the work. Such information shall be in such form and detail as to permit the Engineer to check, to his satisfaction, the costs involved. Upon approval of such different type item, when the cost thereof is less or greater, the Engineer will authorize, in writing, the proper credits to be allowed the Owner, or the proper additional payments to be made to the Contractor.

1.08 BIDS

- A. All Bid proposals must be presented upon the blank bid form (sections 00300, 00301, and 00302) and be accompanied by the forms in the bid documents (section 00400) to be considered complete, shall state the proposed price for the work, both in words and in figures, shall be signed by the bidder with his business address and place of residence and include the completed information in the bid documents.

1.09 ITEMS, INDETERMINATE ITEMS, AND COMPARISON OF BIDS

- A. The work to be done has been divided into items to enable each bidder to bid on the different portions of the work in accordance with his estimate of his cost and so that the actual quantity of work executed under each item may be paid for at the price bid for that particular item, even though such quantity is greater or less than the estimated quantity stated in the bid.

1.10 TIME FOR COMPLETION

- A. The Contractor will be required to complete the work under this Contract within the time stated in SECTION 00500 - AGREEMENT.

1.11 BID SECURITY

- A. Each bid must be accompanied by a bid deposit in the form of a bid bond, or a certified check, issued by a surety or a bank duly authorized to do business in the State of Massachusetts and made payable to the order of the Owner. Attorneys who sign bid bonds (or payment or performance bonds) must file with each bond a certified and effective dated copy of their power of attorney.
- B. The amount of the deposit shall be in an amount of not less than five percent (5%) of the bid.



- C. The deposit shall be enclosed in a sealed envelope containing the Proposal.
- D. Each bid deposit may be held by the Owner as security for fulfillment of the bidder's promises, set forth in his bid, that he will not withdraw his bid while it is being considered and will execute the Contract Agreement and furnish the required bonds and insurance certificates if his bid is accepted. Should the bidder fail to fulfill such promises, his bid deposit shall become the property of or be payable to the Owner as payment for damages.
- E. Unless it shall become the property of or be payable to the Owner, said deposit shall be returned to the bidder as hereinafter provided. Deposits or bid bonds will be returned to all except the three lowest bidders within fifteen (15) days (Sundays and legal holidays excluded) after the formal opening of bids and to the three (3) lowest bidders within (5) days (Sundays and legal holidays excluded) after the Owner and the accepted bidder have executed the Contract Agreement. In the event that the Contract Agreement has not been executed by both the accepted bidder and the Owner within one hundred twenty (120) consecutive calendar days after the opening of the bids, bid security will be returned promptly upon demand of any bidder who has not been notified of the acceptance of his bid.
- F. None of the three (3) lowest bids shall be deemed rejected, notwithstanding acceptance of one of the bids, until the Contract Agreement has been executed by both the Owner and the Accepted bidder.

#### 1.12 SUBCONTRACTORS

- A. Names of intended principal subcontractors must be listed in SECTION 00400 - FORM FOR SUBCONTRACTOR DESIGNATION. There shall be only one subcontractor named for each part of the work to be subcontracted. The Owner in no way implies acceptance of the intended subcontractors by acceptance of bids. Subcontractor acceptance shall be in accordance with SECTION 00700 - GENERAL CONDITIONS. The Contractor shall not be permitted to substitute subcontractors not listed in SECTION - 00400 without written approval of the Owner.

#### 1.13 FORMS TO BE COMPLETED

- A. All forms within sections 00300, 00301, 00302, and 00400 will be completed as part of the Bid proposal.
- B. A Bid proposal may be rejected at the Owner's discretion if a complete Bid proposal is not submitted.

#### 1.14 BONDS

- A. A Performance Bond and a Labor and Materials Payment Bond in the forms which are inserted with the Contract Agreement and each in the sum as herein specified and duly executed by the successful bidder as Principal and by a surety company qualified to do

business under the laws of the State of Massachusetts and satisfactory to the Owner, as Surety, will be required for the faithful performance of the Contract, including maintenance of the work, and the payment for the labor and materials.

<u>Performance Bond</u>	Full amount of the Contract
<u>Labor and Material Bond</u>	Full amount of the Contract

- B. Performance and Labor and Material Payment Bonds must be furnished simultaneously with the delivery of the executed Contract by the successful bidder.

1.15 EXECUTION OF CONTRACT

- A. The bidder to whom the Contract is awarded will be required to execute the Contract Agreement and furnish the required Bonds within Five (5) days (Sundays and legal holidays excluded) after receipt of notification that the Contract Agreement is ready for signature.

1.16 INSURANCE CERTIFICATES

- A. The Contractor will not be permitted to start any construction work under this Contract until he has submitted certificates covering all insurance called for under SECTION 00810 - SUPPLEMENTAL GENERAL CONDITIONS and has obtained approval in writing of these certificates from the Engineer. The City of Waltham and GCG Associates will be named additional insured on the certificate.

1.17 BID ITEM BREAKDOWN

- A. At least ten (10) days prior to the preparation of the first estimate for payment, the Contractor shall provide a complete breakdown of the cost of his work for each lump sum bid item. The breakdown shall be prepared in such a manner that it may be used as a basis for estimating the value of the work completed to the end of any month. The extent and basis of the breakdown shall be subject to the approval of the Engineer.

1.18 LIQUIDATED DAMAGES

- A. Should a Contractor fail to complete his work on or before the time set forth or as provided in the Contract Documents covering extension of time, the Owner may retain an amount as set forth in SECTION 00500 - AGREEMENT as liquidated damages for each calendar day in accordance with the provisions of that section.

1.19 SALES AND USE TAXES

- A. The bidder shall study all tax laws for the jurisdiction in which the work is done, particularly so-called "Sales and Use Taxes" for which he may be liable as a consumer or user of goods. The bid shall be made in accordance with such laws and shall include

such taxes in the bid amount. The bidder shall also obtain, where applicable, sales and use tax exemption.

1.20 BID SUBMISSION

- A. Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his address, and the name of the project for which the bid is submitted, and the name and number of the Contract for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as follows:

**Joseph Pedulla, CPO  
Waltham City Hall  
Purchasing Department  
610 Main Street  
Waltham, MA 02452**

**ATTN: Christopher Road & Montclair Ave  
Water Main Replacement**

- B. The Owner will receive sealed bids until the time, and at the location designated in the INVITATION TO BID. Bids received after this time will not be accepted. All interested parties are invited to attend; bids will be opened publicly and read aloud.

1.21 WITHDRAWAL OF BIDS

- A. The attention of bidders is directed to the fact that, in submitting his bid, the bidder agrees that he will not withdraw it within one hundred twenty (120) consecutive calendar days after the actual date of the opening of bids.

- B. Upon proper request and identification, bids may be withdrawn as follows:

- (1) At any time prior to the designated time for the opening of bids.
- (2) Provided the bid has not been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his bid.

- C. Unless a bid is formally withdrawn, it shall be deemed open for acceptance until the Contract Agreement has been executed by all parties thereto or until the Owner manifests that he does not intend to accept the bid. Notice of acceptance of a bid shall not constitute rejection of any other bid.

1.22 MINIMUM WAGE RATES

- A. Massachusetts Wage Rates, as determined, as determined by the Commission of the Department of Labor and Industries under provision of the Massachusetts General Laws, Chapter 149, Section 27 to 27A, as amended, apply to this project.

B. State Wage Rates are attached to these specifications.  
1.23 INFORMAL BIDS

A. The Owner may reject as informal, bids that contain erasures not properly initialed, improperly executed, or incomplete bid documents. The Owner reserves the right to waive any informalities.

1.24 RIGHT TO REJECT BIDS

A. The Owner reserves the right to reject any or all bids, to accept any bid, or to waive any informality on bids received. The Owner also reserves the right to omit any item or items that he deems advisable.

B. A conditional or qualified bid will not be accepted. The Owner reserves the right to reject unbalanced bids.

1.25 BASIS OF AWARD

A. The Contract will be awarded to the lowest responsible bidder. The Owner will require satisfactory proof that the low bidder is responsible and able to prosecute the work successfully in the time named. The Owner's decision on these matters shall be final.

1.26 MANUFACTURER'S EXPERIENCE

A. Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

1.27 ALTERNATES

A. Where alternate items of work are indicated in the Bid, bidders shall submit prices for all alternates. The Owner reserves the right to select the alternates deemed to be in the best interest of the owner.

B. The Low Bidder will be determined on the basis of the sum of the base bid and the accepted additive alternates.

1.28 MBE/WBE PARTICIPATION –**NOT REQUIRED IN THIS BID/CONTRACT**

A. The minimum percentage that must be contracted with minority-owned and/or women-owned businesses is stated in the Invitation to Bid.

B. The apparent low Bidder must submit the SDO Certified Enterprise Participation Schedule and Letters of Intent from all of the firms listed on the Schedule within five (5) working days after receipt of bids. The City of Waltham may at their discretion, grant an extension

of time to submit these documents, if deemed appropriate and in the public interest to do so. Submit the completed Participation Schedule and Letters of Intent to:

- C. The Bidder must submit prior to, and as a condition of Contract approval, signed subcontracts with all subcontractors or a purchase order or invoice from material suppliers or manufacturers listed on the Participation Schedule.

1.29 BITUMINOUS CONCRETE PRICE ADJUSTMENT CLAUSE

- A. This project includes a bituminous concrete price adjustment clause. The in-place bituminous concrete pavement cost bid for the base bid, chosen alternates, and supplementary unit price items for all bituminous paving items shall be based on the July 2017 liquid asphalt price per ton, which is 410/ TON as published on the MassDOT website. During the month of purchase/installation of the bituminous concrete pavement, any change (increase or decrease) of the liquid asphalt price per ton of 5% or greater as published on the MassDOT website for that month shall cause a price adjustment for bituminous concrete pavement at a ratio of \$0.055 per ton per \$1.00 per ton price difference of liquid asphalt (5.5% liquid asphalt per ton of asphalt pavement).
- B. If a lump sum price is bid for the bituminous concrete pavement, the quantity (tons) of bituminous concrete pavement subject to price adjustment (increase or decrease) will be determined by the following method: (area paved in square yards as specified) multiplied by (the in-place paved depth in inches as specified) multiplied by (0.056 tons per inches-square yards).
- C. Price adjustments for bituminous concrete bid shall be made in conformance with document 00811 as published by MassDot. Due to the delay in published liquid asphalt prices by MassDot, monthly pay requisitions shall include a line for bituminous concrete adjustment on the previous monthly requisition of bituminous concrete (if an adjustment is due) Backup documentation and calculations shall be provided with the pay requisition.

1.30 CONTRACTOR'S CERTIFICATION

- A. All employees who work on this construction site must have no less than 10 hours of OSHA-approved safety and health training. See Chapter 306 of the Acts of 2004.
- B. The Contractor and all subcontractors on this project will be required to provide certification of this compliance with this requirement in accordance with the provisions of these Contract Documents.
- C. The Contractor and all subcontractors on this project will be required to provide certification of this compliance with this requirement in accordance with the provisions of these Contract Documents.

END OF SECTION

SECTION 00300 BID FORM CHRISTOPHER ROAD

PART 1 GENERAL

- 1.01 SCHEDULE OF BID ITEMS
- 1.02 DEFINITIONS OF TERMS AND ABBREVIATIONS USED IN THE BID

PART 2 BID

PART 1 GENERAL

- 1.01 SCHEDULE OF BID ITEMS
  - A. The following Schedule of Bid Items shall be completed in ink or typewritten. All item prices must be entered in both words and figures and extended by the Bidder. In case there is a discrepancy between the item prices shown in words and figures, the amount shown in words shall govern.
  - B. Where the Schedule of Items consists of more than one (1) item, the total bid price for the Contract, calculated as above and entered at the end of the schedule, is not a part of the Bid, but is to be used solely for the comparison of bids to determine the apparent low bidder. The Low Bidder will be determined based on the sum of the individual bid items.
  - C. Failure to submit a formal Bid in accordance with the requirements of the INSTRUCTIONS AND INFORMATION FOR BIDDERS will be considered sufficient grounds for rejection of the entire Bid Proposal.
  - D. Bidders must fill in a price for all items in the bid
  - E. Project Award: The project will be awarded to the lowest bidder. The lowest bidder is defined as the bidder with the lowest price summing the Bid including chosen alternates and qualified by the City.

1.02

DEFINITIONS OF TERMS AND ABBREVIATIONS USED IN THE BID

A. Where any of the following abbreviations are used in the Bid, they shall have the meaning set forth opposite each. Periods may or may not be used in abbreviations.

Alt.	Alternate
CLDI	Cement Lined Ductile Iron
CMP	Corrugated Metal Pipe
C.Y.	Cubic Yard
D.I.	Ductile Iron
Dia.	Diameter
EA.	Each
F.A.	Fees Allowance
HMA	Hot Mix Asphalt
lbs.	Pounds
L.F.	Linear Feet
L.S.	Lump Sum
Min.	Minimum
MFBM	Thousand Board Feet
M.H.	Man-hour
N/A	Not Applicable
NIC	Not In Contract
PE	Polyethylene
psi	Pounds per Square inch
PVC	Polyvinylchloride
R.C.P.	Reinforced Concrete Pipe
R.O.W.	Right of Way
SDR	Standard Dimensional Ratio
S.F.	Square Foot
S.Y.	Square Yard
V.C.	Vitrified Clay
V.F.	Vertical Feet
w/	with
w/o	without

BID FORM FOR  
CITY OF WALTHAM, MASSACHUSETTS  
CHRISTOPHER ROAD WATER MAIN REPLACEMENT PROJECT

The undersigned Bidder declares that the only parties interested in this Bid as principals are as stated; that the bid is made without collusion with any other person, firm, or corporation; that no officer or agent is directly or indirectly interested in this Bid; that he has carefully examined all Contract Documents and Contract Drawings as prepared by City of Waltham Engineering Department, 119 School Street, Waltham Massachusetts and dated April 8, 2018.

The undersigned Bidder understands that the information relative to existing structures, apparent and latent conditions and natural phenomena as furnished to him on the Contract Drawings or in the Contract Documents or by the Owner or the Engineer, carries no guarantee expressed or implied as to its completeness or accuracy and he has made all due allowance therefore. The quantities of work tabulated in this Bid and indicated on the drawings or in the specifications are only approximate and are subject to increase or decrease.

The undersigned Bidder agrees 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 his failure to fulfill his agreements as hereinafter set forth and he further understands that should he so fail, the Owner shall have the right to retain as liquidated damages for the entire amount of the bid security.

In submitting this Bid the undersigned Bidder agrees:

- A. To hold this Bid open for one hundred and twenty (120) calendar days.
- B. To accept the provisions regarding disposition of security.
- C. To enter into and execute a contract, if awarded on the basis of this Bid, and to furnish guarantee bonds.
- D. To accomplish the work in accordance with the Contract Documents.
- E. To complete the work by the time stipulated in the agreement.

The undersigned further understands and agrees that he is to furnish and provide for the respective bid price all the necessary material, machinery, tools, labor, services, and other items of whatever nature, and to do and perform all the work necessary under the aforesaid conditions, to complete the above mentioned project in accordance with the plans and specifications for the project.

The undersigned Bidder further understands that the Documents of the Contract for which his Bid is being submitted establish that liquidated damages in the amount of \$500.00 per calendar day shall be applied for breach of Contract in accordance in with the provisions of AGREEMENT.

The undersigned Bidder acknowledges receipt of Addenda numbered \_\_\_\_\_



The undersigned Bidders also agree as follows:

- A. To do any extra work, not covered by the Contract, which may be ordered by the Engineer, and to accept as full compensation therefore such prices as may be agreed upon in writing by the Engineer and the Contractor in accordance with SECTION 00700 - GENERAL CONDITIONS.
- B. Within ten (10) days from the date of the "Notice of Award", to execute the Contract and to furnish the Owner a satisfactory Performance Bond and Labor and Material Payment Bond as set forth in INSTRUCTIONS AND INFORMATION FOR BIDDERS.
- C. To begin work at the site on the day designated in the "Notice to Proceed" and to prosecute said work in such a manner that the entire project shall be completed within the time specified in the AGREEMENT.

Accompanying this Bid is a certified bid bond or check, for 5% of the bid, in the amount of \$\_\_\_\_\_ (Bidder to fill in) payable to the Owner to secure said Owner against the failure of the undersigned to execute the Contract and furnished satisfactory bonds under the Conditions and within the time specified in this Bid.

BRIEF DESCRIPTION

**BASE BID**

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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1. WATER PIPE & FITTINGS

1A.	Furnish and Install 8" Dia. Class 56, Cement Lined Ductile Iron (CLDI) Water Pipe, all depths of cover, per Linear Foot  _____dollars and _____cents (\$ _____)	320 L.F.	\$ _____
1B.	Furnish and Install 6" Dia. Class 56 Cement Lined Ductile Iron (CLDI) Water Pipe, all depths of cover, per Linear Foot  _____dollars and _____cents (\$ _____)	35 L.F.	\$ _____
1C.	Furnish and Install 8" Gate Valve, With Valve Box, as specified, Each  _____dollars and _____cents (\$ _____)	3 EA.	\$ _____
1D.	Furnish and Install 6" Gate Valve, With Valve Box, as specified, Each  _____dollars and _____cents (\$ _____)	1 EA.	\$ _____
1E.	Furnish and Install New Hydrant, American Darling B-62, Waltham Colors, as specified, Each  _____dollars and _____cents (\$ _____)	1 EA.	\$ _____

Subtotal for Page \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

**BASE BID**

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
----------	--	--------------------	-------------------------------------

1. WATER PIPE & FITTINGS CONT.

1F.	Furnish and Install Ductile Iron Fittings, per Pound _____dollars and _____cents (\$ _____)	2,000 LBS.	\$ _____
1G.	Furnish and Install 1" Dia. Type K Copper Tubing for Water Services, As Specified, per Linear Foot _____dollars and _____cents (\$ _____)	200 L.F.	\$ _____
1H.	Furnish and Install 1" Dia. Corporation Cocks, As Specified, Each _____dollars and _____cents (\$ _____)	5 EA.	\$ _____
1I.	Furnish and Install 1" Dia. Curb Stops and Street Service Boxes, As Specified, Each _____dollars and _____cents (\$ _____)	5 EA.	\$ _____
1J.	Furnish and Install 4" Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and _____cents (\$ _____)	400 L.F.	\$ _____

Subtotal for Page \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

BASE BID

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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1. WATER PIPE & FITTINGS CONT.

1K.	Furnish and Install 2" Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and_____cents (\$_____)	200 L.F.	\$_____
1L.	Furnish and Install 1" Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and_____cents (\$_____)	250 LF.	\$_____
1M.	Furnish and Install Temporary Hydrant As specified, each _____dollars and_____cents (\$_____)	1 EA.	\$_____
1N.	Temporary Water Main Bypass Connection to House Services, and reconnection to permanent City water, Each _____dollars and_____cents (\$_____)	5 EA	\$_____

4. EARTHWORK

4A.	Unclassified Excavation, Disposal and Backfill, per Cubic Yard _____dollars and_____cents (\$_____)	100* C.Y.	\$_____
4B.	Rock Excavation, Disposal and Backfill, per Cubic Yard _____dollars and_____cents (\$_____)	25* C.Y.	\$_____

Subtotal for Page \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

BASE BID

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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4. EARTHWORK CONT.

4C. Gravel Borrow Fill and /or Gravel Borrow Refill of Unsuitable Material, per Cubic Yard.  
 \_\_\_\_\_ dollars  
 and \_\_\_\_\_ cents  
 (\$ \_\_\_\_\_)                      100\* C.Y.    \$ \_\_\_\_\_

4D. Fine Grading and Compacting of Roadway Subgrade areas, per Square Yard  
 \_\_\_\_\_ dollars  
 and \_\_\_\_\_ cents  
 (\$ \_\_\_\_\_)                      1,400 S.Y.    \$ \_\_\_\_\_

\*Indeterminate Quantity. These quantities are not guaranteed. Payment will be based upon actual quantities constructed.

5. PAVEMENT

5A Reclaim Existing Pavement and prepare for Paving, per square yard  
 \_\_\_\_\_ dollars  
 and \_\_\_\_\_ cents  
 (\$ \_\_\_\_\_)                      1,400 S.Y.    \$ \_\_\_\_\_

5C. Furnish and Place (Machine Method) Permanent Base Course Pavement, 3" minimum depth, per Ton  
 \_\_\_\_\_ dollars  
 and \_\_\_\_\_ cents  
 (\$ \_\_\_\_\_)                      300 TON    \$ \_\_\_\_\_

5D. Furnish and Place (Machine Method) Top and Leveling Course Pavement 1 1/2" minimum depth, per Ton  
 \_\_\_\_\_ dollars  
 and \_\_\_\_\_ cents  
 (\$ \_\_\_\_\_)                      150 TON    \$ \_\_\_\_\_

Subtotal for Page                      \$ \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

BASE BID

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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5. PAVEMENT CONT.

5E.	Furnish and Place Bituminous Concrete Pavement (Hand Method) for Test Pits and Miscellaneous Areas, per Ton _____dollars and _____cents (\$ _____)	35 TON	\$ _____
5F.	Furnish and Place Temporary Trench Pavement, 3" minimum paving depth, per Linear Foot _____dollars and _____cents (\$ _____)	1,000 L.F.	\$ _____

6. INCIDENTAL WORK

6A.	Concrete (3000 psi) for Encasement Cradles and Miscellaneous Work, per Cubic Yard _____dollars and _____cents (\$ _____)	10* C.Y.	\$ _____
6B.	Uniformed Police for Traffic Control, Per Man-hour _____ Fourty-four _____dollars and _____ No _____cents (\$ 44.00 _____)	450**M.H.	\$ 19,800
6D.	Unmarked Drain Service Repair, All Sizes up to 12" Inside Diameter As Specified, Each _____dollars and _____cents (\$ _____)	1* EA.	\$ _____

\*Indeterminate Quantity. These quantities are not guaranteed. Payment will be based upon actual quantities constructed.

Subtotal for Page \$ \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

**BASE BID**

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
<b>6. INCIDENTAL WORK CONT.</b>			
6F.	Remodel Existing Drain or Sewer Manhole or Catch Basin Structure, As Required, per Vertical Foot _____dollars and _____cents (\$ _____)	10* V.F.	\$ _____
6G.	Furnish and Install Bituminous Concrete Sidewalk, All widths, 3" min. depth, per square yard _____dollars and _____cents (\$ _____)	50 S.Y.	\$ _____
6H.	Loam & Seeding or Mulch for Landscaping Repair, per Square Yard _____dollars and _____cents (\$ _____)	500* S.Y.	\$ _____
6I.	Furnish and Install Straw Filter Tubes, "Wattles", Per Linear Foot _____dollars and _____cents (\$ _____)	450 L.F.	\$ _____

\*Indeterminate Quantity. These quantities are not guaranteed. Payment will be based upon actual quantities constructed.

\*\*NOTE: Police Detail invoices will be paid by Contractor and reimbursed by the City of Waltham up to \$19,800 for Base Bid. Contractor shall coordinate detail Assignments.

Subtotal for Page \_\_\_\_\_  
**Base Bid**

BRIEF DESCRIPTION

**BASE BID**

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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7. LUMP SUM ITEMS

7A.	Mobilization, the Lump Sum of _____ dollars and _____ cents (\$ _____)	1 L.S.	\$ _____
7B.	Miscellaneous Work and Cleanup, the Lump Sum of _____ dollars and _____ cents (\$ _____)	1 L.S.	\$ _____
7C.	Traffic Control System for Vehicle and Pedestrian Safety, the Lump Sum of _____ dollars and _____ cents (\$ _____)	1 L.S.	\$ _____

Subtotal for Page **Base Bid** \$ \_\_\_\_\_

**Total for Base Bid** \$ \_\_\_\_\_



BRIEF DESCRIPTION

ADD ALTERNATE 1

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
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~ITEMS LISTED IN ADD ALTERNATE #1 THAT ARE ALSO INCLUDED IN THE BASE BID SHALL

HAVE THE SAME UNIT BID PRICES IN BOTH THE BASE BID AND ADD ALTERNATE #1~

8. SEWER PIPE AND FITTINGS, SEWER SYSTEM APURTENANCES

5F. Furnish and Place Temporary Trench Pavement, 3" minimum paving depth, per Linear Foot

\_\_\_\_\_dollars  
and \_\_\_\_\_cents  
(\$ \_\_\_\_\_ )

250 L.F. \$ \_\_\_\_\_

6B. Uniformed Police for Traffic Control, Per Man-hour

\_\_\_\_\_Fourty-four\_\_\_\_\_dollars  
and \_\_\_\_\_zero\_\_\_\_\_cents  
(\$ \_\_\_\_\_ 44.00 \_\_\_\_\_ )

100 MH.\*\* \$ \_\_\_\_\_ 4,400.00 \_\_\_\_\_

7D. Mobilization of Additional Equipment and Materials Required for Add Alternate #1, the Lump Sum of

\_\_\_\_\_dollars  
and \_\_\_\_\_cents  
(\$ \_\_\_\_\_ )

1 L.S. \$ \_\_\_\_\_

7E. Traffic Control System for Vehicle and Pedestrian Safety Required for Add Alternate #1, the Lump Sum of

\_\_\_\_\_dollars  
and \_\_\_\_\_cents  
(\$ \_\_\_\_\_ )

1 L.S. \$ \_\_\_\_\_

\*\*NOTE: Police Detail Invoices will be paid by the Contractor and reimbursed by the City of Waltham up to \$4,400 for Add Alternate #1. Contractor shall coordinate detail Assignments.

Subtotal for Page \$ \_\_\_\_\_

**BID SUMMARY SHEET**

**BID TOTALS:**

TOTAL BASE BID \$ \_\_\_\_\_  
(Pages 00300-5 through 00300-11)

---

(Amount in Words)

TOTAL ADD ALTERNATE 1 \$ \_\_\_\_\_  
(Page 00300-12 through 00300-13)

---

(Amount in Words)

TOTAL BASE BID + ADD ALTERNATE 1 \$ \_\_\_\_\_  
(Pages 00300-5 through 00300-13)

---

(Amount in Words)

Basis of Award shall be at the Owner's sole discretion.

**FORM – (BID CERTIFICATION)**

If a Corporation:

Name of Contractor: \_\_\_\_\_

Signature of Bidder: \_\_\_\_\_  
(Name) (Title)

Business Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Incorporated under the Laws of the State of: \_\_\_\_\_

President: \_\_\_\_\_  
(Name) (Title)

Officers:

Secretary: \_\_\_\_\_  
(Name) (Title)

Treasurer: \_\_\_\_\_  
(Name) (Title)

Dated: \_\_\_\_\_

(Affix Corporation Seal Here)

If a Partnership, Individual, or Non - Incorporated Organization:

Name of Company: \_\_\_\_\_

Signature of Bidder: \_\_\_\_\_  
(Name) (Title)

Name and Address of  
Member of Company: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

END OF SECTION

## SECTION 301

### BID FORM MONTCLAIR AVENUE

To the City of Waltham, Massachusetts:

Regarding: **Montclair Ave Water Main Replacement**

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

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

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

The undersigned, as Contractor, declares as follows:

- The only parties interested in this Bid as Principals are named herein
- 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 Contractor has carefully examined the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this Bid, and has carefully read and examined the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof
- Understands that information relative to subsurface and other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered will be the same as those shown within the Contract Documents and agrees that the Contractor shall not use or be entitled to use any such information made available to him through Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner of the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefore in this BID
- The Contractor understands that the quantities of work tabulated in this Bid or indicated in the Specifications of other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer

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

**Contractors must bid on each Item.**

Refer to Section Special Provisions for Measurement and Payment for Item Descriptions.

**BASE SCOPE OF WORK BID FORM**

The Base Bid include all the work of the Contractor, being all work covered by Items 120.1 through 999, inclusive.

Montclair Avenue Water Main Replacement

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
120.1	50*	CY	UNCLASSIFIED EXCAVATION AT _____ per cubic yard		
129	5300	SY	PAVEMENT MILLING AT _____ per square yard		
141.1	100	CY	TEST PIT FOR EXPLORATION AT _____ per cubic yard		
144	350*	CY	CLASS B ROCK EXCAVATION AT _____ per cubic yard		
151	350*	CY	GRAVEL BORROW AT _____ per cubic yard		
153	50*	CY	CONTROLLED DENSITY FILL AT _____ per cubic yard		
156	50*	CY	CRUSHED STONE AT _____ per cubic yard		
182.2	100*	FT	REMOVAL OF ASBESTOS AT _____ per each		
220	22	EA	DRAINAGE STRUCTURE ADJUSTED AT _____ per each		
220.2	80	VLF	DRAINAGE STRUCTURE REBUILT AT _____ per vertical linear foot		
220.7	13	EA	SANITARY STRUCTURE ADJUSTED AT _____ per each		
221.1	12	EA	FRAME GRATE (OR COVER)MUNICIPAL STANDARD AT _____ per each		

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
238.12	50	FT	12 INCH DUCTILE IRON PIPE AT _____ per foot		
241.15	50	FT	15 INCH REINFORCED CONCRETE PIPE AT _____ per foot		
250.04	535	FT	4 INCH PVC SANITARY SEWER PIPE AT _____ per foot		
252.15	50	FY	15 INCH HDPE PIPE AT _____ per foot		
301.1	1	LS	4 INCH TEMP BYPASS WATER MAIN BASE BID WORK AT _____ per lump sum		
302.06	130	FT	6 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
302.08	1040	FT	8 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
302.12	350	FT	12 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
302.16	75	FT	16 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
309	6000	LB	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ per pound		
347.1	1020	FT	1 INCH COPPER TUBING TYPE K AT _____ per foot		
350.06	6	EA	6 INCH GATE AND GATE BOX AT _____ per each		
350.08	5	EA	8 INCH GATE AND GATE BOX AT _____ per each		
350.12	5	EA	12 INCH GATE AND GATE BOX AT _____ per each		

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
356.16	3	EA	16 INCH GATE AND GATE BOX AT _____ per each		
358	20	EA	GATE BOX ADJUSTED AT _____ per each		
363.1	64	EA	1 INCH CORPORTAION COCK AT _____ per each		
371.06	1	EA	6 INCH COUPLING AT _____ per each		
371.08	4	EA	8 INCH COUPLING AT _____ per each		
371.16	5	EA	16 INCH COUPLING AT _____ per each		
376	6	EA	HYDRANT AT _____ per each		
381.01	64	EA	SERVICE BOX MUNICIPAL STANDARD AT _____ per each		
384	64	EA	CURB STOP AT _____ per each		
460	1650	TON	HOT MIX ASPHALT AT _____ per ton		
464	265	GAL	BITUMEN FOR TACK COAT AT _____ per gallon		
472	320	TON	HOT MIX ASPHALT FOR MISCELANEOUS WORK AT _____ per ton		
472.2	1250	SY	HOT MIX ASPHALT FOR PERMANENT PATCH (5") AT _____ per square yard		
518	11	EA	CURB INLET CONCRETE AT _____ per each		
570.2	1400	FT	HOT MIX ASPHALT CURB TYPE 1, 2 OR 3 AT _____ per foot		



ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
580	150	FT	CURB REMOVED AND RESET AT _____ per foot		
697.1	14	EA	SILT SACK AT _____ per each		
701	75	SY	CEMENT CONCRETE SIDEWALK AT _____ per Square Yard		
702	150	SY	HOT MIX ASPHALT WALK SURFACE AT _____ per Square Yard		
703	400	SY	HOT MIX ASPHALT DRIVEWAY AT _____ per Square Yard		
751.2	650	SY	LOAM BORROW AND SEEDING AT _____ per square yard		
850.1	1	LS	TRAFFIC CONTROL BASE BID WORK AT _____ per lump sum		
999	2250	HR	POLICE DETAILS AT <u>FORTY FIVE DOLLARS AND NO CENTS</u> per hour	\$45.00	\$101,250.00
<b>TOTAL BASE BID:</b>					

Price written in:

Words (Dollars and Cents)

Figures

\*\*\*Indeterminate quantities. These quantities are not guaranteed. Payment will be based on actual quantities constructed.\*\*\*

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

**Add. Alternate #1 – Montclair Avenue Water Main Replacement (Piedmont Ave to Trimount Ave)**

Note: Items listed in the Add. Alternates below that are also included in the Base Bid above shall have the same unit bid prices in both the Base Bid and the Add. Alternates.

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
129	1300	SY	PAVEMENT MILLING AT _____ per square yard		
141.1	50*	CY	TEST PIT FOR EXPLORATION AT _____ per cubic yard		
182.2	50*	FT	REMOVAL OF ASBESTOS AT _____ per each		
220	4	EA	DRAINAGE STRUCTURE ADJUSTED AT _____ per each		
220.2	20	VLF	DRAINAGE STRUCTURE REBUILT AT _____ per vertical linear foot		
220.7	5	EA	SANITARY STRUCTURE ADJUSTED AT _____ per each		
222.1	4	EA	FRAME GRATE (OR COVER)MUNICIPAL STANDARD AT _____ per each		
250.04	20	FT	4 INCH PVC SANITARY SEWER PIPE AT _____ per foot		
252.15	50	FT	15 INCH HDPE PIPE AT _____ per foot		
301.2	1	LS	4 INCH TEMP BYPASS WATER MAIN ADD ALT WORK AT _____ per lump sum		
302.06	40	FT	6 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
302.08	660	FT	8 INCH DUCTILE IRON WATER PIPE AT _____ per foot		
309	2000	LB	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ per pound		

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
347.1	200	FT	1 INCH COPPER TUBING TYPE K AT _____ per foot		
350.06	2	EA	6 INCH GATE AND GATE BOX AT _____ per each		
350.08	2	EA	8 INCH GATE AND GATE BOX AT _____ per each		
358	10	EA	GATE BOX ADJUSTED AT _____ per each		
363.1	20	EA	1 INCH CORPORTAION COCK AT _____ per each		
371.06	1	EA	6 INCH COUPLING AT _____ per each		
376	2	EA	HYDRANT AT _____ per each		
381.01	20	EA	SERVICE BOX MUNICIPAL STANDARD AT _____ per each		
384	20	EA	CURB STOP AT _____ per each		
460	450	TON	HOT MIX ASPHALT AT _____ per ton		
464	65	GAL	BITUMEN FOR TACK COAT AT _____ per gallon		
472	80	TON	HOT MIX ASPHALT FOR MISCELANEOUS WORK AT _____ per ton		
472.2	450	SY	HOT MIX ASPHALT FOR PERMANENT PATCH (5") AT _____ per square yard		
514	2	EA	CURB INLET CONCRETE AT _____ per each		
570.2	100	FT	HOT MIX ASPHALT CURB TYPE 1, 2 OR 3 AT _____ per foot		

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
580	30	FT	CURB REMOVED AND RESET AT _____ per foot		
697.1	3	EA	SILT SACK AT _____ per each		
701	25	SY	CEMENT CONCRETE SIDEWALK AT _____ per Square Yard		
702	100	SY	HOT MIX ASPHALT WALK SURFACE AT _____ per Square Yard		
703	250	SY	HOT MIX ASPHALT DRIVEWAY AT _____ per Square Yard		
751.2	400	SY	LOAM BORROW AND SEEDING AT _____ per square yard		
850.2	1	LS	TRAFFIC CONTROL ADDITIVE ALTERNATIVE AT _____ per lump sum		
999	500	HR	POLICE DETAILS AT <u>FORTY FIVE DOLLARS AND NO CENTS</u> per hour	\$45.00	\$22,500.00
<b>TOTAL ADD ALTERNATE #1:</b>					

Price written in:

Words (Dollars and Cents)

Figures

\*\*\*\*Indeterminate quantities. These quantities are not guaranteed. Payment will be based on actual quantities constructed.\*\*\*\*

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

The Contractor hereby agrees that he will not withdraw this BID within one hundred twenty (120) consecutive calendar days after the actual date of the opening of Bids and that, if the Owner shall accept this BID, the Contractor will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledge, the required CONTRACT BONDS within ten (10) calendar days after notification that the AGREEMENT and other Contract Documents are Ready for signature.

If this BID is accepted by the Owner, the undersigned agrees to substantially complete work provided to be done under the Contract within **180 calendar days** (water main) and final completion within **365 calendar days** (final paving), as stipulated in the AGREEMENT.

This Proposal must bear the written signature of the Contractor or that of his duly authorized agent. If the Contractor is a corporation or a partnership, the Bid must be signed by a duly authorized 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 Contractor)	(Signature and title of authorized representative)
	Date: _____
_____	_____
(Telephone Number)	(Business Address)
_____	_____
(Fax Number)	(City and State)

END OF SECTION 00300



**MONTCLAIR AVENUE WATER MAIN REPLACEMENT BID TOTALS:**

TOTAL BASE BID \$ \_\_\_\_\_  
(Pages 00301-3 through 00301-6)

\_\_\_\_\_  
(Amount in Words)

TOTAL ADD ALTERNATE 1 \$ \_\_\_\_\_  
(Page 00301-7 through 00301-9)

\_\_\_\_\_  
(Amount in Words)

TOTAL BASE BID + ADD ALTERNATE 1 \$ \_\_\_\_\_  
(Pages 00301-3 through 00301-9)

\_\_\_\_\_  
(Amount in Words)

Basis of Award shall be at the Owner's sole discretion.

**BID SUMMARY**

CHRISTOPHER ROAD BASE BID \$ \_\_\_\_\_

CHRISTOPHER ROAD ADD ALT. #1 \$ \_\_\_\_\_

MONTCLAIR AVENUE BASE BID \$ \_\_\_\_\_

MONTCLAIR AVENUE ADD ALT. #1 \$ \_\_\_\_\_

**GRAND TOTAL** \$ \_\_\_\_\_

PERCENT DISCOUNT RATE IF ALL \_\_\_\_\_ % (In Figures)  
BASE BIDS AND ADD ALTERNATES  
ARE AWARDED TOGETHER \_\_\_\_\_ % (In Words)

If accepted, the Percent Discount shall be applied to all  
line item Unit Prices in each Bid and Add Alternates

**DISCOUNTED TOTAL** \$ \_\_\_\_\_  
(In Figures)

\$ \_\_\_\_\_  
(In Words)

Basis of Award shall be at the Owner's sole discretion.



# BID DOCUMENTS

## **FORMS TO BE COMPLETED AND SUBMITTED WITH BID PROPOSAL**

- Form 1: Certificate of Non-Collusion – (Fair Bid Certification)
- Form 2: Certificate of Tax Compliance – (Reap Certification)
- Form 3: Bid Bond
- Form 4: Form of Statement of Bidder Qualifications
- Form 5: References
- Form 6: Form of Subcontractor Designation
- Form 7: Debarment Statement
- Form 8: Certificate of Non-Discrimination and Equal Opportunity

**Form 1:**

**CERTIFICATE OF NON-COLLUSION - (FAIR BID CERTIFICATION)**

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 natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals

---

Authorized Signature

Date

---

Typed name

Title

---

Name of Business

**Form 2:**

**CERTIFICATE OF TAX COMPLIANCE – (REAP CERTIFICATION)**

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A (b), I, \_\_\_\_\_

\_\_\_\_\_ (Name of individual) authorized signatory

for \_\_\_\_\_ (Name of Contractor) do hereby certify

under the pains and penalties of perjury that said contractor has complied with all laws of the

Commonwealth of Massachusetts, and the City of Waltham and is current with all local, state, and

federal taxes and assessments, including child support payments.

Contractor: \_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_  
Signature of authorized representative

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

**Form 3:**

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned \_\_\_\_\_  
\_\_\_\_\_ as Principal,  
and \_\_\_\_\_  
as Surety are hereby held and firmly bound unto \_\_\_\_\_  
as Owner in the penal sum of \_\_\_\_\_  
for the payment of which, well and truly to be made, we hereby jointly and severally bind  
ourselves, successors, and assigns.

Signed, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

The Condition of the above obligation is such that whereas the Principal has submitted to  
\_\_\_\_\_ a certain BID

attached hereto and hereby made a part hereof to enter into a contract in writing for the  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID.

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety: for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

\_\_\_\_\_(L.S.)  
Principal

\_\_\_\_\_  
Surety

By: \_\_\_\_\_

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**Form 4:**

**FORM OF STATEMENT OF BIDDERS QUALIFICATIONS**

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires.

1. Name of Bidder: \_\_\_\_\_

2. Permanent main office address, including ZIP Code:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. When organized: \_\_\_\_\_

4. How many years have you been engaged in the contracting business under your present firm of trade name? \_\_\_\_\_

5. Contracts on hand: (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. General character of work performed by your company. \_\_\_\_\_

\_\_\_\_\_

7. Have you ever failed to complete any work awarded to you? If so, where and why?

\_\_\_\_\_  
\_\_\_\_\_

8. Have you ever defaulted on a contract? \_\_\_\_\_

9. List the more important projects recently completed by your company, stating the approximate cost for each and the month and year completed.

\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

10. List your major equipment available for this contract.

\_\_\_\_\_  
\_\_\_\_\_

11. List your experience in construction work similar to this project.

\_\_\_\_\_  
\_\_\_\_\_

12. List the background and experience of the principal members of your organization, including the officers.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Credit available: \$\_\_\_\_\_

14. Bank Reference: \_\_\_\_\_

15. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the City of Waltham? \_\_\_\_\_

16. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the City of Waltham, MA, in verification of this Statement of the Bidder's Qualifications.

Dated: \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
(Name of Bidder)

By\_\_\_\_\_

Title\_\_\_\_\_

State of: \_\_\_\_\_ )  
  )ss.

County of: \_\_\_\_\_)

\_\_\_\_\_, being duly sworn, deposes and says that he is

\_\_\_\_\_ of \_\_\_\_\_  
(Name of Organization)

and that the answers to the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_ 20\_\_.

\_\_\_\_\_  
(Notary Public)

My Commission expires \_\_\_\_\_



**Form 5:**

REFERENCES

The bidder is requested to state below what work of a similar character to that included in the proposed contract he has done and to give reference that will enable the Owner to judge his experience, skill, and business standing.

(1) Project: \_\_\_\_\_

Amount: \_\_\_\_\_ Year: \_\_\_\_\_

Owner: \_\_\_\_\_

Engineer: \_\_\_\_\_

Person to Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_ Tel. No. \_\_\_\_\_

(2) Project: \_\_\_\_\_

Amount: \_\_\_\_\_ Year: \_\_\_\_\_

Owner: \_\_\_\_\_

Engineer: \_\_\_\_\_

Person to Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_ Tel. No. \_\_\_\_\_

(3) Project: \_\_\_\_\_

Amount: \_\_\_\_\_ Year: \_\_\_\_\_

Owner: \_\_\_\_\_

Engineer: \_\_\_\_\_

Person to Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_ Tel. No. \_\_\_\_\_

(4) Bank Reference: \_\_\_\_\_ Tel. No. \_\_\_\_\_



**Form 7:**

**DEBARMENT STATEMENT  
(MUST BE SIGNED BY ALL CONTRACTORS)**

(To be used for any public construction project)

Any person or corporation that fails to date, sign with original signature, and submit the following statement shall not be awarded this contract.

**Debarment (Chapter 550, Acts of 1991)**

The undersigned certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provisions of Section 29F of Chapter 29 of the General Laws, or any other applicable debarment provisions of any other Chapter of the General Laws, or any Rule or Regulation promulgated there under; and further is not listed on the HUD Debarred Contractors or Subcontractors list.

Date: \_\_\_\_\_

\_\_\_\_\_  
Authorized Official's Signature

\_\_\_\_\_  
Typed or Printed Name of Person Signing Title

\_\_\_\_\_  
Company or Corporation

**Form 8:**

**CERTIFICATE OF NON-DISCRIMINATION AND EQUAL OPPORTUNITY**

***Certification of Bidder Regarding Equal Employment Opportunity***

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY (EEO)	
Instructions	
<p>This certification is required pursuant to Executive Order 11246 (30 CFR 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed sub contractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or sub contract subject to the equal opportunity clause, and if so, whether it has filed all compliance reports due under applicable instructions.</p> <p>Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven calendar days after bid opening. No contract shall be awarded unless such report is submitted.</p>	
Certification by Bidder	
Name and Address of Bidder (include zip code)	
1. Bidder has participated in a previous contract or sub-contract subject to the Equal Opportunity Clause. Yes _____ No _____	
2. Compliance Reports were required to be filed in connection with such contract or sub contract. Yes _____ No _____	
3. Bidder has filed all compliance reports due under applicable instructions, including Monthly Employment Utilization Report (257). Yes _____ No _____ None Required _____	
4. Have you ever been or are you being considered for sanction due to a violation of Executive Order 11246, as amended? Yes _____ No _____	
Name and Title of Signer (please type)	
Signature	Date

# AGREEMENT AND ADDITIONAL CONTRACT DOCUMENTS

## Document List

- Agreement
- Notice to Award and Notice to Proceed & Preconstruction Conference
- Notice of Award
- Notice to Proceed
- Exhibit A: Form of Performance Bond
- Exhibit B: Form of Payment Bond
- Exhibit C: Certificate of Insurance
- Exhibit D: Prevailing Wages to be Paid by the Contractor
- Exhibit E: Certification of a Drug-Free Workplace
- Exhibit F: Registration of a Foreign Corporation
- Exhibit G: Corporate Votes
- Exhibit H: Certificate by Corporation to Sign Documents

1.

AGREEMENT

This AGREEMENT made as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year 20\_\_ by and between \_\_\_\_\_ hereinafter called the Contractor, and the **City of Waltham, Massachusetts**, hereinafter called the OWNER. OWNER and CONTRACTOR in consideration of the mutual covenants hereinafter set forth, agree as follows.

ARTICLE 1. WORK

1.1 The Contractor shall furnish all the materials and perform all of the work shown on the Contract Drawings, entitled "**Christopher Road and Montclair Ave. Water Main Replacement, City of Waltham, Massachusetts**" and as described in the specifications, as prepared by City of Waltham Engineering Department, and shall do everything required by the Contract Documents.

ARTICLE 2. ENGINEER

2.1 The project has been designed by City of Waltham Engineering Department who will act as ENGINEER in connection with completion of the work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME

3.1 The work to be performed under this Contract shall be commenced on the date designated in the Notice to Proceed. All items of work shall be substantially completed within 120 calendar days (water and or sewer work). Final completion shall be within 365 calendar days (roadway reclamation and final paving). Liquidated damages for breach of Contract, as set forth in the GENERAL CONDITIONS, are established at \$500.00 per calendar day.

3.2 CONTRACTOR agrees that the work shall be prosecuted regularly, diligently, and uninterruptedly and at such rate of progress as will insure full completion thereof within the Contract Time stated above. It is expressly understood and agreed, by and between CONTRACTOR and OWNER, that the Contract Time is reasonable for the completion of the work, taking into consideration the average climatic range and usual conditions prevailing in this locality.

ARTICLE 4. CONTRACT SUM

4.1 OWNER will pay CONTRACTOR for performance of the work in accordance with the Contract Documents in current funds at the lump sum and unit prices agreed upon in the CONTRACTOR'S Bid Form attached to this Agreement.

4.2 The OWNER shall pay the CONTRACTOR in current funds the performance of the Work, subject to additions and deductions by Change Order(s) the Contract Sum of \$\_\_\_\_\_, including chosen alternates.

ARTICLE 5. APPLICATIONS FOR PAYMENT

5.1 CONTRACTOR shall submit Application for Payment in accordance with Article 14 of the General Conditions of the Contract. Applications for Payment will be processed by ENGINEER as provided in the General Conditions of the Contract.

## ARTICLE 6. PROGRESS AND FINAL PAYMENTS

6.1 OWNER will make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Application for Payment as recommended by ENGINEER, monthly during construction as provided below. All progress payments will be on the basis of the progress of the work measured by the schedule of values provided for in paragraph 14.1 of the General Conditions of the Contract.

6.2 OWNER will make progress and final payments as provided in Article 14 of the General Conditions of the Contract and in accordance with the application Massachusetts General Law.

## ARTICLE 7. LIQUIDATED DAMAGES

7.1 OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the work is not completed within the Contract Time specified in Article 3 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by OWNER if the work is not completed on time. Accordingly, instead of requiring any such proof OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) \$500.00 per day for each calendar day of delay until the work is completed.

7.2 Provided, that CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is for reasons included in paragraph 12.2 of the General Conditions.

7.3 Provided, further, that CONTRACTOR shall furnish OWNER the required notification of such delays in accordance with paragraph 12.1 of the General Conditions.

## ARTICLE 8. ASSURANCE

8.1 CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, work, locality, and with all local conditions and Federal, State, and Local Laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the work.

8.2 CONTRACTOR has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the work which were relied upon by the ENGINEER in the preparation of the drawings and specification and which have been identified in Article 4 of the Supplemental Conditions.

8.3 CONTRACTOR has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in the above paragraph as he deems necessary for the performance of the work at the Contract Price within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required by him for such purposes.

8.4 CONTRACTOR has correlated the results of all such observations, examinations, investigation, tests, reports and data with the terms and conditions of the Contract Documents.

8.5 CONTRACTOR has given ENGINEER written notice of any conflict, error or discrepancy that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

8.6 CONTRACTOR agrees that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

#### ARTICLE 9. CONTRACT DOCUMENTS

The following, together with this Agreement form the Contract and all are as fully a part of the Contract as if attached to this Agreement or repeated herein: the Advertisement, Bidding Documents, Contract Forms, Conditions of the Contract, the Drawings as enumerated in the List of Contract Drawings; Addenda; Change Orders authorized by the Owner, and Modifications issued after execution of the Contract. Terms used in this Agreement which are defined in the Conditions of the Contract, shall have the meanings designated in those Conditions.

9.1 The Contract Documents which comprise the Contract between OWNER and CONTRACTOR are attached hereto and made a part hereof and consist of the following:

- 9.1.1 Invitation to Bid.
- 9.1.2 Instructions to Bidders.
- 9.1.3 Bid Form and Bid Documents included in Sections 00300, 00301, 00302 and 00400
- 9.1.4 This Agreement and Contract Documents included in Section 00500
- 9.1.5 Construction Performance Bond, Construction Payment Bond, and other required Bonds.
- 9.1.6 Certificate of Insurance
- 9.1.7 Contract Conditions, Provisions and Additional Forms
- 9.1.8 Specifications (as listed in Table of Contents).
- 9.1.9 Drawings, numbered 1 through 9, inclusive and dated April 8, 2018, prepared by City of Waltham Engineering Department for Christopher Rd and Montclair Ave.
- 9.1.10 Addenda number \_\_\_\_\_ to \_\_\_\_\_, inclusive.
- 9.1.11 Any modifications, including Change Orders, duly delivered after execution of Agreement.
- 9.1.12 General and Supplemental Conditions, Additional Articles and permits

#### ARTICLE 10. MISCELLANEOUS

10.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions of the Contract shall have the meanings assigned in the General Conditions of the Contract.

10.2 Neither OWNER nor CONTRACTOR shall, without the prior written consent of the other, assign or sublet in whole or in part his interest under any of the Contract Documents; and, specifically but without limitation, CONTRACTOR shall not assign any monies due or to become due without the prior written consent of OWNER. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.



10.3 OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

10.4 The Contract Documents constitute the entire agreement between OWNER and CONTRACTOR and may only be altered, amended or repealed by a modification.

#### ARTICLE 11. INDEMNIFICATION

11.1 The Contractor shall indemnify and save harmless the City, the City's agents and employees, from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against them by reason of any act or omission of the said Contractor, his agents or employees, in the execution of the work or in guarding the same.

JURISDICTION: This Contract shall be interpreted by the laws of the Commonwealth of Massachusetts and any suit brought pursuant to this Contract shall be commenced only in the Trial Court for Middlesex County, Massachusetts.

DISPUTE RESOLUTION: All disputes arising under this Agreement shall be resolved through Arbitration subject to the following:

- a. In the event the CONTRACTOR intends to bring a claim under this Agreement, the CONTRACTOR shall notify the CITY in writing of its intent to Arbitrate. The CITY may, within 30 days from receipt of such notice, give notice to the Contractor that it rejects arbitration. In the event the CITY rejects arbitration, and the CONTRACTOR intends to pursue its claim, the CONTRACTOR shall bring suit in the Trial Court for Middlesex County, Massachusetts.
- b. In the event the CITY intends to bring a claim under this Agreement, the CITY may elect to either arbitrate the claim or bring its claim directly in the Trial Court for Middlesex County, Massachusetts.
- c. Unless otherwise agreed in writing by the parties, arbitration shall be governed by the rules of the American Arbitration Association."

#### ARTICLE 11 ALTERNATES

The following Alternates have been accepted and their costs are included in the Contract Sum stated in Article 4 of this Agreement:

Alternate No(s):

#### ARTICLE 12 REAP CERTIFICATION

Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A, the undersigned certifies under the penalties of perjury that to the best of his/her 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.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in sextuple. Four copies each have been delivered to OWNER, and one copy each to CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement shall become effective on \_\_\_\_\_, \_\_\_\_\_

OWNER

CONTRACTOR

City of Waltham

\_\_\_\_\_

BY

BY

\_\_\_\_\_

\_\_\_\_\_

(CORPORATE SEAL)

(CORPORATE SEAL)

City of Waltham

\_\_\_\_\_

OWNER

CONTRACTOR

Attest

Attest

\_\_\_\_\_

\_\_\_\_\_

Address for giving notices  
City of Waltham

Address for giving notices

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

As required by Chapter 693 of the Acts of 1964 (M.G.L. Chapter 44, Section 31c,) this is to certify that the **City of Waltham, Massachusetts** has an appropriation, which is adequate to cover the cost of this Contract

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Title

Approved as to form only:

\_\_\_\_\_  
Counsel

\_\_\_\_\_  
Date

Note: If CONTRACTOR is a corporation, an affidavit giving the principal the right to sign the Agreement must accompany the executed Agreement.

## **2. Notice to Award and Notice to Proceed & Preconstruction Conference**

A written Notice to Proceed shall be issued to the Contractor after receipt of the following: acceptance of the Notice of Award, the payment and performance bonds, proof of required insurances, and the completed contract documents. These items must be completed within five (5) days of the receipt of a Notice of Award from the Owner. No work shall be performed by the Contractor until he has received the Notice to Proceed.

Prior to the start of construction, the Contractor, all subcontractors, the project manager, and the owner shall attend a preconstruction conference. The conference will serve to acquaint the participants with the general plan of contract administration and requirements under which the construction operation is to proceed.

The Resident Inspector or the Clerk of the Works will furnish the date, time, and place of the preconstruction conference to the Contractor.

**NOTICE OF AWARD**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT DESCRIPTION: Christopher Road and Montclair Ave, Water Main Project,  
City of Waltham, Massachusetts\_\_\_\_\_

The Owner has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated \_\_\_\_\_ and Information for Bidders. You are hereby notified that your BID has been accepted for items in the amount of: \_\_\_\_\_ which includes the total of base bid, Alternates # \_\_\_\_\_.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and Certificate of Insurance and all other forms included in the contract documents within five (5) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within five (5) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated: \_\_\_\_\_

OWNER City of Waltham\_\_\_\_\_

BY \_\_\_\_\_

TITLE \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

**Receipt of the above NOTICE OF AWARD is hereby acknowledged**

BY \_\_\_\_\_

Dated: \_\_\_\_\_

BY \_\_\_\_\_

TITLE \_\_\_\_\_

**NOTICE TO PROCEED**

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE: \_\_\_\_\_

PROJECT: Christopher Road and Montclair Ave Water Main Project,  
City of Waltham, Massachusetts

You are hereby notified to commence WORK in accordance with the Agreement dated \_\_\_\_\_  
on or before \_\_\_\_\_ and you are to complete the work within \_\_\_\_\_ consecutive  
calendar days thereafter. The date of completion of all WORK is therefore \_\_\_\_\_.

OWNER: City of Waltham

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

**Receipt of the above NOTICE TO PROCEED is hereby acknowledged**

BY \_\_\_\_\_

Dated: \_\_\_\_\_

BY \_\_\_\_\_

TITLE \_\_\_\_\_

**EXHIBITS ATTACHED TO THIS AGREEMENT:**

- Exhibit A: Form of Performance Bond
- Exhibit B: Form of Payment Bond
- Exhibit C: Certificate of Insurance
- Exhibit D: Prevailing Wages to be paid by Contractor
- Exhibit E: Certification of a Drug-Free Workplace
- Exhibit F: Registration of a Foreign Corporation
- Exhibit G: Corporate Votes
- Exhibit H: Certificate by Corporation to Sign Documents

**Exhibit A:**

**PERFORMANCE BOND**

**COMMONWEALTH OF MASSACHUSETTS**

**KNOW ALL PERSONS BY THESE PRESENTS:**

That we, TYPE NAME OF CONTRACTOR HERE as **Principal**,

And TYPE NAME OF SURETY HERE as **Surety**, are held and firmly bound unto

The TYPE CITY OR CITY NAME HERE, as **Obligee**, in the sum of

TYPE CONTRACT AMOUNT IN WORDS HERE dollars \$  
**NNN.NNN.NNN.00**

to be paid to the Obligee, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the said **Principal** has made a contract with the **Obligee**, bearing the date of TYPE MONTH DAY, 200Y

for the construction of Type Project Description Here in Type City or City Name Here, Massachusetts  
Project Title

**NOW**, the condition of this obligation is such that if the **Principal** and all Subcontractors under said contract shall well and truly keep and perform all the undertakings, covenants, agreement, terms and conditions of said contract on its part to be kept and performed during the original term of said contract and any extensions thereof that may be granted by the Obligee, with or without notice to the **Surety**, and during the life and any guarantee required under the contract, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations changes or additions to said contract that may hereafter be made, notice to the **Surety** of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

**IN THE EVENT**, that the contract is abandoned by the **Principal**, or in the event that the Obligee, under the provisions of Article 19 of the General Conditions of said contract terminates the employment of the **Principal** or the authority of the **Principal** to continue the work, said **Surety** hereby further agrees that said **Surety** shall, if requested in writing by the Obligee, take such action as is necessary to complete said contract.

**IN WITNESS WHEREOF**, the **Principal** and **Surety** have hereunto set their hands and seals this:

NNth Day of Type Month of 200Y

<b>PRINCIPAL</b>	<b>TYPE CONTRACTORS'S NAME</b>	<b>SURETY</b>	<b>TYPE SURETY NAME HERE</b>
	_____		_____
<b>By:</b>	_____	<b>By:</b>	_____
	<b>Seal</b>		<b>Attorney-in Fact</b>
<b>Attest:</b>	_____	<b>Attest</b>	_____

The rate for this bond is **NNN%** for the first \$ **NNN,NNN,NNN** and **NNN %** for the next \$**NNN,NNN,NNN.00**

The total premium for this bond is \$ **NNN,NNN,NNN.00**

**Exhibit B:**

**PAYMENT BOND  
COMMONWEALTH OF MASSACHUSETTS**

**KNOW ALL PERSONS BY THESE PRESENTS:**

That we, TYPE CONTRACTOR’S NAME HERE as **Principal**,  
And TYPE SURETY NAME HERE as **Surety**, are held and firmly bound  
unto

The TYPE NAME OF CITY OR CITY HERE, as **Obligee**, in the sum of

TYPE CONTRACT AMOUNT IN WORDS HERE dollars \$

**NNN NNN NNN**

to be paid to the Obligee, for which payments, well and truly to be made, we bind ourselves, our  
respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these  
presents.

**WHEREAS**, the said **Principal** has made a contract with the **Obligee**, bearing the date of TYPE MONTH DAY,  
200Y

for the construction of TYPE PROJECT DESCRIPTION Here in TYPE CITY OR CITY HERE, Massachusetts

Project Title

**NOW** the conditions of this obligation are such that if the **Principal** and all subcontractors under said  
contract shall pay for all labor performed or furnished and for all materials used or employed in said  
contract and in any and all duly authorized modifications, alterations, extensions of time, changes or  
additions to said contract that may hereafter be made, notice to the **Surety** of such modifications,  
alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any  
other purposes or items set out in, and to be subject to, provisions of M.G.L. c.30 §39A, and M.G.L.  
c.149 §29, as amended, then this obligation shall become null and void; otherwise it shall remain in full  
force and virtue.

**IN WITNESS WHEREOF**, the **Principal** and **Surety** have hereunto set their hands and seals this:

NN th Day of Type Month here 20YY

**PRINCIPAL** Type Contractor’s Name Here

**SURETY** Type Surety Name Here

**By:** \_\_\_\_\_

**By:** \_\_\_\_\_

Seal

**Attorney-in Fact**

**Attest:** \_\_\_\_\_

**Attes**  
**t** \_\_\_\_\_

The rate for this bond is NNN% for the first \$NNN,NNN,NNN.00 and NNN% for the next \$NNN,NNN,NNN.00

The total premium for this bond is \$NNN,NNN,NNN.00



**Exhibit C:**

**CERTIFICATE OF INSURANCE**

To: \_\_\_\_\_

NOTE: THIS CERTIFICATE MUST BE FILLED OUT BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE COMPANY ONLY.

This is to certify that (INSURED) \_\_\_\_\_

(ADDRESS) \_\_\_\_\_

by this certificate, insured by the Insurance Company listed below with respect to the types of insurance required between the City of Waltham, Massachusetts, and the above named insured for work in

(LOCATION) \_\_\_\_\_

The City of Waltham, Massachusetts and GCG Associates, Inc will be named additional insured on the Certificate of Insurance.

---

<u>NAME &amp; ADDRESS OF INSURANCE CO.</u>	<u>POLICY NO.</u>	<u>TYPE OF POLICY</u>	<u>LIMITS OF LIABILITY</u>	<u>INCLUSIVE DATES</u>
_____	_____	WORKER'S COMPENSATION	_____	_____
_____	_____	PUBLIC LIABILITY	_____	_____
_____	_____	PROPERTY DAMAGE LIABILITY	_____	_____
_____	_____	PROTECTIVE PUBLIC LIABILITY	_____	_____
_____	_____	PROTECTIVE PROPERTY DAMAGE LIABILITY	_____	_____
_____	_____	VEHICLE LIABILITY AND PROPERTY DAMAGE	_____	_____

---

Before the above stated expiration date the Company will not cancel or reduce the Insurance afforded under the above numbered policies prior to 30 days after notice of such cancellation has been mailed to the **City of Waltham Purchasing Department**

List Name, Address, and Title of person or persons in Massachusetts authorized to accept, service, or notice on behalf of above insurance company (ies).

---

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Date

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Authorized Signature of Insurance

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Company

**Exhibit D:**

**PREVAILING WAGES TO BE PAID BY CONTRACTOR**

The contractor hereby certifies that he/she will comply with the provisions of sections twenty-six to twenty-seven G, inclusive, of Chapter 149 of the Massachusetts General Laws, relating to veterans' and citizens' preference and payment of prevailing wages shall NOT apply to the manufacture of modular buildings procured pursuant to section 44E of said Chapter 149, but shall apply to all work ordinarily and customarily performed on modular buildings at building sites, including, but not limited to, construction of foundations, attachment to external utilities, and installation and assembly of modular units, including any assembly performed at any site in the Commonwealth other than the place of manufacture, and pay the State Wage Rates included in this contract. The contractor and all of their subcontractors are responsible for the prevailing wage rates.

**For a copy of the prevailing wages go to [www.city.waltham.ma.us/bids](http://www.city.waltham.ma.us/bids)**

Contractor: \_\_\_\_\_

By: \_\_\_\_\_

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Signature of authorized representative	Title	Date
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**Exhibit E:**

*Certification of Drug-Free Workplace*

The CONTRACTOR certifies that it will or will continue to provide a drug-free workplace by:

1. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
2. Establishing an ongoing drug-free awareness program to inform employees about-
  - (a) The dangers of drug abuse in the workplace;
  - (b) The contractor's policy of maintaining a drug-free workplace;
  - (c) Any available drug counseling, rehabilitation and employee assistance programs and;
  - (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
3. Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph 1;
4. Notifying the employee in the statement required by paragraph 1 that, as a condition of employment under the grant, the employee will-
  - (a) Abide by the terms of the statement and;
  - (b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
5. Notifying the City in writing, within ten calendar days after receiving notice under sub-paragraph 4(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the City has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;
6. Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph 4(b), with respect to any employee who is convicted-
  - (a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended or;
  - (b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State or local health, law enforcement or other appropriate agency;

7. Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs 1, 2, 3, 4, 5 and 6.

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001

Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Date \_\_\_\_\_

**Exhibit F:**

**REGISTRATION OF FOREIGN CORPORATION**

The Contractor hereby certifies that it meets the registration requirements for foreign corporations, under M.G.L. c. 30, §39L, specifically Northern Ireland or other prohibited nations as detailed by M.G.L., as amended.

Contractor: \_\_\_\_\_

By: \_\_\_\_\_

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Signature of authorized representative                      Title                      Date

**Exhibit G:**

**CORPORATE VOTES**

I, \_\_\_\_\_ hereby certify that I am the duly qualified and acting Secretary of \_\_\_\_\_ and further certify that a meeting of the Directors of Said company, duly called and held on \_\_\_\_\_ 20 \_\_, at which all members were present and voting, the following vote was unanimously passed:

VOTED: To authorize and empower \_\_\_\_\_

Of this company, be and he hereby is authorized to execute contracts and bonds in the name and behalf of said company, and affix its corporate seal thereto; and such execution of any contract or obligation in this company's name on its behalf by such officer under seal of this company shall be valid and binding upon this company.

I further certify that the above vote is still in effect and has not changed or modified in any respect.

A true copy

ATTEST: \_\_\_\_\_

Place of Business: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

I hereby certify that I am the clerk of \_\_\_\_\_ and that \_\_\_\_\_ is the newly elected Vice President of said company, and that the above vote has not been amended or rescinded and remains in full force and as of this date Clerk of \_\_\_\_\_ (Corporate Seal)

**Exhibit H:**

**CERTIFICATE BY CORPORATION TO SIGN CONTRACT**

At a duly authorized meeting of the Board of Directors of the \_\_\_\_\_

\_\_\_\_\_ held on \_\_\_\_\_  
(Name of Corporation) (Date)

At which all the Directors were present or waived notice, it was voted that,

\_\_\_\_\_ (Name) \_\_\_\_\_ (Officer)

of this company, be and he hereby is authorized to execute contracts and bonds in the name and behalf of said company, and affix its Corporate Seal thereto, and such execution of any contract or obligation in this company's name on its behalf by such \_\_\_\_\_

(Officer)

under seal of the company, shall be valid and binding upon this company,

A TRUE COPY,

ATTEST: \_\_\_\_\_  
(Clerk)

PLACE OF BUSINESS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE OF THIS CONTRACT: \_\_\_\_\_

I hereby certify that I am the Clerk of the \_\_\_\_\_

that \_\_\_\_\_ is the duly elected  
\_\_\_\_\_ of said company, and the above vote has not been  
amended or rescinded and remains in full force and effect as of the date of this Contract.

\_\_\_\_\_ (Clerk) \_\_\_\_\_ (Corporate Seal)

END OF SECTION



# 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 consider 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, expeditors, 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 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 AMENDING CONTRACT DOCUMENTS: CHANGES IN WORK
- 12.0 CLAIMS
- 13.0 COST OF WORK:ALLOWANCES: UNIT PRICE WORK
- 14.0 TEST AND INSPECTIONS
- 15.0 PAYMENTS TO CONTRACTOR
- 16.0 SUSPENSION OF WORK AND TERMINATION
- 17.0 FINAL RESOLUTION 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 of 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 its 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.

### 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, 87<sup>th</sup> 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 installation, 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.

## 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 administering 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 Contract shall be deemed to be also inserted in herein.

- 1.0. COMMONWEALTH OF MASSACHUSETTS AND FEDERAL PROVISIONS
- 1.1. The Owner and Contractor agree that the following Commonwealth of Massachusetts and Federal Provisions apply to the Work to be performed under this Contract and that these provisions of this Contract and that these provisions supersede any conflicting provisions of this Contract.
- 1.2. Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program.
- 1.3. Massachusetts General Laws
  - 1.3.1. Chapter 30, Section 39F
  - 1.3.2. Chapter 30, Section 39G
  - 1.3.3. Chapter 30, Section 39M
  - 1.3.4. Chapter 30, Section 39N
  - 1.3.5. Chapter 30, Section 39O
  - 1.3.6. Chapter 30, Section 39P
  - 1.3.7. Chapter 30, Section 39R
  - 1.3.8. Acts of 1983 Chapter 353
- 1.4. All documents in section 00500 – Agreement and additional Contract Documents

END OF SECTION

SECTION 01000  
GENERAL REQUIREMENTS

PART 1 GENERAL

- 1.01 GENERAL
- 1.02 TRAFFIC CONTROL
- 1.03 INTERFERENCE WITH/AND PROTECTION OF STREETS
- 1.04 MAINTAINING SEWAGE FLOWS
- 1.05 HANDLING AND DISTRIBUTION
- 1.06 INSPECTION OF WORK AWAY FROM THE SITE
- 1.07 LINES, GRADES, AND MEASUREMENTS
- 1.08 DIMENSIONS OF EXISTING STRUCTURES
- 1.09 PIPE LOCATIONS
- 1.10 PRECAUTIONS DURING ADVERSE WEATHER
- 1.11 CUTTING AND PATCHING
- 1.12 PROTECTION AGAINST ELECTROLYSIS

PART 1 GENERAL

- 1.01 GENERAL
  - A. The Contractor shall conform to all general requirements as herein specified.
- 1.02 TRAFFIC CONTROL
  - A. For control of moderate traffic, the Contractor shall provide an adequate number of flagmen employed at his own expense.
  - B. Whenever and wherever, in the opinion of the Engineer, traffic is sufficiently congested or public safety is endangered, the Contractor, as required, shall furnish uniformed special officers to direct traffic and keep traffic off the highway area affected by his construction operations. Such officers shall be in addition to the watchmen required under other provisions of the Contract.
- 1.03 INTERFERENCE WITH/AND PROTECTION OF STREETS
  - A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Engineer.
  - B. Streets, roads, private ways, and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.
  - C. The Contractor shall, 24 hours in advance of closing any street, notify the police and fire departments in writing, with a copy to the Engineer. He shall cooperate with the police

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

1.04 MAINTAINING STORMWATER AND SANITARY SEWER FLOWS

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

1.05 HANDLING AND DISTRIBUTION

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

1.06 INSPECTION OF WORK AWAY FROM THE SITE

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

1.07 LINES, GRADES, AND MEASUREMENTS

- A. Reference marks establishing the controlling grades are available from the Engineer. These reference marks shall be replaced at the Contractor's expense if damaged or destroyed by construction operations.
- B. The Contractor shall be responsible for detailed layout, stakeout and grade control required, and shall employ a registered land surveyor or registered professional engineer for this purpose. The Owner will provide engineering inspection.
- C. Construction staking shall consist of construction layout and reference staking necessary for the proper control and satisfactory completion of all structures, grading, paving, drainage and all other appurtenances required for the completion of the Contract and acceptance of the work.

- D. The Owner will furnish the Contractor such control points, bench marks and other data as may be necessary for the construction staking and layout by qualified engineering or land surveying personnel. It shall be the responsibility of the Contractor to verify all such data prior to construction.
- E. Upon request of the Engineer, the Contractor shall furnish copies of all data used in setting and referencing all stakes and other layout markings used by the Contractor. The Contractor shall be responsible for the placement and for the accurate re-establishment of all baselines shown on the Plans, and for the replacement of existing survey points found on the Project and/or noted on the Plans. All brass survey pins in lead plugs and "PK" nails which are to be set or reset and are not to be set in stone bounds installed under this Contract, as noted on the Contract Drawings, are to be set or reset at no additional cost to the Authority. "PK" nails are to be galvanized, 1 ¼ inch minimum, with the letters "PK" on the head, separated by an indentation which marks the actual survey point, and shall be subject to the approval of the Engineer. All stakes, references and batterboards, including original, additional or replacements which may be required for the construction operations, shall be furnished, set and properly referenced by the Contractor. He shall be solely and completely responsible for the accuracy of the line and grade of all features of the work. Any errors or apparent discrepancies found in previous surveys, plans or in these Contract Documents shall be called to the Engineer's attention by the Contractor for correction or interpretation prior to proceeding with the work.
- F. All staking shall be performed by qualified engineering or land surveying personnel, acceptable to the Engineer. These personnel shall perform the staking under the direct supervision of a registered land surveyor or registered professional engineer. All stakes used for control staking shall be of a quality meeting the approval of the Engineer.
- G. When requested by the Engineer, the Contractor shall provide safe and convenient access to control points, batterboards and references. The Owner may make a check of the control of the work, as established by the Contractor, at any time as the work progresses. The Contractor will be informed of the results of these checks, but the Owner by so doing in no way relieves the Contractor of his responsibility for the accuracy of the layout work. The Contractor shall, at his expense, correct or replace, as required, any deficient layout and Construction work which is a result of inaccuracies in his taking operation or of his failure to report inaccuracies. If the Owner is required to make further studies, redesign, or both, all expenses incurred by the Owner due to such inaccuracies will be deducted from any monies due the Contractor.
- H. The Contractor shall furnish all necessary personnel, engineering equipment and supplies, materials, and transportation incidental to the accurate and satisfactory completion of this work. There will be no direct payment for construction staking, or layout, but the cost thereof shall be considered as included in the bid unit prices or the Bid.
- I. The Contractor shall verify dimensions and utility locations shown on the Contract Drawing and if any inconsistencies or discrepancies should be noted on the Contract Drawings, or between the Contract Drawings and actual field conditions, or between

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

#### 1.08 DIMENSIONS OF EXISTING STRUCTURES

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

#### 1.09 PIPE LOCATIONS

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

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

#### 1.10 PRECAUTIONS DURING ADVERSE WEATHER

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

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

#### 1.11 CUTTING AND PATCHING

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

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

- B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.
- C. The contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.
- D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.
- E. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

#### 1.12 PROTECTION AGAINST ELECTROLYSIS

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

END OF SECTION





SECTION 01010  
SUMMARY OF WORK

1. GENERAL SCOPE OF WORK

A. The Work under the Contract consists of:

1. Replacement of an existing 6" water main with approximately 320 linear feet of 8" cement lined ductile iron (CLDI) Class 56 water pipe and appurtenances, including replacement water services to the resident property line and replacement of valves and hydrants.
2. Installation of a temporary water system, temporarily paved at street crossings. Installation of temporary water services with buried or direct connection to existing water user services.
3. Removal, disposal and abandonment of existing water mains, water services and appurtenances.
4. Reclamation and paving including driveway aprons to Right-of-Way along a portion of Christopher Road.

B. In addition, the Work under the Contract includes:

1. Work outside the Project Site as called for in the Contract Documents and as required for the performance of the Work.
2. The restoration of any items damaged or destroyed by encroaching upon areas outside the Project Site.
3. Providing and restoring, where appropriate, all temporary facilities.
4. All Work either shown on the Drawings or included in the specifications unless specifically indicated as not to be done.

2. TIME OF COMPLETION

- A. In accordance with Article 9 of the General Conditions, the Work shall start as stated in the Notice to Proceed and all items related to the pipe installation and paving shall be completed within 180 calendar days.

END OF SECTION



SECTION 01025

MEASUREMENTS AND PAYMENT

PART 1      GENERAL

- 1.01      GENERAL
- 1.02      PAYMENT OF WORK

PART 2      CONTROL OF WORK

- 2.01      PIPE COVER
- 2.02      DESIGN CHANGES
- 2.03      NORMAL LIMITS
- 2.04      NORMAL TRENCH LIMITS
- 2.05      NORMAL TRENCH DEPTH
- 2.06      NORMAL TRENCH WIDTHS
- 2.07      NORMAL STRUCTURE LIMITS
- 2.08      NORMAL PARKING LOT/ROAD LIMITS
- 2.09      NORMAL SIDEWALK/DRIVEWAY LIMITS

PART 3      MEASUREMENT AND PAYMENT ITEMS

- 1      WATER PIPE AND APPURTENANCES
- 2      EARTHWORK
- 3      PAVEMENT
- 4      INCIDENTAL WORK
- 5      LUMP SUM ITEMS

PART 1      GENERAL

- 1.01      GENERAL

- A.      The following section describes the measurement of and payment for the work to be completed under the respective items listed in the BID.

- 1.02      PAYMENT OF WORK

- A.      Payment shall be for the price set forth in the BID and is deemed full compensation for all materials, labor, tools, equipment and incidentals necessary to perform the work.

PART 2      CONTROL OF WORK

- 2.01      PIPE COVER

- A.      Pipe "cover" shall be defined as the vertical distance between the ground surface and the top of pipe.

2.02 DESIGN CHANGES

- A. If changes are made in the design based on the Contract Drawings and Specifications as issued, and should such changes increase or decrease the amount of work to be done under the various Lump Sum Items on which the bid is based, adjustment will be made therefore as stipulated under the General Conditions of the Contract.

2.03 NORMAL LIMITS FOR EARTHWORK

- A. The following limits establish the normal limits for all pay items except where additional work beyond these limits is indicated on the Contract Drawings. Except as specifically directed by the Engineer or indicated on the drawings, all work beyond these limits is the responsibility of the Contractor, and will not be considered a payment item.
- B. Payment for excavation above or below normal grade shall only be made if such excavation is ordered in writing by the Engineer. Excavation done at the discretion of the Contractor will not be considered for payment.

2.04 NORMAL TRENCH LIMITS

- A. Normal limits of excavation for pipe installation shall be as indicated in the tables for trench width and trench depth. Excavation above normal limits for pipe shall be defined as that excavation above the elevation corresponding to the bottom of the specified depth, and outside of the specified payment width. Excavation below normal limits shall be defined as all excavation below the elevation corresponding to the bottom of the specified depth. For excavations below the specified depth, the cost for the increased limits of excavation and backfilling shall be in addition to the cost of normal excavation and backfill limits and no deductions shall be made for the normal situation.

2.05 NORMAL TRENCH DEPTH

- A. Pipe trench depth shall be defined from the ground elevation as determined by the Engineer prior to excavation. Depth of rock excavation shall be from the top of the rock formation encountered to the depth below the invert as noted below. A minimum clear space of 6-inch shall be provided between the rock and any part of the pipe. Trench depth in open cut and sheeted areas shall be from the original ground elevation to the depth below the pipe invert as noted in the table below, which defines the normal limits of trench excavation.

B.	<u>Pipe Size</u>	<u>Depth Below Invert</u>
	W.S. up to 4-in	1.2 ft.
	6-in to 16-in	1.2 ft.
	18-in to 21-in	1.3 ft.
	24-in to 30-in	1.4 ft.
	36-in and 42-in	1.5 ft.
	48-in and 54-in	1.6 ft.
	66-in and 54-in	1.8 ft.

2.06 NORMAL TRENCH WIDTHS

A. Pipe trench widths referred to herein are the distances separating the vertical planes between which the pipe is to be laid. In computing the amount of rock excavation in trenches, granular fill, concrete backfill, replacement of utility crossings or replacement of unsuitable excavated material ordered by the Engineer for payment under the respective Items of the Bid Form, the maximum limits of trench width shall be as follows:

a. For pipe up to 15 inches in diameter, allowable trench width at a plane 12 inches above pipe shall be no more than 36 inches. For pipe greater than 15 inches, the allowable width shall be equal to the pipe outside diameter plus 24 inches.

b. The trench payment widths up to 10 feet deep, extending from a plane 12 inches above the pipe to the grade surface shall be:

<u>Size</u>	<u>Width</u>
1. Service Pipe up to 4 inches	36 inches
2. 6 inches through 15 inches	48 inches
3. 18 inches through 21 inches	60 inches
4. 24 inches through 21 inches	66 inches
5. 27 inches through 30 inches	72 inches
6. 36 inches through 30 inches	84 inches

c. Additional width for deeper trench shall be limited to an increase of 1 foot for depths 10 feet to 15 feet and 2 feet for depths 15 feet to 20 feet.

IN ROCK

<u>Pipe Size</u>	<u>0-12 ft. Invert Depth</u>	<u>Over 12 ft. Invert Depth</u>
0-24-in	5.0 ft.	7.0 ft.
Over 24-in	Nominal Dia. +3.0 ft.	Nominal Dia. +5.0 ft.

2.07 NORMAL STRUCTURE LIMITS

A. Normal limits of excavation for structures shall be defined as that area 12 inches below the base of the structure and within a vertical line offset 2 feet from footings or 4 feet from base slabs. Excavation above normal limits for structures shall be defined as that excavation above the elevation corresponding to 12 inches below the base, and outside of the aforementioned vertical offsets of the structure for which the excavation is being done. Excavation below normal limits shall be defined as that excavation below the elevation corresponding to 12 inches below the base of the structure for which the excavation is being done.

## 2.08 NORMAL ROADWAY EXCAVATION LIMIT

- A. Normal limit for roadway excavation shall be defined as 16" below existing roadway pavement grade from edge of pavement to edge of pavement as shown on the typical cross-sections on the Contract Drawings.

## 2.09 NORMAL SIDEWALK/DRIVEWAY LIMITS

- A. Normal limits for construction of the sidewalk/driveway shall be as defined as the bottom of the 8" gravel base and sides on the typical cross sections on the Contract Drawings.

## PART 3 MEASUREMENT AND PAYMENT ITEMS

### 1. WATER PIPE AND APPURTENANCES

#### ITEM 1A & 1B: WATER MAINS

- A. Measurement for payment under Items 1A and 1B shall be the length of the pipeline, sized 8" and 6" diameter measured in place and recorded by the Resident Engineer. Payment shall be by the linear foot basis, with no measured deductions made for fittings and valves.
- B. Measurement of pipe used for cross connections and/or hydrant branches shall be made from the centerline of tees or tapping sleeves and valves and from the centerline of tee to centerline of hydrant. Payment shall be based on the linear foot basis with no deductions made for fittings and valves.
- C. Prices bid under this Item for water pipe shall be full compensation for all labor, equipment, tools and materials necessary to complete the work as specified, which shall include all fittings, joint restraining gaskets, reducers, tees, bends, couplings, etc. and appurtenances (not paid for under other items), "mega lug" or equal restraints, temporary facilities, handling, storing and distribution of materials, excavation, segregating and stockpiling material suitable for backfill, backfill above trench grade including all bedding materials, placing sand blanket around new water pipe, 12" of roadway gravel, saw-cutting pavement, existing pavement removal and disposal, compacting trenches, dewatering, sheeting and shoring not ordered left in place, restoration, adjusting or supporting of existing utility pipes and conduits, removing and disposing or abandoning existing water mains and hydrants, capping existing water mains, and daily and final cleanup, flushing, hydrostatic testing, and chlorinating, water quality analyses, connections to existing water mains, and all other incidental work relative thereto, not specifically paid for under other Items and as specified and as shown on the plans.
- D. Prices bid under this Item for water pipe shall include furnishing all labor, materials, tools and equipment to connect to the existing water main, which shall include shutting down existing water mains as necessary, including excavation, backfill, compaction,

dewatering, disposal of surplus or unsuitable materials, temporary sheeting or bracing as required, cutting and conditioning, or tapping of existing water main, sand blanket, 12" gravel road base, all fittings, and appurtenances (as previously stated) and assembly, cleanup and all other incidental work not specifically mentioned to satisfactorily complete this Item, including coordination with water users to shut down affected water service with 72-hour minimum notification and as specified and as shown on the plans.

- E. The Contractor shall furnish and install all temporary watertight plugs, caps or blank flanges that may be required to properly protect the work and to test and chlorinate the mains. The Contractor shall also provide all necessary labor, tools, and materials required to dewater and permanently plug all abandoned valve boxes. Payment for furnishing and installing these items shall be made under the applicable pipe laying items listed under this Item, which shall also include all costs relative to flushing to remove silt and debris from the mains.
- F. The Contractor shall be provided with water for flushing, testing and chlorinating water mains, at no cost, but only once for each section of pipe. Water required for additional flushing, testing and re-chlorination shall be billed to the Contractor at the prevailing rates of the Owner, (or water Utility having jurisdiction) and this sum of money shall be paid by the Contractor upon receipt of a bill from the Owner. The Owner may deduct such amounts of money from the Contractor's periodic estimates for payment.
- G. Only seventy-five (75) percent of the price bid per linear foot of pipe shall be eligible for payment upon installation. The balance shall not be eligible for payment until the pipe has been successfully tested and chlorinated and is accepted by the Owner for incorporation into the existing system. The above percentages will apply before the specified retainage is withheld.
- H. Pipe and other appurtenant water works materials delivered to the job site and properly stockpiled and protected, shall be eligible for payment upon written request by the Contractor. With each request for payment of stored materials, the Contractor shall submit an itemized and properly executed transfer of title form, made out to the owner. Payment shall be based upon seventy-five (75) percent of the total amount of each material invoice, as submitted to Contractor by materials supplier. All such pre-payments for materials, by the Owner, will later be deducted from the Contractor's Periodic Estimates for Payment. Prepayment for materials by the Owner shall not relieve the Contractor of responsibility for prompt payments to suppliers, and for successful protection of stored materials. The Owner may require copies of paid invoices as a prerequisite for payment.
- I. Payment for furnishing and installing water mains of the various types and diameters listed shall be made at the unit prices bid under the applicable Item.



ITEM 1C & 1D: VALVES

- A. Measurement for payment for furnishing and installing the mechanical joint ductile iron valves shall be the number of items counted in-place and recorded by the Engineer.
- B. Payment for furnishing and installing the various types and sizes of valve listed or as shown on the contract drawings, shall be made at the unit prices bid under the particular Item.
- C. The unit prices bid under this Item shall be full compensation for all labor equipment, tools and materials necessary to complete the work as specified, which shall include shutting down existing water mains as necessary, cutting and conditioning, or tapping of pipe, saw cutting existing pavement removal and disposal, joint accessories and restraints, jointing, assembly, support system, valve boxes, raising castings and covers to finished grade, excavation, backfill and compaction, and all other incidental work relative thereto.

ITEM 1E: HYDRANT

- A. Measurement for payment for furnishing and installing a new hydrant shall be the numbers of items counted in place and recorded by the Engineer.
- B. Payment for furnishing and installing a new hydrant, as listed in the proposal or as shown on the contract drawings shall be installed at the unit prices bid under Item 1E.
- C. The unit price bid under each division of this Item shall be full compensation for all labor, equipment, tools and materials necessary to complete the work as specified, which shall include shutting down existing water mains as necessary, furnishing and installing, hydrant, hydrant extension if necessary, excavation, cutting pipe, installation and/or removal, transporting, transporting old hydrant to the Waltham DPW or disposal, stacking, repair, capping and restraining existing pipe, thrust blocks, saw cutting existing pavement removal and disposal, backfill and compaction, drainage well, factory painting to the City of Waltham paint color, and all other incidental work relative thereto.

ITEM 1F: DUCTILE IRON FITTINGS

- A. Ductile Iron fittings, paid for under the associated pipe item, actually installed shall be measured by the pound, including the cement lining, based on the nominal weights of specific fittings tabulated in the AWWA Specifications or certified shipping weight slips furnished by the supplier to the Contractor. Mechanical joint glands, restraints, bolts, gaskets and accessories will not be included in the weight measurement, but are considered incidental to this item and the cost is to be included in the fitting weight.
- B. Payment for furnishing and installing the various sizes and types of ductile iron fittings: hydrant extensions, bends, tees, solid sleeves, flexible couplings, and/or transition couplings, etc. listed here and not shown or called out on the contract drawings shall be

made at the price per pound in the bid. This price shall be full compensation for furnishing and installing the glands, gaskets, restraints, jointing, concrete thrust blocks, extensions and all work required for, incidental to the satisfactory completion of the Item for which payment is not provided under other items.

- C. If additional ductile iron fittings are required that are not called out or shown on the drawings, the Contractor shall be compensated for the fitting by the unit price bid for this item.
- D. The unit prices bid under this Item shall be full compensation for all labor, equipment, tools, and materials necessary to complete the work as specified, which shall include cutting and conditioning of pipe, fitting accessories, jointing, excavation, backfill and compaction, and all other incidental work relative thereto.

ITEMS 1G THROUGH 1I: COPPER TUBING WATER SERVICES AND APPURTENANCES

- A. Payment for furnishing and installing 1" diameter, water service connections as directed by the Engineer shall be made at the unit prices bid under the applicable Items. These Items may be utilized for new water services or to replace existing services only as directed by the Engineer. No payment is to be made under this Item for replacement of existing water services damaged or removed by the contractor in the performance of other work under this Contract.
- B. The unit prices bid under these Items shall be considered as fair compensation for all labor, equipment, tools and materials necessary to furnish and install a new water service within City property and to complete the work as specified, which shall include excavation, tapping water mains, assembling fittings, laying service pipe, connecting to existing services, saddles, tapping tees if required, couplings, adaptors and other appurtenant materials, dewatering, backfill and compaction, sand blanket backfill, 12" roadway gravel, saw cutting trenches, removal and disposal of pavement and surplus backfill, abandoning existing water services and removing existing corporations and installing plugs, 72-hour advance water customer notification, all other incidental work related thereto.
- C. Method of Measurement: Payment for furnishing and installing water service connections shall be made as follows:
  - 1. Payment for furnishing and installing 1" Type K Copper water tubing pipe per linear foot and all couplings shall be made at the unit price bid under Item 1G. Payment for removing and disposing of the existing water services shall be included in the unit price for furnishing and installing the pipe, item 1G and shall include coordination of shutting down existing water mains, if required, through prior notification of affected users no less than 72 hours before as necessary.
  - 2. Payment for furnishing and installing each corporation cock shall be made at the unit price bid under Item 1H, shall include furnishing and installing each corporation cock and all required adaptors, couplings, saddles, tapping tees and

other accessory items to connect to the existing water main and all required work to wet tap the existing water main.

3. Payment for furnishing and installing each curb stop and street service box including extension rod shall be made at the unit price bid under Item 1I, shall include furnishing and installing each curb stop and all required reducers, adaptors, couplings and other accessory items to connect to the existing water service at the City property line beyond the back of the proposed sidewalk. Street service boxes shall be Erie service box with 18" stainless steel extension rod.

#### ITEMS 1J THROUGH 1N: TEMPORARY BYPASS PIPING & APPURTENANCES

- A. Payments made for furnishing and installing 4", 2" and 1" diameter temporary bypass piping, temporary valves and hydrants and service connections as per contract shall be made at the unit prices bid under the applicable items.
- B. Payment under these items shall include full compensation for furnishing and installing appropriate barricade and protection for installed water main bypass system including barrels and cones as necessary. No payment is to be made under these Items for replacement of temporary piping, valves, hydrants or service connections damaged or removed by the contractor in the performance of other work under this contract. No payment is to be made under these Items for replacement of temporary piping, valves or hydrants or service connections damaged on-site for the duration of this contract.
- C. Payments under these Items shall be full compensation for the design and approval by the engineer. Refer to Section 02768.
  1. Payment under Items 1J, 1K and 1L for the installation of bypass piping shall be per linear foot and shall include furnishing all pipe, fittings, valves, hoses, stone dust, crusher run material, barricades, disinfection and testing, dechlorination and all other materials necessary to install and activate the temporary bypass water system, complete. Payments made under Items 1J, 1K and 1L shall be full compensation for the for the maintenance and removal of all bypass piping shall include all labor, tools and equipment necessary to remove all temporary piping, hydrants, fittings, valves and hoses and all else installed to temporarily serve all water customers.
  2. Payment under item 1M shall include installation of temporary hydrants, per each, and shall include furnishing all temporary hydrants, fittings, valves, hoses, stone dust, crusher run material, barricades, disinfection and testing, dechlorination and all other materials necessary to install and activate the temporary hydrants for the bypass water system, complete.
  3. Payment under item 1N shall include all labor, tools and equipment necessary to adequately temporarily serve and maintain each water customer with adequate domestic and fire service lines, per each service connection at

connection point, including the removal of meters if necessary. Pipe and fittings required for each service shall be included under the price of the bypass piping items. Payment under this item shall include the following:

- a) Accurately locating water service lines and coordinating with water users for connection shutdowns required for temporary bypass and permanent water line connections.
- b) Coordination with utility companies both Public and Private.
- c) Prices bid under this Item for water pipe shall include furnishing all labor, materials, tools and equipment to connect temporary water services to water user services at the right of way. Work under this item shall include shutting down existing water pipes as necessary, including excavation, backfill, compaction, dewatering, disposal of surplus or unsuitable materials, temporary sheeting or bracing as required, cutting and connecting to existing pipe, fittings required or all materials and work required for tapping of existing water services, sand blanket, 12" gravel road base, all fittings, and appurtenances (as previously stated) and assembly, cleanup and all other incidental work not specifically mentioned to satisfactorily complete this Item, including coordination with water users to shut down affected water service with 72-hour minimum notification and as specified and as shown on the plans.
- d) Removal of temporary connections upon completion and restore service to normal operating conditions.

4. EARTHWORK

ITEM 4A: UNCLASSIFIED EXCAVATION, GENERAL EXCAVATION AND TEST PIT EXCAVATION AND BACKFILL

- A. Should the Engineer order test pit excavation, general excavation or unclassified excavation, the Contractor shall be paid therefore under this Item. Measurement for the quantity of excavation and backfill to be paid for shall be the number of cubic yards excavated and backfilled, in place, as ordered by the Engineer.
- B. Payment shall constitute full compensation for the work of excavating, placing on-site or disposal of surplus or unsuitable materials, backfill and all work incidental thereto.

ITEM 4B: ROCK EXCAVATION, DISPOSAL AND BACKFILL

- A. Measurement for the quantity of rock to be paid for under this Item shall be the number of cubic yards of rock, measured in place before excavation, within the limits of normal excavation as specified, unless rock excavation beyond such limits has been authorized by the Engineer, in which case measurements shall be made to the authorized limits.

- B. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Engineer, unless in the opinion of the Engineer, satisfactory measurements can be made in some other manner.
- C. Payment for rock excavation shall be full compensation for all labor, materials, and equipment necessary for rock excavation, disposal, and furnishing, placing and compacting acceptable backfill. The bidder should include in his bid under all items involving excavation, the cost of doing the entire excavation as earth. The unit price for rock excavation covers the difference between the cost of rock excavation and the cost of earth excavation.

ITEM 4C: GRAVEL BORROW FILL AND/OR GRAVEL BORROW REFILL OF UNSUITABLE MATERIAL

- A. When additional gravel borrow fill (not already paid for under another item in this contract) is required or, in the opinion of the Engineer, the material above or below normal limits including tests pits is unsuitable for backfill, it shall be disposed of and replaced in such volumes within the lines of payment as the Engineer may order. This Item applies only to the use of borrow refill when stockpiles of excavated suitable backfill materials are insufficient in quantity.
- B. All borrow refill shall be sand and gravel Type 3 material.
- C. The quantity to be paid for shall be equal to the number of cubic yards of unsuitable material replaced with Type 3 sand or gravel borrow.
- D. The unit price shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary for replacing of excavated material and furnishing, placing new fill material or placing and compacting sand and gravel in such excavations and furnishing.

ITEM 4D: FINE GRADING AND COMPACTING OF SUBGRADE AREAS

- A. The square yard price for this Item shall constitute full compensation for the placement of on-site pavement sub-grade material (reclaim gravel) for the roadway, fine grading and compacting of the sub-grade areas prior to the placement of pavement. Also straight cut existing pavement.
- B. The square yard price for this Item shall include furnishing all labor, materials, tools and equipment for the shaping, fine grading and compacting of the pavement sub-grade as shown on the Contract Drawings, as directed by the Engineer and as required to place the proposed base course pavement.
- C. The square yard price shall also include the cost associated with dust control of the fine graded areas, through use of water and flake calcium chloride, as required and as specified in Section 01567 of the Contract Documents.

5. PAVEMENT

ITEM 5A: RECLAIM EXISTING PAVEMENT (RECLAIMED BASE COURSE)

- A. Measurement for payment under this Item (Reclaimed Base Course) shall be the actual number of square yards of reclaimed base course, measured in place to the limits specified on the plans or as directed by the Engineer. Excess reclaimed material to be used before gravel borrow. No deduction shall be made for manhole covers, grates, or other surface structures.
- B. Payment for this Item shall constitute full compensation for the reclaimed base course, complete in-place including scarifying, pulverizing, stockpiling and mixing the existing pavement, blending with the underlying material or gravel borrow, and spreading, rough grading and compacting the graded material. It shall also include the cost of labor, equipment, materials and all other work necessary to satisfactorily complete the work.
- C. Payment for this Item shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary to saw cut pavement, lower existing, utility castings, utility valve boxes, frames and covers. This Item includes all costs associated with the preparation of the existing road for the reclamation. The unit price per square yard for reclaimed base course shall also include the restoration of all drainage and utility castings, utility valve boxes, frames and covers to the top of the proposed reclaimed base course (the surface upon which the bituminous concrete binder and top is to be placed).
- D. Payment for this Item shall constitute full compensation for the removal and disposal of unsuitable subgrade and subbase material or surplus material associated with the pulverizing operation. The square yard price shall also include the cost associated with dust control, through use of water or flake calcium chloride, as required and as specified in Section 01567 of the Contract Documents. Excess reclaimed material shall become the property and responsibility of the Contractor.
- E. Payment for this Item shall constitute full compensation for the completing all cuts and fills necessary to establish the proposed standard cross section and proposed centerline as shown on the contract drawings. Surplus reclaimed material shall be used to complete all filling operations. Surplus reclaimed material to be used before gravel borrow. See Section 02220

ITEM 5C: 3" BASE COURSE PAVEMENT (MACHINE METHOD)

- A. Measurement for payment under this Item shall be the actual number of tons of asphalt placed for permanent base course pavement, and maintained as shown on the drawings, as specified, and as directed by the Engineer.
- B. Payments for this Item shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary to place the base course pavement, including construction of pavement end joints, saw cutting joints, tack coat along the edges,

minor adjustments to subbase material, raising all castings and gate boxes to binder grade and to maintain the permanent base course pavement as required by the Specifications.

- C. The Contractor shall continuously maintain pavement, as specified, and repair the pavement at his own expense. No additional compensation shall be made for labor, materials, tools and equipment required for maintenance and/or repair of pavement.

ITEM 5D: 1-1/2" PERMANENT TOP COURSE PAVEMENT (MACHINE METHOD)

- A. Measurement for payment under this Item shall be the actual number of tons of asphalt placed for permanent top course pavement, and maintained as shown on the drawings, as specified, and as directed by the Engineer.
- B. Payment for this Item shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary to place the top course pavement, including all raising of castings and gate boxes to finished grade, sweeping and cleaning existing street, as required, including construction of pavement end joints, saw cutting joints, applying prime or tack coat by tank truck with heated spreader bar only, (no "tack wand or wagon accepted"), sanding and sealing all joints and to maintain the permanent top course pavement as required by the Specifications.
- C. The Contractor shall continuously maintain pavement, as specified, and repair the final paving at his own expense. No additional compensation shall be made for labor, materials, tools and equipment required for maintenance and/or repair of pavement.

ITEM 5E: BITUMINOUS CONCRETE PAVEMENT (HANDWORK)

- A. Measurement for payment under this Item shall be the actual number of tons of asphalt placed by hand work as shown on the Contract Drawings, as specified, or as directed by the Engineer.
- B. Payment for this Item shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary to place the bituminous pavement for driveways, berms, walkways, sidewalks, and miscellaneous areas, including sweeping and cleaning existing street, as required, and application of prime or tack coat, saw cutting and disposal of existing pavement, concrete, etc., raising castings, and to maintain the pavement as required by the Specifications.
- D. The Contractor shall continuously maintain paving, as specified, and repair paving at his own expense, No additional compensation shall be made for labor, materials, tools and equipment required for maintenance and/or repair of pavement.

ITEMS 5F: 3" TEMPORARY TRENCH PAVEMENT

- A. The quantity to be measured for payment under this Item shall be the actual number of linear feet of 3" depth trench pavement, placed in one compacted lift and maintained as shown on the Drawings, as specified, and as directed by the Engineer. Item shall be

for temporary trench pavement placed at all widths as required for permanent water main and water main bypass line.

- B. The unit price for this Item shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary to place a compacted 3" bituminous concrete (dense binder) course trench pavement, removing cracked or broken pieces of existing pavement from the trench edges after utility installation, placement and adjustment of gravel base course, fine grading and compaction, prime or tack coat, raising of frames and covers to trench pavement grade and to maintain the trench pavement as required by the specifications.
- C. The Contractor shall continuously maintain trench paving, as specified, and repair trench paving at his own expense. No additional compensation shall be made for labor, materials, tools and equipment required for maintenance and/or repair of trench pavement.
- D. A minimum compacted pavement thickness of 3" inches of dense binder shall be used to pave trenches as directed by the engineer. This item shall be used to pave the utility trenches and shall include sanding and sealing after placement.

6. INCIDENTAL WORK

ITEM 6A: CONCRETE FOR ENCASEMENT, CRADLES AND MISCELLANEOUS WORK

- A. Measurement for the quantity of encasement, pipe cradle or miscellaneous work to be paid for shall be the quantity of cubic yards for thrust blocks, encasement, pipe cradle, concrete dams, around street castings or miscellaneous work (not in front of curbs) furnished in place within the limits of normal excavation and to a depth as shown on the Contract Drawings, or as specified by the Engineer.
- B. Payment of this Item shall constitute full compensation for furnishing and placing thrust blocks, pipe encasement, pipe cradle, concrete dams, around street castings and miscellaneous work not included under other items (not in front of curbs) as shown on the drawings, or as directed or specified. Concrete furnished and placed under other items shall not be included for payment under this Item.

ITEM 6B: UNIFORMED POLICE FOR TRAFFIC CONTROL

- A. Payment for special assignments of personnel of the City Police Department will be made for the actual amount invoiced to Contractor by the Police Department including the department's administrative costs. The allowance established in the Bid Form is for bidding purposes only. The actual invoiced rates may differ from these established rates.
- B. Payments made for this item are based on actual invoiced amounts which have been paid to the City Police Department by the Contractor. Paid invoices must be submitted by the Contractor for payment under this item.



ITEMS 6D: UNMARKED SERVICE PIPE REPAIR

- A. Measurement for payment for repairing an unmarked existing drain service broken during the installation of the proposed water main or water service shall be the numbers of items counted in place and recorded by the Engineer.
- B. Item 6D shall be for measurement and payment of repair of unmarked drain.
- C. Payment for repairing existing sewer or drain service not shown on the contract drawings or unmarked in the field within the water trench limits which is broken during the installation of the proposed water main or water service, as specified or as shown on the contract drawings shall be installed at unit price bid under Item 6D.
- D. The unit price bid under Item 6E shall be full compensation for all labor, equipment, tools and materials necessary to complete the work as specified, which shall include handling flows, furnishing and installing up to 12" inside diameter – SDR 35-PVC or HDPE replacement pipe matching the existing inside pipe diameter, adapters, couplings, bends, excavation, cutting pipe, dewatering, removal and disposal of broken service pipe, placement and adjustment of 12" gravel base course, transporting, repair, backfill and compaction, crushed stone cradle, sand blanket, and all other incidental work relative thereto.
- E. The Contractor shall excavate back along and expose the existing drain service on either side of the proposed water main or water service trench to expose the unbroken pipe ends and cut away damaged pipe. Replacement pipe, bends and adapter couplings shall then be installed between the existing pipe ends as required for a watertight sewer or drain service repair.
- F. Existing drain services shown on the contract drawings or pre-marked in the field within the water trench limits, which are either intentionally, or accidentally broken or damaged during the proposed water main or water service installation are not eligible for payment unless authorized by the Engineer.
- G. The existing drain services are clay or concrete and require watertight adapter couplings for repair. "Fernco" style flexible rubber adapter couplings are acceptable as method of repair to adapt to existing pipe ends. Brick or cement collars will not be accepted as a method of repair to adapt to existing pipe ends.

ITEM 6F: REMODEL EXISTING MANHOLE OR CATCH BASIN STRUCTURE

- A. The quantity to be measured for payment under this item shall be the number of vertical feet of existing manhole or catch basin structure removed and replaced or rebuilt, below 16" from existing grade, as specified, or as directed by the Engineer.
- B. The unit price for this item shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary to remove and replace or rebuild an existing manhole or catch basin structure, including excavation and disposal of excess material,

brick masonry, backfilling and compacting, adjusting to 16" below existing grade, as required by the Contract Documents or as directed by the Engineer.

ITEM 6G: PAVED SIDEWALK

- A. Measurement for payment under this Item shall be the actual number of square yards of bituminous concrete sidewalk, walkways and miscellaneous bituminous areas that are 3" minimum compacted depth paved, furnished and installed or replaced, and maintained as shown on the contract drawings within the limits, and as directed by the Engineer.
- B. Payment for this Item shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary to complete the work as specified, which shall include clearing and grubbing, saw cutting of existing pavement, excavation to gravel subgrade and disposal of existing bituminous concrete, cement concrete and brick pavement and topsoil and subsoil, excavating as necessary, furnishing and installing 8" gravel subbase, compacting gravel base course, fine grading, furnishing and installing of 3" minimum compacted bituminous concrete consisting of and 1 ½" binder course and 1 ½" top course, as specified, infrared treatment of joints between new and existing pavement, furnishing backfill and placing loam and seeding and establishing growth, dewatering, restoration, adjusting or supporting of existing utility pipes and conduits, adjusting of castings, gate boxes, etc. to the finished grade, daily and final cleanup, and all other incidental work relative thereto and not specifically paid for under other items of work and to maintain the sidewalk as required by the specifications.
- C. The Contractor shall continuously maintain sidewalk and areas as specified, and repair any defective paving at his own expense. No additional compensation shall be made for labor, materials, tools and equipment required for maintenance and/or repair of sidewalk.
- D. Excavation and backfill within normal limits shall be to the depth required to furnish and install the new compacted gravel base and bituminous concrete paving to the proposed grade.
- E. The existing gravel base may be reused if determined by the engineer to be acceptable with no deductions. Additional gravel if required shall be added as necessary prior to placement of the bituminous paving at no additional cost.
- F. Sidewalks at a minimum 3" bituminous concrete thickness shall be measured in square yards as the actual area between the back of curb or back of grass strip and back of sidewalk multiplied by the length of sidewalk.

ITEM 6H: LOAMING AND SEEDING OR MULCH FOR LANDSCAPING REPAIR

- A. Measurement for payment under this Item shall be the actual number of square yards actually loamed and seeded or mulch placed at a 6" minimum depth within the limits indicated on the Contract Drawings or as directed by the Engineer.
- B. Payment shall constitute full compensation for excavation and to subgrade for loam and disposing of excess subgrade material, furnishing and placing loam (min. 6" of loam) and seed or mulch (min. 6"), grading, compacting and providing establishment of growth of grass as specified.

ITEM 6I: STRAW FILTER TUBES "WATTLES"

- A. The quantity to be measured for payment under this Item shall be the actual number of linear feet of straw filter tubes "wattles" furnished and installed as shown on the Contract Drawings, as specified and as directed by the Engineer.
- B. The unit price for this Item shall include full compensation for furnishing all labor, materials, tools and equipment necessary to furnish and install, maintain as specified, remove and dispose of wattles, complete, including earth excavation, backfill, fill, grading, disposal of materials, clearing and grubbing, site restoration and clean-up and all incidental work, not specifically mentioned, to satisfactorily complete this Item.

7. LUMP SUM ITEMS

GENERAL

- A. The extent of utility relocations required for the completion of lump sum items are shown on the contract drawings. All work associated with support of utilities in conjunction with any of these lump sum items shall be included within the scope of the lump sum item.

ITEM 7A & D.: MOBILIZATION

- A. The lump sum price for this Item shall constitute full compensation for furnishing at the project site, all men and equipment necessary to properly commence and complete the various sections of work described in the bid. Mobilization costs are those costs incurred in initiating the contract and providing for the above-mentioned equipment and labor to be operational at the site, exclusive of the cost of materials. For purposes of this contract, operational shall mean the substantial commencement of work. The lump sum price of this work shall not exceed five percent (5%) of the total bid amount. Bids not in compliance with the above may be considered unresponsive and may be rejected for that reason.
- B. Mobilization may be considered as complete by the Engineer when the Contractor substantially commences work on the project with a full complement of men and equipment necessary to expeditiously perform and complete the required work in the opinion of the Engineer. The Engineer may authorize a percent (%) complete of this

Item for payment if all of the mobilization has not been accomplished. A breakdown of the lump sum price must be submitted to the Engineer.

- C. The lump sum price for mobilization shall include coordinating a location for staging and storing stockpiled materials including private agreements and fees that may be associated. The City of Waltham is not responsible to provide or coordinate.
- C. Payment for the lump sum price bid in the proposal for mobilization shall be full compensation for all costs and work involved under this Item.

ITEM 7B: MISCELLANEOUS WORK AND CLEAN-UP ITEMS

- A. Measurement for payment for miscellaneous work and cleanup shall be on lump sum basis.
- B. Payment of the lump sum price under the Item 7B of the Bid Form shall fully compensate the Contractor for labor, materials, equipment, and incidentals required to do all work specified below, and shown on the Drawings, and any other miscellaneous work obviously necessary to complete the Contract. Payment shall include but not be limited to supporting all existing utilities, modification to existing utilities, maintaining existing drainage flows, removal and resetting of fences, walls, landscape boulders, driveway edging etc. and the Contractor shall be responsible for site restoration and cleanup upon completion of the project and to comply with the provisions of Section 02995 of these specifications.

In addition, to allow the installation of the proposed water system, the Contractor shall do the following, which is paid for under Item 7B.

- The temporary and permanent relocation and protection of any trees, signs, benches, mailboxes, newspaper holders, trash barrels, post office boxes, planters, etc. located along the roadway and on the existing sidewalks prior to proposed construction activities.
- Coordinating a location for staging and storing stockpiled materials.
- Coordination with utility companies both Public and Private.
- Accurately locating water service lines and coordinating with water users for connection shutdowns required for temporary bypass and permanent water line connections not specifically included for payment under Item 1N.
- Furnish and install appropriate barricade and protection for installed water main bypass system including barrels and cones as necessary.
- Replace sidewalks and curbing disturbed during the installation of the proposed water system not specifically paid for under pavement or incidental work items.

- Protection of the trees and roots located adjacent to and within the limit of work.
  - Protection and support of telephone poles located adjacent to and within the limit of work.
  - All slope protection and erosion control measures including catch basin silt sacks, necessary to comply with the requirements of Section 02270 and as shown on contract documents, not specifically paid for under item 6I.
  - All testing, disinfection and dechlorination of the proposed water system as specified in Section 02675 and all temporary caps and taps required.
  - All permits as specified in Section 00821.
  - All work to remove, dispose or abandonment of the existing water system on Christopher Road.
  - All calcium chloride and water as required to control and maintain dust control on site.
- C. The Engineer may authorize a percent (%) complete of this Item for payment if not all of the work has been accomplished. A breakdown of the lump sum price must be submitted to the Engineer at the start of work.
- D. If the Owner chooses to accept Add Alternate #1, the Lump Sum payment for Item 7B included in the Base Bid shall be considered full compensation for Miscellaneous Work and Clean up by the Contractor as part of Add Alternate #1 as well.

ITEM 7C & E: TRAFFIC CONTROL SYSTEM FOR VEHICULAR AND PEDESTRIAN SAFETY

- A. The lump sum for this Item shall constitute full compensation for the implementation of the traffic control system designed by a Massachusetts certified traffic engineer, complete as detailed in the Specifications. See Section 01570.
- B. The lump sum price for this Item shall include furnishing all labor, materials, tools, and equipment to start up and implement the traffic control system including all signs, barriers, warning light, and any detour controls as specified and as deemed necessary by the City.
- C. The Engineer may authorize a percent (%) complete of this Item for payment if not all of the work has been accomplished. A breakdown of the lump sum price must be submitted to the Engineer at the start of work.

~~ITEMS 8A THROUGH 8E ARE ADD ALTERNATE 1~~

2. SEWER PIPE AND FITTINGS, SEWER SYSTEM APPURTENANCES

ITEM 8A & 8B: GRAVITY SEWER PIPE AND FITTINGS

- A. The quantity of pipe to be paid for under these Items shall be based on the length of pipe installed, measured on a linear foot basis. Measurement for payment does not signify that the sewer line is accepted.
- B. Measurement for length will be along the horizontal center line of pipe as installed including wyes, saddles, tee branches and bends from center to center of manholes excluding the length of manhole inverts. Connections to 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.
- C. Payment for pipe shall be on the basis of the linear foot of pipe, and the type of pipe installed. The Contractor's attention is directed to the Technical Specifications that stipulate that all pipes between adjacent manholes shall be of the class required by the critical depth of cover between said manholes. The unit pipe prices shall include full compensation for furnishing the class of pipe required by the manhole-to-manhole profile regardless of depth of cover variations.
- D. Payment shall constitute full compensation for furnishing and installing pipe of the type and size specified on the Bid Form (Item 8A-8B) for the respective quantities as above determined at the applicable bid price. Each unit price shall constitute full compensation for furnishing all labor, materials, fittings, tools, and equipment necessary for laying, jointing and testing the pipe, unless specified elsewhere, including earth excavation (except rock excavation), saw cutting of pavement, dewatering, removal and replacement or supporting of existing utility pipes and conduits, jetting which is required, compaction as specified, cleaning of lines by high pressure water (1200 psi min.), mandrilling and air testing lines, television inspections, portable trench box or temporary timber sheeting, disposal of surplus materials, backfilling, screened gravel cradle, dust control, removal and disposal of existing pipe, and all work incidental thereto not specifically paid for under other items. Cost for wyes, tees, saddles, adapter couplings (including connections to existing pipes at private property/side streets) shall be included in the unit price of the pipe (Item 8A-8B). Payment for pipe will be seventy five percent of amount installed until pipe has been tested and television inspection is completed.
- E. Where excavated material is not suitable for backfill and excess stockpiled excavated material is not available in sufficient quantities, payment for imported backfill shall be made under the applicable earthwork item.

ITEM 8C: FURNISH AND INSTALL SEWER MANHOLE FRAME AND COVER

- A. The quantity to be measured for payment under this Item shall be the actual number of sewer manhole frame and covers furnished and installed as specified and shown on the contract drawings. See Detail Sheet.
- B. The unit price shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary to install the sewer manhole frame and cover, including excavation and disposal of the sewer manhole frame and cover at the Fairhaven BPW, backfilling and compacting, adjustment to grade, as required. Bituminous or cement concrete backfill if required will be paid for under associated item.
- C. Sewer manhole frames and covers to be, models as manufactured by East Jordan Iron Works and Town Standards and as shown on the construction plans

ITEM 8D: 4' DIAMETER PRECAST CONCRETE SANITARY MANHOLES

- A. Measurement for payment under this item shall be the actual number of manholes of each classification, constructed as specified.
- B. Payment for manholes shall include furnishing and installing manhole bases, concrete intermediate platforms as specified on plans, brickwork for inverts, and adjusting frames and covers to grade, walls and domes, complete.
- C. Payment shall constitute full compensation for furnishing all labor, materials, tools, and equipment necessary for construction of the manholes including the walls, steps, watertight connections, sealant, damp proofing, bases, brick inverts or granite inverts, concrete collars, excavation, temporary sheeting, backfill, dewatering, compaction as specified, disposal of surplus material, screened gravel or crushed stone subbase, testing, connection of sewers into manhole base, removal and disposal of existing sewer manholes and all other work necessary for constructing a complete manhole. Payment shall also include the cost of resetting the frames and covers to accommodate final paving, and installation of stubs, knockouts and stoppers as indicated on the drawings.

ITEM 8E: SEWER SERVICE CLEANOUT ASSEMBLY

- A. The unit price of the Item shall constitute full compensation to furnish and install a sewer service cleanout assembly, including 4" through 6" diameter, schedule 35-PVC pipe, wye, bend, push on style cap to 4" below finished grade, adapter couplings and 12" diameter sewer casting and brickwork as shown on the contract drawings and as specified. See section 02622 of these specifications.
- B. The unit price shall include furnishing all labor, materials, tools and equipment to install a sewer cleanout assembly, including locating the existing sewer service at the sidewalk, excavation, backfill, compaction, dewatering, saw cutting trenches, removal and disposal of pavement and surplus backfill, disposal of surplus or unsuitable materials, crushed stone bedding, sand blanket backfill, temporary sheeting or bracing as required, cutting and conditioning existing sewer pipe, 12" gravel road base, all assembly, concrete encasement, raising of the sewer cleanout casting to finished grade, cleanup and all other incidental work not specifically mentioned to satisfactorily complete this item.

- B. Sewer cleanout assembly shall consist of 4" through 6" reducing adapter coupling, 6" pipe, 6" wye, 6" bend, push on style 6" cap to 4" below finished grade and 12" diameter sewer casting placed on a section of 12" diameter pvc and encased in concrete.
- C. The sewer cleanout casting is to be 12 "diameter x 3" depths, Model#R812-000, stamped "SEWER" as manufactured by East Jordan iron Works or equal.
- D. Sewer cleanout assembly is to be located and installed within the proposed concrete sidewalk at the existing sewer connection. A sewer casting shall be set to grade over the PVC cleanout when the concrete sidewalk is installed.

END OF SECTION





SECTION 01050

ABBREVIATIONS

PART 1 GENERAL

1.01 ABBREVIATIONS

PART 1 GENERAL

1.01 ABBREVIATIONS

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

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standard Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Administration
(USASI)	(formerly the United States of America Standard Institute)
USEPA	United States Environmental Protection Agency

END OF SECTION



SECTION 01300

SUBMITTALS

PART 1        GENERAL

- 1.01        INTENT
- 1.02        MATERIALS-SAMPLES-INSPECTION-REVIEW
- 1.03        SHOP AND WORKING DRAWINGS
- 1.04        RECORD OF AS-BUILT DRAWINGS
- 1.05        OPERATION AND MAINTENANCE INSTRUCTIONS

PART 1        GENERAL

1.01        INTENT

- A.        The submittals consist of several classes applying to the execution of several or all of the individual Division 2 thru 16 Specifications.
  
- B.        Provisions of this section shall be binding on all applicable work performed under the other detailed specifications and payment for work performed under this section shall be apportioned against each of the payment items listed in the Bid, unless otherwise directed.

1.02        MATERIALS - SAMPLES - INSPECTION - REVIEW

- A.        Unless otherwise indicated on the drawings or specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor to be incorporated in the work shall be subject to the inspection and review by the Engineer. No material shall be processed for, fabricated for, or delivered to the work without prior review by the Engineer.
  
- B.        As soon as possible after the formal execution of the Contract Agreement, the Contractor shall submit to the Engineer, the names and addresses of the manufacturers and suppliers of all materials and equipment he proposes to incorporate into the work. Where such names have been directly specified in the Bid, or where substitutions have been made in compliance with the INSTRUCTION AND INFORMATION FOR BIDDERS, repetitive submission will not be necessary. When shop and working drawings are required as specified below, the names and addresses of the manufacturers and suppliers shall be submitted prior to the submittal of the drawings so that the Engineer may review the manufacturer and/or supplier as to his or their ability to furnish a product meeting the specifications, subject to final review of the particular material or equipment. As requested, the Contractor shall also submit data relating to the materials and equipment he proposes to incorporate into the work, in sufficient detail to enable the Engineer to identify the particular product in question and to form an opinion as to its conformity to the Contract requirements. Such data shall be submitted in a manner similar to that specified for shop and working drawings.

- C. If the Engineer so requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped as directed, at the expense of the Contractor. Except as otherwise specified, tests shall be arranged and paid for in accordance with the General Conditions.
- D. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the materials is intended, and the name of the Contractor submitting the sample.
- E. To ensure consideration of samples, the Contractor shall notify the Engineer in writing that the samples have been shipped and shall properly describe the sample using standard submittal forms supplied by the Engineer. In no case shall the letter of notification be enclosed with the samples.
- F. The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection, testing, and approval before the materials and equipment are needed for incorporation in the work. Delay resulting from his failure to do so shall not be used as the basis of a claim against the Owner or the Engineer.
- G. In order to demonstrate the proficiency of workers, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall, at his own expense, provide such samples of workmanship on wall, floor, finish, etc., as may be required.
- H. When required, the contractor shall furnish to the Engineer triplicate sworn copies of manufacture's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.
- I. After acceptance of the samples, data, etc., the materials and equipment used on the work shall correspond therewith.

1.03 SHOP AND WORKING DRAWINGS

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

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

- B. Such drawings shall show the principal dimensions, weight, structural and operating features, performance characteristics and wiring diagrams, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.
- C. When so specified or if considered by the Engineer to be acceptable, manufacture's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for review in place of shop and working drawings. In such case the requirements shall be specified for shop and working drawings, insofar as applicable.
- D. The Contractor shall be responsible for the prompt submission of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.
- E. No material shall be purchased for fabricated especially for this Contract until the required shop and working drawings have been submitted and reviewed as conforming to the Contract requirements. All materials and work involved in the construction shall then be as represented by said drawings.
- F. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the drawings and specifications in all respects; that the electrical characteristics are correct; and that the dimensions of work submitted fit the available space. Any deviations from the Contract requirements shall be clearly noted on the shop drawings. The Contractor shall stamp each submittal with his firm's name, date, and approval, thereby representing that the above has been complied with. Shop drawings not so checked and stamped will be returned without being examined by the Engineer.
- G. All shop drawings shall be properly identified and indicate the article number of the specifications or the drawing number which applies to the submitted item.
- H. The Engineer's review of shop and working drawings will follow a general check made to ascertain conformance with the design concept and functional result of the project and compliance with the information given in the Contract Documents. The contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to the fabrication processes or to techniques of construction; and for coordination of the work of all trades.

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

<u>Review Code</u>	<u>Action Code</u>
No Exception Taken	-
Note Markings	Confirm
Rejected	Resubmit

1.04 RECORD OR AS-BUILT DRAWINGS

- A. During the progress of the work, each major subcontractor shall keep on file one complete set of red line prints furnished by the Engineer on which shall be accurately and promptly noted, as the work progresses, changes, revisions and additions to the work. Wherever the work is installed otherwise than as shown on the contract Drawings said changes shall be noted. Corrections shall be made in red ink. The above prints upon completion of the work shall be submitted to the Engineer.
- B. Before the Contractor is entitled to receive his final payment under this Contract, he shall submit to the Engineer for transmittal to the Owner the above complete set of annotated plans of his work performed by him indicating in particular the location of covered work, pipes, wires, ducts, etc. All trades must cooperate with the Contractor in preparation of this set of plans to facilitate its accuracy and completeness.

1.05 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. The Contractor shall thoroughly instruct the Owner's representative in the proper operation of all mechanical and electrical systems. Skilled personnel shall be retained as long as necessary for this purpose.
- B. The Contractor shall submit to the Engineer three (3) typed sets, bound neatly in loose leaf binders, of all instructions for the installation, operation, care and maintenance of all equipment, fixtures and systems. Information shall indicate possible problems with equipment and suggested corrective action. The instructions shall include other information deemed necessary by the Engineers.
- C. The Contractor shall furnish three (3) typed sets of instructions for lubricating each piece of equipment. Instructions shall state type of lubricant, where and how frequently lubrication is required.
- D. The Contractor shall submit to the Engineer three (3) typed sets of instructions for the ordering and stocking of spare parts for all equipment. The lists shall include catalog numbers of parts and suggested supplier. Each set shall also include an itemized list of component parts that should be kept on hand with information where such parts can be purchased.

- E. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models or similar equipment shall be deleted or neatly lined out.
- F. Such operating instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site.

END OF SECTION





SECTION 01500

TEMPORARY PROVISIONS AND PROTECTION

OF UTILITIES AND PROPERTIES

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE

PART 2        EXECUTION OF WORK

- 2.01        COORDINATION WITH OTHERS
- 2.02        PUBLIC SAFETY AND CONVENIENCE

PART 1        GENERAL

1.01        SCOPE OF WORK

- A.        The Contractor's attention is directed to the location of underground utilities in the proposed area of work.
- B.        The Contract Drawings indicate the approximate location in plan and profile of existing overhead and subsurface utilities in the vicinity of the work.
- C.        Whatever measures are necessary to protect these lines during the work shall be included in the Contract Unit Price for the various items involved.
- D.        In case of damage to utilities, the Contractor shall promptly notify the Owner and shall, if requested, furnish manpower under the Owner's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the Owner, either the municipality or the utility company. The cost of such repairs shall be borne by the Contractor without compensation.
- E.        The locations of existing underground utilities are shown in an approximate way only. The Contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.
- F.        The work to be done under this Contract may necessitate changes in the properties of utility companies or the municipality hereinbefore listed. Immediately after executing the Contract, the Contractor shall confer with the owners of all utilities in order that relocations of mains or services may be made at times consistent with operations of this Contract.
- G.        The rims of all utility manholes and boxes shall be set to conform to the required grades and the Contractor shall see that all such setting or resetting is substantially and

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

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

PART 2 EXECUTION OF WORK

2.01 COORDINATION WITH OTHERS

- A. Before starting any work under this Contract, the Contractor shall submit a Schedule of Operations. The work schedule shall include a plan of his construction procedures and the safety measures he will use during the prosecution of the work.
- B. The Contractor shall coordinate his work with the work to be done by the Public Utilities or other agencies, and he shall so schedule his operations as to cause the least interruption to the normal flow of traffic in existing roads.
- C. The Contractor shall provide, place and erect all necessary barricades and warning signs and maintain adequate lights and illumination. He shall be held responsible for all damage to the work due to any failure of signs and barricades needed to protect the work from traffic, pedestrians or other causes.
- D. The Contractor shall assume full charge of space for the storage of materials of all subcontractors and trucks, confining all apparatus, storage of materials and construction operations to the limits indicated by ordinance or permits. He shall allot space for the storage of materials of subcontractors, facilitate the progress of the work, prevent friction, and maintain order and tidiness throughout the project site. Storage areas within the project are limited. The Contractor may be required to obtain storage areas outside the project limits at his own expense. The Contractor shall enforce any instruction of the Owner or the Engineer regarding signs, advertising, fires, danger signals, barricades, smoking, etc.
- E. Existing property markers shall be tied by the Contractor with respect to the construction and/or base line with such ties being given to the Resident Engineer. Such work shall be considered as part of the Contractor's incidental work for which no payment will be received.
- F. No extra payment shall be made for scheduling the work or for maintenance of traffic; the cost of which shall be included in the various bid items of the Bid.

- G. The casting of all structures, which are required to be set or reset under the pertinent items of this contract or by others shall not be set complete in place to the established grade until after the bituminous concrete base course has been completed in place as directed.
- H. The Contractor shall not proceed with surfacing operations without the specific written approval of the Engineer.
- I. Wherever it is necessary to meet existing surface, the Contractor shall construct a foundation, base and surface to form a continuous smooth roadway.
- J. The Contractor shall provide for the removal of all dirt spilled from his trucks on existing pavement over which it is hauled, or otherwise deposited thereon whenever, in the judgment of the Engineer, the accumulation is sufficient to cause the formation of mud or dust, or interfere with drainage or create a traffic hazard.
- K. Private Property that is disturbed, outside of the construction limits, shall be repaired by the Contractor at his own expense. No area shall be used for storage without the permission of the Engineer, and the Contractor may be required to obtain storage areas outside the project limits at his own expense.
- L. Particular care shall be taken to establish and maintain methods and procedures which will not create unnecessary or unusual hazards to public safety. The convenience of the general public along and adjacent to the highway shall be provided for in an adequate and satisfactory manner. Adequate access shall be maintained to all buildings in use. Signs are to be kept clean at all times, and legends shall be distinct and unmarred.
- M. The Contractor shall place and erect the necessary detour signs as indicated on the Contract Drawings and under the related sections as specified, and shall maintain said signs for the duration of the project.
- N. The Telephone Company and the Electric Company shall install and/or relocate poles and services as required. The Gas Company shall relocate its service as required. The Contractor shall schedule his operation so as to permit regulated public service corporations to remove and temporarily or permanently relocate their property which conflicts with respect to line and grade of any structure to be constructed under this Contract. All other structures which are owned by public service corporations and are within the limits of work shall be protected by the Contractor. Any public service corporation's property which require temporary supports shall be supported by the respective utilities during the period of construction.
- O. Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities or his intention to commence operations affecting such utilities at least one (1) week in advance of the commencement of such operations that may affect their utilities and the Contractor shall at the same time file a copy of such notice with the Engineer.

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

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

## 2.02 PUBLIC SAFETY AND CONVENIENCE

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

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

END OF SECTION

SECTION 01562

DUST CONTROL

<u>PART 1</u>	<u>GENERAL</u>
1.01	DUST CONTROL OPERATIONS
1.02	REQUIREMENTS

PART 1      GENERAL

1.01      DUST CONTROL OPERATIONS

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

1.02      REQUIREMENTS

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

END OF SECTION



SECTION 01567

POLLUTION CONTROL & ENVIRONMENTAL PROTECTION

PART 1      GENERAL

1.01      SCOPE OF WORK

1.02      RELATED WORK SPECIFIED ELSEWHERE

PART 2      MATERIALS

2.01      POLLUTION AND EROSION CONTROL MATERIALS

PART 3      EXECUTION

3.01      PRECONSTRUCTION CONFERENCE

3.02      PROCEDURAL DETAILS

3.03      DUST CONTROL

3.04      ACCEPTANCE

PART 1      GENERAL

1.01      SCOPE OF WORK

- A.      This work shall consist of temporary and permanent control and restoration measures as hereinafter stated or ordered by the Engineer during the life of the Contract to control water pollution and erosion (through use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion and pollution control devices or methods) and to limit disturbance and/or alteration of the natural environmental setting.
- B.      The temporary pollution control and environmental protection and restoration provisions contained herein shall be coordinated with detailed construction specifications elsewhere in the Contract to the extent practical to assure economical, effective and continuous pollution and erosion control, and environmental protection and restoration throughout the construction and post construction period.
- C.      Payment for this work shall be apportioned against each of the payment items listed in the Bid, unless otherwise specified.

1.02      RELATED WORK SPECIFIED ELSEWHERE

- A.      This is a general section and relates to any and all other sections wherein the work might result in pollution or environmental damage.
- B.      SECTION 01710 - CLEANING UP



PART 2      MATERIALS

2.01            POLLUTION AND EROSION CONTROL MATERIALS

- A.            Mulches may be hay, straw, fiber mats, netting, wood cellulose, corn or tobacco stalks, bark, corncobs, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.
- B.            Slope drains may be constructed of pipe, fiber mats, riprap, plastic sheets, or other material acceptable to the Engineer that will adequately control pollution.
- C.            Grass shall be quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area providing a temporary cover which will not later compete with grasses sown later for permanent cover.
- D.            Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Engineer.
- E.            Flake calcium chloride shall be used for dust control.

PART 3      EXECUTION

3.01            PRECONSTRUCTION CONFERENCE

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

3.02            PROCEDURAL DETAILS

- A.            The Engineer shall have the authority to limit the area of erodible earth exposed by construction and to direct the Contractor to provide immediate permanent or temporary pollution control and environmental protection measures to prevent contamination of adjacent streams or other watercourses, ponds, or other areas of water impoundment. Such work may involve the construction of temporary mulches, mats, seeding or other control devices or methods as required by the conduct of the work.
- B.            The Contractor shall be required to incorporate all permanent pollution control and environmental protection features into the project at the earliest practical time as outlined in his approved schedule. Temporary pollution control and environmental protection measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of

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

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

1. Clearing Grubbing - Disturbed areas shall be re-grassed at the direction of the Engineer.
2. Tree cutting in undeveloped cross-country or building site areas as designated by the Engineer - Trees within the temporary right-of-way, shall be cut only with the written approval of the property owner. Trees approved for cutting shall be marked with a 2-inch wide paint ring. The Contractor shall furnish the Engineer with sufficient spray paint and shall be present during all tree marking, and shall notify the appropriate property owner, the Owner, and the Engineer, concerning his availability for tree-marking at least ten (10) calendar days prior to the start of the applicable construction. Trees not approved for cutting shall be adequately protected against damage by methods approved by the Engineer. Cut or damaged trees not approved for cutting or outside of the total working right-of-way shall be replaced with trees of similar nature and maturity at the Contractor's expense. When directed, stumps of approved cut trees shall be removed and replaced with seedlings of a similar nature, 6-12 feet in height.
3. Access road construction - Riprap or sodding shall be used to prevent erosion.
4. Material Storage - Materials shall be stored only at approved locations. Petroleum products shall be stored away from wetland areas.
5. Excavation - The Contractor shall use care to contain wet fill where it is dumped. When material is stockpiled next to a trench, the side away from neighboring brooks, swamps, canals, etc., shall be utilized where space conform to the natural angle of repose of the soil. The Contractor shall promptly remove all sediment from brooks and swamp areas, if deposition cannot be avoided during construction. The Contractor shall promptly remove excess fill and regress the work area. Excess fill shall not be disposed of in wetlands, other than in areas defined on the drawings, or areas approved by commissions or authorities having jurisdiction.
6. Water handling - The Contractor shall be required to use crushed stone or plastic sluiceways leading to brooks to filter and pool pumped discharges.
7. Backfilling - The Contractor shall replace unsuitable material with suitable material. He shall also be responsible for surface repairs as required.
8. General - Trash receptacles shall be required on the job site. The Contractor shall perform preliminary clean-up operations as he completes segments of his work.

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

### 3.03 DUST CONTROL OPERATIONS

- A. The Contractor shall perform dust control operations, in an approved manner, whenever necessary or when directed by the Engineer, even though all other work on the project shall be suspended. Dust lying shall be generally accomplished by the use of water; however, the use of flake calcium chloride may be ordered when necessary to control dust nuisance.
- B. The Contractor shall practice dust control to meet all air pollution standards as set forth by federal and state regulatory agencies.

### 3.04 ACCEPTANCE

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

END OF SECTION

SECTION 01570

TRAFFIC CONTROL AND POLICING

PART 1            GENERAL

1.01            SCOPE OF WORK

PART 2            MATERIALS

2.01            GENERAL

PART 3            EXECUTION OF WORK

3.01            SCHEDULE OF OPERATIONS

3.02            LOCATION OF SIGNS

PART 1            GENERAL

1.01            SCOPE OF WORK

- A.            The Contractor shall install construction traffic and pedestrian controls as specified herein and any additional construction and/or detour controls deemed necessary by the Engineer or the Contractor himself, or required by the Manual on Uniform Traffic Control Devices.
  
- B.            Where the roadway under construction is the only means of vehicular or pedestrian access to a particular area, the Contractor must provide continual access to that area for residents and emergency vehicles.
  
- C.            Work under these items shall conform to the relevant provisions of the Massachusetts "Standard Specifications for Highways and Bridges", latest edition, as amended and specified herein.

PART 2            MATERIALS

2.01            GENERAL

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

PART 3            EXECUTION OF WORK

3.01            SCHEDULE OF OPERATIONS

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

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

3.02 LOCATION OF SIGNS

- A. The detour signs and other control devices shall be located as specified herein.
- B. The construction and/or detour signs as herein specified shall be removed and relocated after each phase of the project.
- C. The Contractor shall notify the responsible heads of the Fire, Police, and Public Works Departments, before beginning each phase of the project.
- D. All signs, barricades, makings and lighting devices shall conform to the Manual on Uniform Traffic Control Devices - latest edition.
- E. The contractor shall submit a Traffic Control Management plan detailing types of signs, detours, and locations of signs for review by the City. The submitted traffic plan shall be stamped by a Massachusetts Registered Professional Engineer.

END OF SECTION

SECTION 01710  
CLEANING UP

PART 1        GENERAL  
1.01        SCOPE OF WORK

PART 1        GENERAL

1.01        SCOPE OF WORK

- A.        During its progress the work and the adjacent areas affected thereby shall be kept clean and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that public property owners will be inconvenienced as little as possible.
  
- B.        Where material or debris has washed or flowed into or been placed in watercourses, drains, catch basins, or elsewhere as a result of the Contractor's operations, such materials or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, etc., kept in a neat, clean and functioning condition.
  
- C.        On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him, shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
  
- D.        The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration, or as required in other divisions of this specification.
  
- E.        The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors and on completion of the work shall deliver it undamaged and in a fresh and new appearing conditions. All mechanical equipment shall be left fully charged with lubricant and ready for operation.
  
- F.        Payment for cleanup and restoration shall be apportioned against each of the payment items listed in the BID, unless otherwise specified.

END OF SECTION



SECTION 02016

PRE/POST CONSTRUCTION SURVEY

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS - NOT APPLICABLE

PART 3        EXECUTION OF WORK

- 3.01        INVESTIGATIONS CONDUCTED FOR INSURING AGENCIES
- 3.02        EXAMINATION OF EXISTING STRUCTURES
- 3.03        SURVEY OF EXISTING UTILITIES
- 3.04        POST CONSTRUCTION SURVEY

PART 1        GENERAL

- 1.01        SCOPE OF WORK

- A.        Work under this section consists of furnishing all labor, materials, equipment and supervision necessary to perform a pre/post construction survey of a designated "blasting area" or area where proposed excavations would influence the condition or alignment of existing structures or appurtenances. Such a study would involve a detailed, descriptive investigation with photographic support of, as minimum, all buildings within 300 feet of anticipated rock blasting or as specified herein.

- 1.02        RELATED WORK SPECIFIED ELSEWHERE

- A.        DIVISION 2 - As Appropriate

PART 2        MATERIALS - NOT APPLICABLE

PART 3        EXECUTION OF WORK

- 3.01        INVESTIGATION CONDUCTED FOR INSURING AGENCIES

- A.        Adequate liability coverage shall be secured by the Contractor for himself, the Owner and the Engineer. Such coverage as applied to this section shall cover all damages resulting from seismic disturbances created by execution of the proposed project. In the event of damage to private property resulting from excavation or blasting operations, the Owner and the Engineer shall be held harmless.
  
- B.        Pre/post construction surveys shall be performed under the supervision of a professional engineer registered in Massachusetts and shall be documented with



photographs. The pre-construction study shall be conducted no more than four weeks prior to commencement of work in the designated area in order to be considered a valid representation of existing conditions.

### 3.02 EXAMINATION OF EXISTING STRUCTURES

- A. Investigations of area structures shall be conducted with photographic support so as to exactly define the condition of their foundation and supporting columns. This established base shall be later used for comparison with post construction conditions. Deficient and failing structures shall be defined in detail.
- B. Examination of bridges and other roadway structures shall also be conducted with regards to structural integrity, alignment, elevation and with regards to related structures.

### 3.03 SURVEY OF EXISTING UTILITIES

- A. Examinations shall also be conducted with respect to area utilities. Alignments of utility poles and pipe lines shall be established wherever possible by photographic means. Elevations and conditions of drainage structures to be left-in-place shall also be examined if such information has not already been obtained by the Engineer.

### 3.04 POST CONSTRUCTION SURVEY

- A. Upon completion of construction operations in a given area, the Contractor shall conduct a final inspection and survey so as to ascertain any damage or non-damage resulting from his operations. The survey shall be fully supported by photographic evidence, and any resulting damage shall be immediately reported to the Owner, the Engineer and the insurance agent for the Contractor.

END OF SECTION

SECTION 02100

SITE PREPARATION

<u>PART 1</u>	<u>GENERAL</u>
1.01	SCOPE OF WORK
1.02	RELATED WORK SPECIFIED ELSEWHERE

PART 2            NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01	PROTECTION
3.02	PRELIMINARY SITE PREPARATION
3.03	EXPLOSIVES
3.04	CONSTRUCTION NEAR TREES
3.05	DISPOSAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A.     Furnish all labor, materials, tools, equipment, and service necessary to perform the following items of work which relate to the performance of the construction contract, in accordance with the contract drawings.
  
- B.     Work shall include:
  - 1.    Field engineering and grade control.
  - 2.    Modifications and/or abandoning or removal of existing utility structures and lines not paid for under other items.
  - 3.    Furnish and Install Erosion Control Barriers and remove barrier upon completion of project.
  - 4.    Sawcutting of pavement
  - 5.    Excavation of pavement and subbase and removal of surplus as specified under Section 02220.

1.02     RELATED WORK SPECIFIED ELSEWHERE

- A.     DIVISION 2 - SITE WORK - As Appropriate

PART 2 NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passersby. Streets, roads, adjacent property, and existing utilities to remain shall be fully protected throughout the construction operations.
- B. This item shall include any additional work required in crossing existing culverts, water courses, catch basins, drains, fire hydrants, gas, water and sewer lines and services, utility poles, and other utilities. Also included in this item is all work required to support existing utilities and structures including, but not limited to, the following: bracing, hand excavation and backfill (except concrete cradles), and any other work required for crossing the utility or obstruction, but included for payment in other items of this Specification.
- C. Fences, trees, signs, traffic islands, guardrails, and utility poles in the vicinity of the work shall be protected from damage under this item. If damaged or removed, they shall be replaced in a condition equal to that existing before construction began.

3.02 PRELIMINARY SITE PREPARATION

- A. Prior to any excavation the Engineer will furnish the following survey work: location of the benchmark(s) at the site and copies of survey notes. The Contractor shall furnish and set, at his own expense, all remaining stakes required for the construction operations and he shall be solely responsible for the accuracy of the line and grade of his work.
- B. The Contractor shall be held responsible for the preservation of all stakes and marks placed by the Engineer. If any of such stakes or marks are disturbed or destroyed by the Contractor, he shall replace them at his expense.

3.03 EXPLOSIVES

- A. Explosives will not be permitted.

3.04 CONSTRUCTION NEAR TREES

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

3.05 DISPOSAL

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

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

END OF SECTION



SECTION 02110

CLEARING AND GRUBBING

<u>PART 1</u>	<u>GENERAL</u>
1.01	SCOPE OF WORK
1.02	RELATED WORK SPECIFIED ELSEWHERE

PART 2 MATERIALS - NOT APPLICABLE

<u>PART 3</u>	<u>EXECUTION OF WORK</u>
3.01	CLEARING
3.02	GRUBBING
3.03	DISPOSAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The provisions of this section apply to undeveloped or cross-country building site areas as designated by the Engineer. It is the intent of the Contract Documents that damage and/or alteration of existing terrain be minimized and confined to a limited area.
- B. The Contractor shall clear and grub as shown on the plans, unless otherwise directed by the Engineer. Trees approved for cutting shall be marked by a 2 inch wide paint ring.
- C. The Contractor shall not cut or injure any existing trees or other vegetation outside the limits of the areas of work, as indicated on the Contract Drawings, without written approval from the Engineer. Trees or group of trees to be left in place, inside the work limits, shall be protected from damage by barriers or other suitable means to be approved by the Engineer.

1.02 RELATED SPECIFIED ELSEWHERE

- A. SECTION 02200 - EARTHWORK  
SECTION 02270 - SLOPE PROTECTION & EROSION CONTROL

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 CLEARING

- A. With the exception of those trees and other vegetation which the Engineer denotes for preservation by the Contractor, the Contractor shall cut or remove all trees, saplings, brush, and other vegetative matter such as snags, leaves, saw dust, bark, etc., and refuse. The ground shall be cleared to the width of the permanent easement unless otherwise directed by the Engineer.
- B. Trees or group of trees designated to be left standing shall be trimmed of all dead branches 1 ½ inches in diameter or more. The trees shall be trimmed of live branches to height specified by the Engineer. All limbs which are to be trimmed must be neatly cut as close as possible to the tree trunk or a major branch; and all cuts more than one inch in diameter shall be painted by an approved tree wound paint.

- C. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operation, trees, stumps, and stubs to be cleared shall be cut as close to the ground surface as practicable, with no more than 6 inches remaining above the ground surface in the case of small trees, and 12 inches in the case of large trees.

### 3.02 GRUBBING

- A. In areas to be grubbed, the Contractor shall remove completely all stumps, remove to a depth of 18 inches all roots larger than 3 inches in diameter, and remove to a depth of 6 inches all roots larger than ½ inch in diameter. Such depths shall be measured from the existing ground surface or the proposed finished grade, whichever is the lower. Depressions resulting from grubbing shall be filled in with approved material and compacted to the height of the adjacent surface.

### 3.03 DISPOSAL

- A. All material collected in the course of the clearing and grubbing, and not to remain shall become the property of the Contractor and shall be disposed of in a manner satisfactory to the Engineer. Disposal of the materials in the clearing and grubbing operations and shall not be left until the final cleanup period.
- B. Burning shall not be allowed without a permit from the Fire Department and the approval of the Engineer. The Contractor will be responsible for compliance with all Federal, State and Local Laws regarding such burning. The site of the fire shall be picked out in advance by the Engineer. Burning shall be carried out in such a manner as to avoid all hazards which might cause damage to existing structures, construction in progress, trees, vegetation or other property not designed to be disposed of. All disposal by burning shall be under constant attention by the Contractor until the fire has burned out or has been properly extinguished.
- C. Prior to depositing surplus material at any offsite location, the Contractor shall obtain a written agreement between himself and the owner of the property. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit the material at no expense to the project Owner or the Engineer. A copy of the agreement shall be furnished to the Engineer.
- D. Because of the disease-carrying characteristics of elm trees, the Contractor shall take special care to completely dispose of all elm trees or the limbs of elm trees removed, by burying under 12 inches of soil in approved areas. Where it is evident that removed timber carries Dutch Elm disease, then the timber shall be disposed of in accordance with applicable laws.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1      GENERAL

- 1.01      SCOPE OF WORK
- 1.02      RELATED WORK SPECIFIED ELSEWHERE
- 1.03      SITE INFORMATION
- 1.04      PROTECTION OF EXISTING CONDITIONS

PART 2      MATERIALS - NOT APPLICABLE

PART 3      EXECUTION OF WORK

- 3.01      DESCRIPTION
- 3.02      OPEN EXCAVATION
- 3.03      SEPARATION OF SURFACE MATERIALS
- 3.04      EXCAVATED MATERIAL
- 3.05      DRAINAGE
- 3.06      STRUCTURE EXCAVATION
- 3.07      SLABS ON GRADE
- 3.08      TRENCH EXCAVATION
- 3.09      TRENCH EXCAVATION IN FILL
- 3.10      TRENCH LIMITS
- 3.11      EARTH EXCAVATION BELOW NORMAL GRADE
- 3.12      EXCAVATION NEAR EXISTING STRUCTURES
- 3.13      RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES
- 3.14      CARE AND RESTORATION OF PROPERTY
- 3.15      DUST CONTROL
- 3.16      BACKFILLING - GENERAL
- 3.17      BACKFILLING AROUND STRUCTURES
- 3.18      BACKFILLING IN OPEN TRENCH
- 3.19      MATERIAL FOR FILLING AND EMBANKMENTS
- 3.20      GRADING

PART 1      GENERAL

1.01      SCOPE OF WORK

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



- B. The Contractor is advised that lines and grades, as shown on plans and profiles, are subject to change. Although it is the intention to adhere to that which is shown on the plans, the Engineer reserves the right to make changes in lines and grades of utilities and locations of manholes when such changes may be necessary or advantageous.
- C. The Contractor's particular attention is directed to the related sections of the specifications. Specific information is provided for stockpiling material on-site or off-site and disposal of unsuitable material. Special requirements applicable to excavation to remove soft material, site preparation settlement, and timing of construction are identified.
- D. In open trenching on State, County, or local highways and railroad properties, the Contractor shall be governed by the conditions, restrictions and regulations made by the appropriate body. All such regulations shall be in addition to those set forth in these specifications.
- E. Any excavation, dewatering, sheeting, and bracing shall be carried out in such a manner as to eliminate any possibility of undermining or disturbing the foundations of any existing structures or any work previously completed under this Contract, or as specified herein.
- F. The Contractor shall fill or backfill all excavations as indicated on the Contract Drawings and as specified herein, but is advised that some of the excavated material may not be suitable as backfill material.

1.02 RELATED WORK SPECIFIED ELSEWHERE

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

1.03 SITE INFORMATION

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

1.04 PROTECTION OF EXISTING CONDITIONS

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

- B. Utility agencies shall be contacted and advised of proposed work prior to the start of actual excavation. The Contractor shall obtain information from the proper sources and authorities concerning locations of all utilities within the scope of this work, in order that there will be no damage done to such utilities.
- C. If and when encountered, utilities shall be supported and protected, and the Engineer shall be notified. Entrance, opportunity, and ample time shall be allowed for such measures as may be required for the continuance of utility services. Utilities to be abandoned within excavation areas shall be removed, plugged, or capped by the Contractor as directed by the Engineer. Permanent existing utilities near the excavation and/or construction work shall be properly protected during construction work, and any damage to such permanent utilities shall be repaired by the Contractor without expense to the Owner or Engineer.
- D. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs. No separate item is provided for service supports and the Contractor must cover supports in the unit prices bid for the roadway construction.
- E. The Contractor shall not be compensated for any additional work involved whenever a utility or underground structure is so encountered within the work limits.
- F. The Contractor shall not be compensated for any additional work involved if the utilities or underground structures cross the trench line transversely above or below the proposed work.
- G. Rules and regulations governing the respective utilities shall be observed. Active utilities shall be adequately protected from damage, and shall not be removed or relocated except as indicated or directed.
- H. All existing pipes, poles, wires, fences, curbing, and other structures which, in the opinion of the Engineer, must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from injury by the Contractor, and in case of injury, the Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. The Contractor shall at his own expense replace, repair, or restore the affected facilities to their original condition or shall reimburse the owner of said facilities for such expenses as the owner may accrue. When the owners do not wish to make the repairs themselves, all damage shall be repaired by the Contractor, or, if not promptly done by him, the Engineer may have the repairs made at the expense of the Contractor.
- I. Survey markers: Any existing property boundary markers, Town bounds, control points, and datum elevations markers or bench marks to be removed and replaced as shown on the Contract Drawings or directed by the Engineer shall be removed and replaced by the Contractor with all expenses for such replacement paid for by the Contractor.

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

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 DESCRIPTION

- A. The Contractor shall make excavations in such manner and to such width as will give suitable room for building the structures or for constructing the roadways but complying with the limits shown on the Contract Drawings. The Contractor shall furnish and place all sheeting, bracing, and supports; shall do all pumping and draining and any other work necessary for dewatering and shall render the bottom of the excavation firm and dry and in all respects acceptable.
- B. In no case, except as provided for in Part 3.10 titled "Trench Limits", shall the earth be plowed, scraped, or dug by machinery so near to the finished grade as to result in disturbance of material below said grade. The last of the material to be excavated shall be removed with pick and shovel just before placing pipe, masonry, or other structures.
- C. All excavations shall be braced with steel sheeting or steel excavation boxes as specified in the related specifications or as shown on the Contract Drawings.

3.02 OPEN EXCAVATION

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

3.03 SEPARATION OF SURFACE MATERIALS

- A. From areas within which excavations are to be made, loam, topsoil, sand, and gravel shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate materials, he shall furnish as directed and without additional compensation, clean backfill and loam and topsoil at least equal in quantity and quality to that excavated.
- B. When excavations are to be made in paved surfaces, the Contractor shall machine cut the pavement along the proposed trench lines, with either a pneumatic hammer or mechanical saw in such a manner that the edges of the remaining pavement follow clean, trim, straight lines. If pavement is removed, it shall not be mixed with other excavated material, but shall be disposed of away from the site before the remainder of the excavation is made.

### 3.04 EXCAVATED MATERIAL

- A. Excavated material shall be so placed as not to interfere with travel on the streets and driveways by the occupants of adjoining property, cause undesirable settlement, or obstruct free access to hydrants and gate valves. Access for emergency vehicles shall be maintained at all times. Excavated material shall not be deposited on private property until written consent of owner or owners thereof has been filed with Engineer. Onsite excavated material stockpiles shall be stored as directed by the Engineer. However, if it is impractical or unsafe to stack suitable, excavated, backfill material adjacent to the work, the material shall be hauled and stored at a location provided by the Contractor at no additional expense to the Owner. Excavated material shall not be deposited in brooks or streams. Excavation shall include the removal of unearthed wooden structures.
- B. It is expressly understood that no excavated materials shall be removed from the site of work or disposed of by the Contractor except as directed or approved by the Engineer. All material designated by the Engineer to be removed from the site shall be immediately removed and legally disposed of according to Federal, State and Local codes and regulations. The Contractor will be required to clean any roads and streets of material that is spilled from his operation of hauling and disposing of unsuitable excavated material.
- C. Suitable excavated material may be used for fill or backfill on other parts of the work.
- D. Upon completion of the backfilling, the streets or property shall be cleaned, surplus material removed, and the surfaces restored to the condition in which they were before construction. All materials left over in public highways shall become the property of the Contractor. If the Contractor fails to promptly remove such surplus material, the Engineer may have the work done and charge the cost thereof as money paid to the Contractor.
- E. Material excavated from private property shall belong to the property owner or his representative, and shall be disposed of by the Contractor, as required by said property owner or representative, but the longest haul requested by the Owner shall in no case exceed 5 miles. If the Contractor fails to promptly remove such surplus material, the Engineer may have the same done and charge the cost thereof as money paid to the Contractor.

### 3.05 DRAINAGE

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

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

- B. Every precaution necessary to obtain watertight construction of all joints in pipe, manholes, wyes, and drop connections must be taken.
- C. All ground water which may be found in trenches or excavations and any water which get may into them from any cause whatsoever shall be removed.
- D. All water pumped or drained from the work shall be disposed of in a suitable manner, satisfactory to the Engineer, without undue interference with other work or damage to pavements, other surfaces, or property.

### 3.06 STRUCTURE EXCAVATION

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

### 3.07 SLABS ON GRADE

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

### 3.08 TRENCH EXCAVATION

- A. Excavation shall not commence in any section until the pavement covering the proposed excavation has been properly cut.
- B. In general, trenches shall be excavated to such depth as will permit pipe to be laid at elevations, slopes or depths of cover as indicated on the Contract Drawings. Deeper trenches shall be provided where necessary on account of the conformation of the ground and to permit the alignment of the pipe without undue deflection of joints.
- C. Trenches shall be excavated by hand or machinery to the width and depth indicated on the Contract Drawings and specified herein under Paragraph 3.10 "Trench Limits". All

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

- D. Particular care shall be taken that no stone 6 inches or larger in any diameter protrudes more than 3 inches from the bottom or side of the trench. Suitable bell holes shall be made in the trench at joints as required.
- E. At completion of a workday, all excavations shall be covered by backfilling to existing grade or plating to entirely cover the opening or completely enclosing with a 6 foot high temporary chain link fence.
- F. In earth excavation in sections where bedding is excluded, the bottom of the trench shall be shaped so as to conform to the outside of the pipe, particular care being taken to recess the bottom of the trench in such a manner as to relieve the bell of all load.

### 3.09 TRENCH EXCAVATION IN FILL

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

### 3.10 TRENCH LIMITS

- A. The limits of normal trench excavation shall be as shown on the Contract Drawings or specified herein. Trenches shall be excavated to the required depths, adding, however, to such depths the thickness of the pipe and, where applicable, the thickness of the bedding. The width of the trench at the bottom shall always be wide enough to make the joints properly. When, in the opinion of the Engineer, it is necessary to lay a concrete foundation, the excavation shall be made as shown on the details or as ordered by the Engineer.
- B. Where the bottom of the trench, by mistake of the Contractor, has been taken out to a greater depth than above specified, it shall be refilled to the proper grade, using screened gravel material by the Contractor who shall receive no additional compensation whatever therefore. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted.
- C. The Contractor shall at all time exercise care not to excavate outside the trench limiting lines as shown on the Contract Drawings unless otherwise authorized by the Engineer.
- D. Bedding for pipe will be as detailed on the Contract Drawing and as specified in the related section of the specifications.

### 3.11 EARTH EXCAVATION BELOW NORMAL GRADE

- A. If in the opinion of the Engineer, the material at or below the depth to which excavation for structures and pipes would normally be carried is unsuitable for foundation, it shall be removed to such widths and depths as directed and replaced with suitable material. Such work shall be paid for under appropriate items.
  - 1. Roadway over-excavations shall be backfilled with compacted Type 3 material.
  - 2. Trench over-excavation shall be minimum of 3 feet or as directed by the Engineer and shall be lined with a geotextile fabric.

### 3.12 EXCAVATION NEAR EXISTING STRUCTURES

- A. Attention is directed to the fact that there are pipes, drains, and other utilities in certain locations. Some of these have been indicated on the Contract Drawings, and an attempt has been made to show all of the lines and services, but the completeness of accuracy of the information given is not guaranteed.
- B. All pipes and other utility conduits shall be located on the ground with pipe finding equipment well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or by marked stakes in the ground. All such location work shall be provided by the Contractor in cooperation with the appropriate utility to the satisfaction of the Engineer at no extra cost.
- C. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools, as directed. Such manual excavation when incidental to normal excavation shall be done to the satisfaction of the Engineer at no extra cost.

### 3.13 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

- A. Whenever the Contractor encounters certain existing structures as described below and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed, to change the location or, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.
- B. In removing existing pipes or other structures, the Contractor shall use care to avoid damage to material, and the Engineer shall include for payment only those new materials which, in his judgment are necessary to replace those unavoidably damaged.
- C. The structures to which the provisions of the preceding two paragraphs shall apply include pipes, wires, and other structures which (a) are not indicated on the Contract Drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot

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

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

### 3.14 CARE AND RESTORATION OF PROPERTY

- A. Excavation machinery and cranes shall be of suitable type and be operated with care to prevent damage to trees not to be cut and overhanging branches and limbs.
- B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. In case of cutting or unavoidable damage to branches, limbs, and trunks of trees, the cut or damaged portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.
- C. Cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations shall be protected by suitable means or shall be dug up and temporarily replanted and maintained. After the construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured so such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to the kind and quality existing at the start of the work.
- D. On paved surfaces, the Contractor shall not use or operate tractors, bulldozers, or other power operated equipment, with treads or wheels of which are so shaped to cut or otherwise damage such surfaces. All surfaces which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operation. Suitable materials and methods shall be used for such restoration.
- E. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

### 3.15 DUST CONTROL

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

### 3.16 BACKFILLING - GENERAL



- A. In general, and unless other material is indicated on the Contract Drawings or specified elsewhere, material used for backfilling trenches and excavations around structures shall be suitable material which was removed in the course of construction excavation. Backfilling shall not commence until the Engineer gives permission. Where the trench is in an area to be paved, or in an unpaved vehicular or pedestrian traveled way, or the shoulder of a paved roadway, a suitable pavement base shall be provided to a depth of at least that required in the related sections of the specifications.
- B. Suitable backfill material shall be free from cinders, ashes, refuse, boulders, rocks, or stones greater than 6 inches in any dimension, unsuitable organic material, or other material which, in the opinion of the Engineer, is unsuitable.
- C. Frozen material shall not be placed in the backfill, nor shall backfill be placed upon frozen material. Previously frozen material shall be removed, or shall be otherwise treated as required, before new backfill is placed.

### 3.17 BACKFILLING AROUND STRUCTURES

- A. The Contractor shall not deposit backfill against structures until the structure has obtained sufficient strength to withstand the earth pressure placed upon it and in no case less than seven days, nor before carrying out and satisfactorily completing the tests specified in the related sections of the specifications. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to the structure than the depth of the structure below grade. Such backfilling shall be carried up evenly on all walls of a structure simultaneously with maximum allowable variation of 2 feet in elevation at any point. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.
- B. In addition, where pipe is connected to the structure, the backfilling procedure shall be carried out as specified in "Backfilling in Open Trench".
- C. Measurement of fill material under this work will not include any filling made beyond a vertical plan of one foot outside the footings except as directed.
- D. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled or graded to eliminate ridges of soil left by compaction equipment. No fill shall be placed and compacted on snow, ice, or soil that was permitted to freeze prior to compaction.

### 3.18 BACKFILLING IN OPEN TRENCH

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

- B. If a screened gravel or concrete envelope is not used, the selected material shall be (see Contract Drawings for additional or superseding information) free from large lumps and stones having any dimension greater than 2 inches, and shall be placed simultaneously on both sides of the pipe, so that there will be no tendency to displace the pipe alignment. In placing the material, care shall be taken that stones do not strike the pipe and geotextile fabric shall be installed to the limits shown on the Contract Drawings at the locations specified on the drawings or as directed by the Engineer.
- C. A sand blanket (Type 2 material) shall be placed at the sides of the pipe up to the top of the pipe and shall be hand-placed and thoroughly compacted using approved hand-operated tampers. Backfilling shall be carried up evenly on both sides of the pipe.
- D. Type 2 material shall be extended up to a level of 1 foot above the top of the pipe shall be placed in 6 inch layers, leveled along the length and width of the trench and thoroughly compacted with approved tampers.
- E. The sand blanket (Type 2 material) may be omitted for cast iron, ductile iron and reinforced concrete pipe provided, however, that no stone large than 2 inches is in contact with the pipe.
- F. The backfill in the remainder of the excavation above the top of the screened gravel or concrete envelope, if used, shall be Type 1, backfilled in approximately 12 inch layers and promptly compacted by mechanical tamping. Material used for backfilling to a point two feet over the pipe shall contain no stones larger than three inches in greatest dimension. Backfilling or tamping with trenching machines is prohibited.
- G. Care shall be taken in the use of mechanical or other tampers not to injure or move the pipe or cause the pipe to be supported unevenly.
- H. Large masses of backfilling material shall not be dropped into the trench in such a manner, in the opinion of the Engineer, as to endanger the pipe.
- I. All backfilled trenches shall be thoroughly surface tamped with a tamping machine approved by the Engineer.
- J. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material.
- K. No compacting shall be done when the material is too wet to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compacting.

### 3.19 MATERIAL FOR FILLING AND EMBANKMENTS

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

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

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

### 3.20 GRADING

- A. Grading, in preparation for placing of paved walks and drives and appurtenances, shall be preformed at all places to the lines, grades, and elevations as directed by the Engineer. All unsuitable material encountered, of whatever nature, shall be removed and disposed of as directed. During the process of grading, the sub-grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or conditions or the work.
- B. The right is reserved to make minor adjustments or revisions in lines or grades if found necessary as the work progresses or in order to obtain satisfactory construction.
- C. All slopes cut during construction shall be uniformly redressed to the slope, cross-section and alignment existing prior to construction as indicated on the Contract Drawings or as directed by the Engineer.

END OF SECTION

SECTION 02220

RECLAMATION OF BASE COURSE

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS

- 2.01        SCARIFIED AND PULVERIZED MATERIAL

PART 3        CONSTRUCTION METHODS

- 3.01        RECLAMATION OF BASE COURSE CONSTRUCTION METHODS

PART 1 GENERAL

- 1.01        SCOPE OF WORK

- A.        The work shall consist of scarifying and pulverizing the in place asphalt pavement and underlying material, mixing and/or blending the material, removing excess material necessary to provide a sufficient depth of reclaimed material and spreading and compacting the resultant mixture to the lines and grades shown on the plans or established by the Engineer.
- B.        Work under this Item shall conform to the relevant provisions of the Massachusetts Department of Public works "Standard Specifications for Highways and Bridges" (latest edition).

- 1.02        RELATED WORK SPECIFIED ELSEWHERE

- A.        SECTION 02250 - COMPACTION CONTROL AND TESTING

PART 2        MATERIALS

- 2.01        SCARIFIED AND PULVERIZED MATERIAL

- A.        All scarified and pulverized material shall pass the 3 inch sieve. Materials for blending shall conform to the requirements of Gravel Borrow, Type b (M1.03.0) of the Massachusetts Department of Public Works Standard Specifications for Highways and Bridges.

PART 3        CONSTRUCTION METHODS

- 3.01        RECLAMATION OF BASE COURSE CONSTRUCTION METHODS

- A.        Prior to scarifying and pulverizing the existing pavement, the Contractor shall locate and protect existing drainage and utility structures and underground pipes, culverts, conduits and other appurtenances. If the upper sections of utilities are removed to facilitate scarifying and pulverizing the existing pavement, the remaining part of the

structure shall be immediately covered with a steel plate capable of withstanding a 36.5 ton truckload with impact.

- B. The Contractor shall submit to the Engineer for approval a description of equipment and process to be used for scarifying and pulverizing the existing pavement. The pulverizing operation shall be controlled in such a manner that the resultant material will be free from excessive fine material (material passing the No. 200 sieve). The Engineer will determine the acceptable level of fine material.
- C. The bituminous pavement and underlying material shall be scarified to depths shown on the plans or established by the Engineer and pulverized and mixed to produce a consistent homogeneous material, 100 percent passing the 3 inch sieve and without an excess of material passing the No. 200 sieve. If the Engineer directs, Gravel Borrow (Type b) shall be blended with the pulverized material in quantities established by the Engineer to produce a uniform blend suitable for use as base course only if excess suitable reclaim from other areas is not available.
- D. Unsuitable material in the subgrade shall be removed to the lines and depths established by the Engineer and shall be included in the unit price for reclaim item. If excess suitable reclaimed base course material is available, it shall be used to replace unsuitable material without extra compensation. Any excess reclaimed material shall become the property and responsibility of the Contractor. If sufficient suitable reclaimed base course material is not available, then the unsuitable material shall be replaced with Gravel Borrow conforming to the requirements of Subsection M1.03.0, Type b.
- E. Suitable material in the subgrade (material under reclaim) shall be removed to the lines and depths as shown on the contract drawings or as established by the Engineer and shall be included in the unit price of reclaim item.
- F. The mixed and/or blended base course material shall be spread and compacted in accordance with the requirements of SECTION 02250 - COMPACTION CONTROL AND TESTING, to the widths, depths and crowns shown on the plans or established by the Engineer.
- G. Procedure for completing cut operations where the removal of subgrade material is required shall be to windrow all reclaim material to the opposite side of the excavation. Excavate subgrade material to the proposed grade, then windrow back all reclaim material to the proposed grade of the reclaimed material. The cost associated with this work shall be paid for under the reclaim item.
- H. Procedure for completing cut operations where the removal of subgrade material is not required shall be to remove surplus reclaimed material to the proposed grade of the reclaimed material and stockpile for later use or to place in fill areas as required. The cost associated with this work shall be paid for under the reclaim item.
- I. Procedure for completing fill operations is to place suitable surplus excavated reclaimed material (from cut areas) to the proposed grade of the reclaimed material. If surplus

reclaimed material is unavailable then Gravel Borrow conforming to the requirements of Subsection M1.03.0, Type b shall be placed. The cost associated with this work shall be paid for under the reclaim item.

- J. According to the proposed standard cross section as part of the contract drawings, the proposed reclaimed base course shall be a minimum 12" depth in all areas upon completion of the work.

END OF SECTION



SECTION 02221

ROCK EXCAVATING AND DISPOSAL

PART 1 GENERAL

- 1.01 SCOPE OF WORK
- 1.02 RELATED WORK SPECIFIED ELSEWHERE

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

- 3.01 ROCK EXCAVATION - GENERAL
- 3.02 ROCK BLASTING
- 3.03 EXPLOSIVES
- 3.04 BLASTING RECORDS
- 3.05 EXCESS ROCK EXCAVATION
- 3.06 SHATTERED ROCK
- 3.07 BACKFILLING ROCK EXCAVATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work under this section consists of furnishing all labor, tools, equipment and supervision necessary to excavate rock, if encountered, to the lines and grades required to install the pipe as indicated on the Contract Drawings. The Contractor shall dispose of the excavated material for backfill in place of the excavated rock.
- B. In general, rock in trench shall be excavated so as to be not less than 6 in. from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or when so specified or indicated on the drawings, it shall be backfilled with the same material as that required for bedding the pipe and will be furnished and placed at the expense of the Contractor.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. DIVISION 2 -SITE WORK

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 ROCK EXCAVATION - GENERAL

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



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

### 3.02 ROCK BLASTING

- A. If blasting is required and allowed, it shall be done in a safe manner by a licensed blaster, and the Contractor shall take all precautions necessary for the protection of persons and property. Extreme care shall be exercised in the handling and use of explosives. No blasting work shall be performed without permission from all governing authorities and the Engineer. Any blasting work approved as necessary shall be done in accordance with all applicable safety regulations including all State and local regulations. Ample warning shall be given for all blasts, and adequate means taken to prevent all persons from entering the blasting area. Experienced personnel shall do all blasting operations. The Contractor shall be entirely responsible for any blasting operations and the results therefrom. The Contractor at no additional expense to the Owner shall correct any damage caused by blasting.
- B. Prior to conducting any blasting, the Contractor shall prepare, and submit to the Engineer for review, a description of the blasting procedures that the Contractor proposes to use on the various segments of the work. The Contractor shall measure vibration from blasting operations at all structures within 100 feet of a blast with a seismograph. The Contractor shall perform a series of test shots to ascertain the allowable load per delay. The Contractor shall adjust the maximum allowable particle velocity to site-specific requirements.
- C. The Contractor shall perform a pre/post construction survey of existing structures, utilities, bridges, and roadways on both sides of the water main alignment where any structures are within 100 feet of the water main centerline.
- D. The surveys shall be performed under the supervision of a Professional Engineer, registered in Massachusetts, and shall be documented with photographs.
- E. Blasting and explosion coverage shall be obtained if there is a need for blasting under this Contract, and no blasting shall be performed until such insurance has been secured. Insurance amounts shall correspond with Contract general and supplemental conditions.

### 3.03 EXPLOSIVES

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

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

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

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

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

#### 3.04 BLASTING RECORDS

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

#### 3.05 EXCESS ROCK EXCAVATION

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

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

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

#### 3.06 SHATTERED ROCK

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

3.07 BACKFILLING ROCK EXCAVATIONS

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

END OF SECTION

SECTION 02224

FILL AND BACKFILL MATERIALS

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        APPROVAL OF MATERIALS
- 1.03        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS

- 2.01        TYPE 1 - COMMON BORROW
- 2.02        TYPE 2 - SAND BORROW
- 2.03        TYPE 3 - SAND AND GRAVEL
- 2.04        TYPE 4 - COARSE GRAVEL
- 2.05        TYPE 5 - LOAM BORROW AND TOPSOIL
- 2.06        TYPE 6 - SCREENED GRAVEL MATERIALS
- 2.07        TYPE 7 - CRUSHED STONE

PART 3        EXECUTION OF WORK

- 3.01        PLACING AND COMPACTING

PART 1        GENERAL

- 1.01        SCOPE OF WORK

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

- 1.02        APPROVAL OF MATERIALS

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

- 1.03        RELATED WORK SPECIFIED ELSEWHERE

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

PART 2        MATERIALS

- 2.01        TYPE 1 - COMMON BORROW

- A. Common Borrow shall be a granular material obtained from approved on-site or off-site natural deposits and unprocessed except for the removal of unacceptable material and stones larger than six (6) inches. It shall not contain vegetation or roots. It shall be free from loam, clay, fine wood, trash, and other objectionable materials or harmful substances.
- B. Common Borrow shall consist of a material satisfactory to the Engineer and not specified as gravel borrow, sand borrow, special borrow material or another particular kind of borrow. This material shall have the physical characteristics of soils designated as group A-1, A-2 - 4 or A-3, under AASHTO-M145. It shall have properties such that it may be readily spread and compacted for the formation of embankments.

2.02 TYPE 2 - SAND BORROW

- A. Sand Borrow shall consist of clean, inert, hard, durable grains of quartz or other hard durable rock. It shall be free from clay, loam, vegetable or other objectionable matter.
- B. Material for pipe cover, landscaping, or other uses as determined by the Engineer, shall be well graded as follows or as indicated on the Contract Drawings. The allowable amount of material passing a No. 200 sieve as determined by AASHTO-T11 shall not exceed 10 percent by weight.

<u>Sieve Size</u>	<u>Percent by Weight Passing Through</u>
$\frac{3}{8}$ inch	85 - 100
#16	50 - 85
#200	0 - 10

2.03 TYPE 3 - SAND AND GRAVEL

- A. The sand and gravel material for foundation sub-grades or structural fills shall meet AASTHO-M145, for A-1-a, A-1-b, or A-3 soils. The mixture shall consist of clean hard durable particles or fragments. It shall be free from loam, organic or other objectionable matter.
- B. Subgroup A-1-a includes those materials consisting predominantly of stone fragments or gravel, either with or without a well-graded binder of fine material and with 50% maximum passing the No. 10 sieve, 30% maximum passing the No. 40 sieve and 15% maximum passing the No. 200 sieve. The fraction passing the No. 40 shall have a maximum plasticity index of 6.
- C. Subgroup A-1-b includes those materials consisting predominantly of course sand either with or without well-graded soil binder and with 50% maximum passing the No. 40 sieve and 25% maximum passing the No. 200 sieve. The fraction passing the No. 40 shall have a maximum plasticity of 6.

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

2.04 TYPE 4 - COARSE GRAVEL

- A. The material shall consist of clean hard, inert, durable particles or fragments. It shall be free from clay, loam, vegetable or other objectionable matter. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used.
- B. Material for foundation under drainage, pavement subbase, or other uses as determined by the Engineer shall be well graded as follows:

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

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

2.05 TYPE 5 - LOAM BORROW AND TOPSOIL

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

2.06 TYPE 6 - SCREENED GRAVEL MATERIALS

- A. The gravel shall generally conform to ASTM-C33 and shall consist of clean, hard, inert, durable particles or fragments. It shall be free from clay, loam, organic or other objectionable matter. Crushed rock of suitable size and grading may be used instead of screened gravel. The specifications which follow shall apply to whichever material is used.
- B. Material for trench stone fill shall consist of sound angular stones; 50 to 70 percent of which shall weigh at least 500 pounds and the remainder shall weigh not less than 50 pounds each.
- C. Material for trench bedding shall be well graded from ¾ inch to 2 inch.
- D. Material for stabilizing trench base shall be well graded from ½ inch to 1 ½ inch.

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

<u>SIEVE SIZE</u>	<u>PERCENT BY WEIGHT PASSING</u>
1 inch	100
¾ inch	90 - 100
⅜ inch	20 - 55
#4	0 - 10
#8	0 - 5

2.07 TYPE 7 - CRUSHED STONE

- A. The crushed stone shall consist of clean, hard, inert, durable particles or fragments. It shall be free from clay, loam, vegetable or other objectionable matter.
- B. At least 50% of the material passing a one (1) inch sieve shall have a fractured face. The percent of wear of the crushed stone for pavement base coarse shall not exceed 50.

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

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

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

PART 3 EXECUTION OF WORK

3.01 PLACING AND COMPACTING

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

END OF SECTION

SECTION 02226

SAND BLANKET

- PART 1        GENERAL
- 1.01        CONTRACT DOCUMENTS
  - 1.02        DESCRIPTION OF WORK
  - 1.03        RELATED WORK SPECIFIED ELSEWHERE

- PART 2        MATERIALS
- 2.01        SAND
  - 2.02        GRADATION

- PART 3        EXECUTION OF WORK
- 3.01        PLACING AND COMPACTING

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        DESCRIPTION OF WORK
  - A.        The Contractor shall furnish, place and compact sand in trenches and elsewhere, as directed by the Engineer.
- 1.03        RELATED WORK SPECIFIED ELSEWHERE
  - A.        DIVISION 2—As Appropriate

PART 2        MATERIALS

- 2.01        GRAVEL
  - A.        The sand shall consist of clean, hard and durable particles or fragments of quartz on the durable rock. It shall be free from dirt, vegetable or other objectionable matter, an excess of soft, thick elongated, laminated or disintegrated pieces.
- 2.02        GRADATION
  - A.        The sand shall be well graded in size so that 90 to 100 percent passes a ½ inch sieve and not more than 15 percent will pass a No. 200 sieve.



PART 3      EXECUTION OF WORK

3.01      PLACING AND COMPACTING

- A.      The material shall be placed and compacted as specified in SECTION 02250—  
          COMPACTION CONTROL AND TESTING

END OF SECTION

SECTION 02250

COMPACTION CONTROL AND TESTING

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE
- 1.03        SUBMITTALS

PART 2        MATERIALS

- 2.01        TEST METHODS

PART 3        EXECUTION OF WORK

- 3.01        COMPACTION EQUIPMENT
- 3.02        COMPACTION REQUIREMENTS
- 3.03        APPROVAL OF FILL OR BACKFILL MATERIAL
- 3.04        FREQUENCY OF COMPACTION TESTING
- 3.05        FAILED TESTS

PART 1        GENERAL

1.01        SCOPE OF WORK

- A.        The Contractor shall furnish all labor, materials and equipment necessary to place and compact fill or backfill. The Contractor shall furnish all equipment necessary to collect soil samples.
- B.        Actual testing of soil samples with the exception of insitu-density determinations shall be done by an independent testing laboratory approved by the Owner. Insitu-density determinations shall be made by the Engineer or his representative. Copies of test results shall be furnished by the test laboratory directly to the Engineer.

1.02        RELATED WORK SPECIFIED ELSEWHERE

- A.        SECTION 02200 - EARTHWORK
- B.        SECTION 02224 - FILL AND BACKFILL MATERIALS
- C.        SECTION 02226 – SAND BLANKET

1.03        SUBMITTALS

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

PART 2        MATERIALS

2.01            TEST METHODS

- A.            Contractor shall provide heavy-duty sample bags for fill or backfill material to be tested. Soils shall be classified as in the in the related sections of the Specifications which include AASHTO specifications M145 Recommended Practice for Classification of Soils as Soil-Aggregate Mixtures for Highway Construction Purposes.
- B.            Soil samples shall be prepared for testing according to ASTM D42 Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.
- C.            Gradation testing shall be done according to ASTM D2216 Particle Size Analysis of Soils and ASTM D1140 test for Amount of Materials in Soils Finer than the No. 200 sieve.
- D.            Moisture content of soil shall be determined by ASTM D2216 Laboratory Determination of Moisture Content of Soil.
- E.            Liquid Limits and Plasticity Index shall be determined ASTM D423 Liquid Limit of Soils and ASTM D424 by Plastic Limit and Plasticity Index of Soils.
- F.            Maximum dry density for each type of fill shall be determined by ASTM D1557 Method D Moisture - Density Relations of Soils using 10-lb. Hammer and 18-in. Drop.
- G.            In-place field unit weight shall be determined by ASTM D- 1556 Density of Soil in Place by the Sand-Cone Method.
- H.            Maximum dry density at the discretion of the Engineer may be determined in accordance with ASTM D-2049 test for Relative Density of Cohesionless Soils.

PART 3        EXECUTION OF WORK

3.01            COMPACTION EQUIPMENT

- A.            No backfilling shall be done until the compacting equipment list has been submitted and approved as conforming to the Contract requirements. Sufficient compacting equipment shall be available at all times, thereafter while backfilling is being conducted.
- B.            Each layer of fill shall be inspected prior to compaction. All visible roots, vegetation, or debris shall be removed. Stones larger than 6 inches in diameter shall be removed. The water content of each layer shall be determined to be suitable for compaction or shall be brought to a suitable condition. Material incorporated in the fill which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense. Placement of fill on frozen ground or placement of fill material which is frozen will not be permitted.

- C. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
- D. Filling shall begin in the lowest section of the area. Fill shall be spread in layers as specified. The surface of each layer shall be approximately horizontal but will be provide with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point. Filling shall be conducted so that no obstruction to drainage from other sections of the fill area is created at any time. Sumps, if any, shall be continuously maintained in effective operating condition.
- E. Each layer of material shall be compacted by the use of only approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, or where such equipment is not permitted, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
- F. The compaction equipment shall be operated so as to make a minimum of three passes over each section of each layer of fill. Each successive pass shall overlap the adjacent pass by not less than 10%. Additional passes shall be made to obtain the required compaction, if necessary.
- G. Compaction by water jetting or puddling will be allowed only if the Engineer deems the conditions suitable for this method. Wherever the material contains excessive amounts of clay or loam to prevent satisfactory drying, water-jetting shall not be used.
- H. If the material is allowed to be compacted by water jetting or puddling, it shall be placed in uniform layers not exceeding 4 ft. deep. Each layer shall be thoroughly saturated throughout its full depth and at frequent intervals until all slumping ceases. For water jetting or puddling, the Contractor shall provide one or more jet pipes, each of sufficient length to reach the specified depth and not less than 1 ½ in. in diameter. The jet pipe shall be equipped with a quick-acting valve and sufficient fire hose to connect to a hydrant or pump having adequate pressure and capacity. A hydrant shall be utilized only upon approval of the local Water and/or Fire Departments. The Town requires that all water usage shall be metered. The Contractor shall obtain a meter for hydrant usage at the water department. There will be no additional charge for water used for the project.

### 3.02 COMPACTION REQUIREMENTS

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

- B. Pipe Sand Blanket: Material shall be Type 2 fill placed uniformly in 6 inch layers and compacted to 90% of maximum dry density of the sand. Compaction shall be accomplished by 20 lb. hand tampers.
- C. Trench Cover: Material shall be Type 1, 2, 3 or 4 fill placed uniformly in 12 inch layers and compacted to 95% of maximum dry density for the type of material used. Compaction shall be accomplished by mechanical tampers. Compaction by water-jetting shall be in accordance with the related sections of the specifications.
- D. Catch Basin and Manhole Base Bedding: Material shall be Type 6 fill placed uniformly in 6 inch layers and compacted. Compaction shall be accomplished by 20 lb. hand tampers or pneumatic tampers.
- E. Structural Fill (foundation sub-grade, foundation under drainage, pavement sub-grade, pavement sub-base): Material for foundation sub-grade or pavement sub-grade shall be Type 3 fill. Structural fills shall be placed in 6 inch layers compacted to 95% maximum dry density for a given type of material. Compaction shall be by mechanical power driven vibratory compactors. Pavement sub-grade in cut areas shall be rolled and compacted to 95% density of the in situ material.
- F. Fill around structures shall be Type 1, 2, 3, or 4 material placed in 6 inch layers and compacted to 95% maximum dry density. Compaction shall be accomplished by mechanical power driven vibratory compactors. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to the structure than the depth of the structure below grade.
- G. Non Structural Fill (Landscaping and other uses as designated by the Engineer): Material shall be Type 1, 2, 3 or 4 placed in 12" layers and compacted to 45% maximum dry density for the given type of material used. Compaction shall be accomplished by mechanical power-driven vibratory compactors.

### 3.03 APPROVAL OF FILL OR BACKFILL MATERIAL

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

3.04 FREQUENCY OF COMPACTION TESTING

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

3.05 FAILED TESTS

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

END OF SECTION



SECTION 02270

SLOPE PROTECTION AND EROSION CONTROL

<u>PART 1</u>	<u>GENERAL</u>
1.01	SCOPE OF WORK
1.02	RELATED WORK SPECIFIED ELSEWHERE
<u>PART 2</u>	<u>MATERIALS</u>
2.01	SLOPE PROTECTION AND EROSION CONTROL
2.02	SEDIMENTATION POOLS
2.03	SILT FENCES
2.04	STONE LINED WATERWAYS
<u>PART 3</u>	<u>EXECUTION OF WORK</u>
3.01	PRECONSTRUCTION CONFERENCE
3.02	PROCEDURAL DETAILS
3.03	ACCEPTANCE

PART 1 GENERAL

- 1.01 SCOPE OF WORK
- A. This work shall consist of temporary and permanent control measures as shown on the Contract Drawings, as required, or as ordered by the Engineer throughout the construction and post-construction period to control erosion and sedimentation by the use of silt fences, sedimentation pools, check dams, filter fabric and other control devices. The erosion and sediment control features installed by the Contractor shall be satisfactorily maintained by the Contractor.
  - B. In the event that temporary erosion and sediment control measures are required due to the Contractor's negligence, carelessness or failure to install permanent controls as a part of the work scheduled, and such additional measures are ordered by the Engineer, the work shall be performed by the Contractor at his expense.
  - C. Repeated failures by the Contractor to control erosion (pollution/siltation) shall be cause for the Engineer to employ outside assistance or to use his own forces to provide the necessary corrective measures. The cost of such assistance plus Engineering costs will be charged to the Contractor and appropriate deductions made from the Contractor's monthly progress estimate.
  - D. The Contractor shall remove sediment from behind silt fences, check dams and from sedimentation pools as necessary or as directed by the Engineer.
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
- A. SECTION 1300 - SUBMITTALS
  - B. DIVISION 2 - SITE WORK



PART 2                      MATERIALS

2.01                      SLOPE PROTECTION AND EROSION CONTROL

- A.                      This work shall consist of the design, installation, maintenance and removal of temporary erosion control measures such as mulching slope drains and grasses to control and/or prevent erosion around the construction site during construction. Mulches may be hay, straw, fiber mats, netting or other suitable material acceptable to the Engineer.
- B.                      Slope drains may be constructed of pipe, fiber mats, or other material acceptable to the Engineer that adequately controls erosion.
- C.                      Grass shall be a quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area providing a temporary cover which will not later compete with the grasses used later for permanent cover.
- D.                      Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Engineer.
- E.                      Hay bales shall be 36" x 18" x 24", or larger, with two 1" x 1" x 48" stakes, per bale, to secure the bale in place.

2.02                      SEDIMENTATION POOLS

- A.                      Sedimentation pools where used shall be constructed to a size and configuration and at locations as approved by the Engineer. The sedimentation pools shall be constructed and operational before excavation, embankment or drainage system construction in the area served by the pool is started. A series of haybales, in a rectangle secured with oak stakes (see attached detail), line with siltation fence, and shall be used to construct a siltation pool. The discharge hose from the trench shall discharge into the pool. Sedimentation pools shall be maintained during and after construction in good hydraulic condition such that function as intended. Pools shall be maintained and kept in operation by the Contractor for the duration of the project. Sediment and other deposits shall be removed when the depth of material reaches 12 inches, or as directed by the Engineer, to ensure satisfactory pool performance. The Contractor shall provide and maintain access to the pools for their maintenance. The pools shall be removed at the completion of the Contract or when directed by the Engineer. All disturbed areas shall be covered with 4 inches of plantable soil borrow and seeded in accordance with the provisions of these Specifications.

2.03                      SILT FENCES

- A.                      This work shall consist of the construction, maintenance and removal of temporary silt fences. The silt fences shall be placed at the location shown on the Contract Drawings or as directed by the Engineer. The silt fences shall be in place before construction in the area begins.

- B. The snow fence should be set in place with a 6" trench on the front side. The filter fabric will be laid loosely on the fence so as not to stretch the material. The panels shall be overlapped a minimum of 12 inches. Suitable tie wire shall be used to secure the cloth to the top of the fence. The bottom of the cloth should be buried in the trench to prevent water from flowing beneath the fence. Fence posts shall be wooden or metal posts set 1 ½ feet into the ground at 6' centers.
- C. The filter fabric shall conform to the following requirements. The yarn shall consist by weight of at least 85 percent vinylidene chloride and shall contain stabilizers added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and/or heat exposure. After weaving, the cloth shall be calendered so that the filaments retain their relative positions with respect to each other. The cloth shall be free of defects or flaws which significantly affect its physical and/or filtering properties. It shall be woven in widths of at least 6 feet and in rolls of not less than 50 linear feet. The sheets of filter cloth shall be sewn together with polypropylene or polyvinylidene chloride at the point of manufacture to form sections not less than 24 feet wide. All edges of the cloth shall be salvaged. During shipment and storage, cloth shall be wrapped with a suitable material for protection against damage.
- D. Should the Contractor desire to use an equal filter fabric sample of the proposed filter fabric shall be furnished 30 days prior to installation of the fabric. Samples, shipping, and cost of testing shall be at the Contractor's expense. A minimum of 5 square yards of cloth a minimum of 36 linear inches of seam, with at least one foot of cloth each side of the seam, shall be furnished for testing. Mill certificates, or affidavits from the manufacturer, shall accompany these samples, citing the trade name and producer of the cloth and certifying that the samples are representative of the material which will be installed on the project and that the cloth meets the requirements stated in this Specification. In addition, a certified copy of permeability and filtration tests from a qualified laboratory showing the performance of filter with various grain size soils and water, giving both particle retentions and permeability, shall be submitted at the request of the Engineer.
- E. Filter fabric shall be handled and placed in accordance with the manufacturer's recommendations. When the fabric is joined by stitching it shall be stitched with a yarn of contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per inch of seam.
- F. Should the fabric be damaged during placing, the torn or punctured section shall be repaired by placing a piece of fabric that is large enough to cover the damaged area and to meet the overlap requirement.
- G. Damaged sections of the silt fences shall be repaired or replaced by the Contractor for the duration of their use. Sediment shall be removed as directed by the Engineer.

- H. The silt fences shall be removed when adequate vegetative growth insures no further erosion of the slopes or when directed by the Engineer. The filter fabric may be cut at ground level.
- I. All material, including the filter fabric and fence, become the property of the Contractor and shall be disposed of away from the site.

#### 2.04 STONE LINED WATERWAYS

- A. The Contractor shall provide all material, labor, and crushed stone for waterways, consisting of a protective covering of angular shaped stones laid on the waterway to insure protection of the waterway.
- B. The waterway shall be placed to line and grade as shown on the plans or as directed by the Engineer on a prepared bed of crushed stone. Each stone for the waterway shall be carefully placed by hand, normal to the slope and firmly bedded thereon. Each stone shall weigh not less than 50 pounds nor more than 125 pounds and at least 75% of the volume shall consist of stones weighing not less than 75 pounds each. The remainder of the stones shall be so graded that when placed with the larger stones, the entire mass will be compacted with a minimum percentage of voids and a minimum thickness of 6 inches.

### PART 3 EXECUTION OF WORK

#### 3.01 PRECONSTRUCTION CONFERENCE

- A. At the preconstruction conference or prior to the start of the applicable construction, the Contractor shall submit to the Engineer for acceptance, his plans and schedules for accomplishment of temporary and permanent slope protection and erosion control and restoration work, as are applicable for clearing and grubbing and general construction and disposal of unsuitable material and restoration of disturbed land to its original (prior to construction) condition. No work shall be started until schedules and methods of operations have been approved by the Engineer.

#### 3.02 PROCEDURAL DETAILS

- A. The Engineer shall have the authority to limit the area of erodible earth exposed by construction and to direct the Contractor to provide immediate permanent or temporary erosion control and slope protection measures to prevent sediment runoff to adjacent streams, ponds, or other areas of water impoundment. Such work may involve the construction of temporary mulches, mats, seeding or other control devices or methods as required by the conduct of the work or as directed by the Engineer.
- B. The Contractor shall be required to incorporate all permanent erosion control measures into the project at the earliest practical time as outlined in the approved schedule. Temporary erosion control and slope protection measures will be used to correct conditions that develop during construction that were not foreseen during the design stage.

- C. The Contractor shall undertake and comply with the following measures with respect to adverse environmental impacts, resulting from the operations listed below.
1. Clearing and Grubbing - Disturbed areas shall be re-grassed at the direction of the Engineer.
  2. Access Road Construction - Riprap or sodding shall be used to prevent erosion.
  3. Material Storage - Materials shall be stored only at approved locations. Petroleum products shall be stored away from wetland areas.
  4. Excavation - The Contractor shall use care to contain wet fill where it is dumped. When material is stockpiled next to a trench, the side away from neighboring brooks, swamps, canals, etc., shall be utilized where space is available. Side slopes of stockpiled material shall conform to the natural angle of repose of the soil. The Contractor shall promptly remove all sediment from brooks and swamp areas, if deposition cannot be avoided during construction. The Contractor shall promptly remove excess fill and re-grass the work area. Excess fill shall not be disposed of in wetlands, other than in areas defined on the drawings, or areas approved by commissions or authorities having jurisdiction.
  5. Water handling - The Contractor shall be required to use crushed stone or plastic sluiceways leading to brooks to filter pumped discharges.
  6. Backfilling - The Contractor shall replace unsuitable material with properly suitable material. He shall also be responsible for surface repairs as required.
  7. General - Trash receptacles shall be required on the job site. The Contractor shall perform preliminary clean-up operations as he completes segments of his work.
  8. Spillings - Ground spilling of oil or other petroleum products drained from equipment shall be prohibited. The Contractor shall provide leakproof containers for receiving drained oil and shall properly dispose of such oil away from the site of the job.

### 3.03 ACCEPTANCE

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

END OF SECTION



SECTION 02380

SHEETING AND BRACING

<u>PART 1</u>	<u>GENERAL</u>
1.01	SCOPE OF WORK
1.02	RELATED WORK SPECIFIED ELSEWHERE
1.03	SUBMITTALS
<u>PART 2</u>	<u>MATERIALS</u>
2.01	STEEL SHEET PILING
2.02	TIMBER SHEET PILING
2.03	STEEL SHORING BOXES
2.04	STEEL PLATES
<u>PART 3</u>	<u>EXECUTION OF WORK</u>
3.01	GENERAL
3.02	INSTALLATION OF SHEETING AND PLATES
3.03	EXCAVATION UTILIZING SHORING BOXES
3.04	SHEETING AND PLATES LEFT-IN-PLACE
3.05	EXTRACTION OF SHEETING PLATES

PART 1      GENERAL

1.01      SCOPE OF WORK

- A.      The Contractor shall do all permanent and temporary work involved in the bracing of excavation through the use of steel sheet pilings, timber sheeting, shoring boxes, and steel plates or as shown on the Contract Drawings or as directed by the Engineer.
  
- B.      The Contractor shall take responsibility and shall furnish all parts, labor and materials for the placement and maintaining of sheeting, bracing or shoring of the sides of the excavation so as to prevent earth movements which would in any way diminish the width of excavation so as to interfere with proper construction, which would cause injury to persons in or about the work site, which would endanger adjacent structures, or which would delay the progress of work.
  
- C.      The Contractor shall engage a Professional Engineer, registered in the State of Massachusetts and possessing prior experience in this field to design all necessary sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design, and written certification of this shall be provided promptly by the Professional Engineer.

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. DIVISION 2 - SITE WORK

1.03 SUBMITTALS

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

PART 2 MATERIALS

2.01 STEEL SHEET PILING

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

2.02 TIMBER SHEET PILING

- A. Timber Sheeting shall be composed of a 3 layer laminated timber with tongue and groove connecting edges. The toe of the sheeting shall be cut on a diagonal so that, in driving, the pile will be continuously wedged back against the previously driven pile. Timber sheet piling shall conform to the requirements of AASHTO M. 09. 01-1.
- B. Timber Sheeting shall be sound, straight grained, free from shakes, loose knots, and other defects liable to impair its strength or durability.

2.03 STEEL SHORING BOXES

- A. In areas where temporary sheeting is specified, steel shoring boxes may be utilized to protect the excavation from collapsing when approved by the Engineer.
- B. The boxes shall be composed of sections, the number of which shall be dictated by the depth of excavation. The forward end of the box shall be equipped with cutting edges to facilitate the movement of the box along the trench bottom and shall be equipped with eyelets or hooks by which the excavator may pull the boxes along.

2.04 STEEL PLATES

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

PART 3 EXECUTION OF WORK

3.01 GENERAL

- A. Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of materials from behind the sheeting. If it is necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside the sheeting, but if voids are formed, they shall be filled immediately and compacted.
- B. The Engineer may direct that sheeting and bracing be cut off at any specified elevation, at least 3 feet below final grade.
- C. In streets, the Contractor will generally be required to install the braced excavation from the existing ground surface.

3.02 INSTALLATION OF SHEETING AND PLATES

- A. Sheet piles shall be driven in such a manner as to preserve interlocking between piles and so as to be vertical without any tendency to leaning.
- B. If handling holes on sheets should extend below normal static groundwater elevation, they shall be welded or plugged so as to facilitate trench dewatering operations.
- C. Splicing of steel piles shall not occur without the prior approval of the Engineer and spliced sections shall not be driven until inspection of the welded splice has been conducted by the Engineer.
- D. Bracing of the sheeting shall follow the designs of the Contractor's Professional Engineer and be subject to additional bracing if directed by the Engineer.

3.03 EXCAVATION UTILIZING SHORING BOXES

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



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

3.04 SHEETING AND PLATES LEFT-IN-PLACE

- A. When indicated in the Contract Documents, or as directed by the Engineer, sheeting and/or bracing shall be left-in-place and properly backfilled.
- B. The Engineer may direct the Contractor at any time in writing, to have sheeting, bracing, left in place to be embedded in backfill or concrete for the purpose of preventing subsequent injury to structures or property.

3.05 EXTRACTION OF SHEETING AND PLATES

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

END OF SECTION

SECTION 02401

DEWATERING

<u>PART 1</u>	<u>GENERAL</u>
1.01	SCOPE OF WORK
1.02	RELATED WORK SPECIFIED ELSEWHERE
1.03	DESIGN AND PERFORMANCE REQUIREMENTS
1.04	SUBSURFACE CONDITIONS

<u>PART 2</u>	<u>MATERIALS</u>
2.01	SUBMITTAL

<u>PART 3</u>	<u>EXECUTION OF WORK</u>
3.01	GENERAL
3.02	CONCRETE STRUCTURES
3.03	SURFACE WATER CONTROL
3.04	INSTALLATION OF DEWATERING SYSTEM
3.05	OBSERVATION WELLS
3.06	SITE RESTORATION

<u>PART 1</u>	<u>GENERAL</u>
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1.01	SCOPE OF WORK
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- A. The Contractor shall furnish all labor, materials, equipment, appurtenant material and equipment, and incidentals required to design, install, operate and remove a temporary dewatering system to prevent surface and groundwater from entering any excavations required as per this Contract. The dewatering system installed shall lower the groundwater and prevent surface water intrusion to provide a firm, dry excavation with a stable bottom and sidewalls capable of supporting structures, pipes and backfill.
- B. The Contractor shall retain the services of a Professional Geotechnical Engineer, registered in the State of Massachusetts and experienced in dewatering systems, to design the dewatering system to be used during construction. A copy of the proposed dewatering system including plans and calculations shall be submitted to the Engineer for review at least two weeks prior to commencing any work. All drawings and calculations shall bear the stamp and signature of the Registered Professional Geotechnical Engineer. The Registered Professional Geotechnical Engineer shall monitor the installation of the dewatering system and visit the site periodically during the construction period.
- C. The dewatering system shall include the installation of one or a combination of the following dewatering methods as necessary: sumps and ditches, horizontal drainage systems, cofferdam dewatering, well method, well point method, cutoff methods and other methods as designated by the Contractor's Geotechnical Engineer and approved by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

1.04 SUBSURFACE CONDITIONS

- A. Test borings and groundwater observation wells installed along the excavation route by the Owner or Engineer shall be made available to the Contractor for his use.
- B. The Contractor shall also consider groundwater level fluctuations due to the season, precipitation, or other factors.
- C. The Contractor shall be responsible for obtaining all additional and supplementary information he deems necessary for the design of the dewatering system.

PART 2 MATERIALS

2.01 SUBMITTALS

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

PART 3 EXECUTION OF WORK

3.01 GENERAL

- A. The Contractor shall conduct all dewatering operations in a manner, which will protect existing structures, pipelines and utilities from undermining of their bearing soils or disturbance to soil supporting, overlying or adjacent to structures. The Contractor shall be solely responsible for damage to properties, buildings, structures, utilities, pavements, sidewalks or pipelines resulting from his dewatering and surface water control operation.
- B. The Contractor shall control all surface and groundwater so that dry, firm, undisturbed bearing soils exist in the trench or pit during all stages of excavation, construction and backfilling. Softening and instability due to the presence of seepage of water shall not be allowed to occur.
- C. The Contractor shall maintain surface and groundwater control until backfilling is completed so as not to cause shifting of pipe due to flotation and buoyant forces.

3.02 CONCRETE STRUCTURES

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

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

### 3.03 SURFACE WATER CONTROL

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

### 3.04 INSTALLATION OF DEWATERING SYSTEM

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

### 3.05 OBSERVATION WELLS

- A. The Contractor shall install observation wells along the trench centerline in all areas requiring predrainage. There shall be an operating observation well located within 50 ft. of the working edge of the excavation. The Contractor shall install all observation wells to a minimum bottom of the excavation. Observation wells shall consist of a screened or slotted well point and a riser pipe shall be fitted with a threaded watertight cap. Additional observation wells may be required as instructed by the Engineer in areas where a sand stratum underlies a clay layer located at or below the bottom of the excavation.
- B. The Contractor shall make water level readings in the observation wells twice daily, and submit a copy to the Engineer on a daily basis. The Engineer shall be permitted to make independent readings as he requires.

### 3.06 SITE RESTORATION

- A. Upon completion of the excavation work and approval of the Engineer, the Contractor shall restore the area to its pre-construction condition. All equipment, materials and accessories shall be removed and shall become the property of the Contractor. Observation wells shall be filled with sand upon completion of the Contract or as directed by the Engineer.
- B. Any areas requiring repaving shall be repaved in accordance with related sections of the specifications.

END OF SECTION

SECTION 02575

PAVING AND ROAD CONSTRUCTION

PART 1        GENERAL

- 1.01        CONTRACT DOCUMENTS
- 1.02        DESCRIPTION OF WORK
- 1.03        RELATED WORK SPECIFIED ELSEWHERE

PART 2 MATERIALS

- 2.01        GENERAL CRITERIA
- 2.02        SUBGRADE
- 2.03        SUBBASE
- 2.04        TRENCH PAVEMENT
- 2.05        HOT MIX ASPHALT (HMA) INTERMEDIATE DENSE BINDER - PERMANENT PAVEMENT
- 2.06        HOT MIX ASPHALT (HMA) SURFACE COURSE – STANDARD TOP - PERMANENT PAVEMENT
- 2.07        SIDEWALKS, DRIVEWAYS AND CURBS
- 2.08        PAVEMENT EXCAVATION - COLD PLANER (MILLING)

PART 3        EXECUTION OF WORK

- 3.01        HOT MIX ASPHALT (HMA) PAVING - GENERAL
- 3.02        CARE AND RESTORATION OF PROPERTY
- 3.03        PREPARATION OF SUBGRADE IN CUT AREAS
- 3.04        PREPARATION OF SUBGRADE IN FILL AREAS
- 3.05        PREPARATION OF SUBBASE
- 3.06        TRENCH PAVEMENT
- 3.07        PERMANENT PAVEMENT
- 3.08        MAINTENANCE OF PAVING
- 3.09        SIDEWALKS, DRIVEWAYS AND CURB CONSTRUCTION

PART 1        GENERAL

1.01        CONTRACT DOCUMENTS

- A.        The general provisions of the Contract, including General and Supplemental Conditions and General Requirements, apply to the work specified in this section.
- B.        The Contractor shall be responsible for maintaining all pavements and sidewalks placed as part of the Contract, in a safe and satisfactory condition until the project is accepted as complete. For any pavement or sidewalk area damaged, the Contractor shall remove entire pavement structure in damaged area and replace it as directed by the Engineer.
- C.        Should the application of the wearing surface be delayed for any reason including bad weather, the Contractor shall provide and maintain the base in acceptable condition until the new pavement is place.

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

1.02 DESCRIPTION OF WORK

- A. Work under this section consists of furnishing all materials, labor, tools, equipment and supervision necessary to restore existing or construct new pavement sub-grades, subbase, HMA binder courses, tack coats and HMA surface courses for roadways and all curbs, sidewalks, driveways, and parking areas.
- B. The materials and construction methods used for this work shall conform to the Massachusetts Highway Department, "Standard Specifications for Highways and Bridges", 1988 Edition, and subsequent revisions and addenda.
- C. All temporary construction roads, ditches, and drainage facilities shall be removed and the site restored before completion of the project.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. SECTION 02200 - EARTHWORK
- B. SECTION 02224 - FILL AND BACKFILL MATERIALS
- C. DIVISION 2 - SITE WORK -As Appropriate
- D. DIVISION 3 - CONCRETE - As Appropriate

PART 2 MATERIALS

2.01 GENERAL CRITERIA

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

2.02 SUBGRADE

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

2.03 SUBBASE

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

- 2.04 TRENCH PAVEMENT – IF REQUIRED
- A. Trench pavement shall be a HMA intermediate dense binder.
- 2.05 HOT MIX ASPHALT (HMA) INTERMEDIATE COURSE DENSE BINDER  
- PERMANENT PAVEMENT
- A. Dense binder course shall be the first layer of bitumen and aggregate mixture overlying the screened gravel sub-base.
- B. Dense binder course shall be HMA Intermediate Dense Binder Course as given in the Massachusetts Highway Department Standard Specifications for Highways and Bridges.
- 2.06 HOT MIX ASPHALT (HMA) SURFACE COURSE – STANDARD TOP  
-PERMANENT PAVEMENT
- A. Surface course shall be HMA Surface Standard Top Course Pavement as given in the Massachusetts Highway Department Standard Specifications for Highways and Bridges.
- 2.07 SIDEWALKS, DRIVEWAYS AND CURBS
- A. HMA for driveways, sidewalks and curbs (Cape Cod berms) shall be in accordance with the appropriate section in the Massachusetts Highway Department Standard Specifications for Highways and Bridges or as noted on the design plans.
- 2.08 PAVEMENT EXCAVATION - COLD PLANER (MILLING)
- A. This work consists of removing pavement by cold planer in designated areas. The cold planer must be equipped with an elevating device capable of loading directly into dump trucks while operative. It shall have all necessary safety devices.
- B. Milling shall be done to a depth of 1 ½ inches.
- C. Excavation shall be in accordance with MHD Specifications 120.66.
- D. The contractor shall dispose of the material cold planed at his expense.

PART 3 EXECUTION OF WORK

- 3.01 HOT MIX ASPHALT (HMA) PAVING - GENERAL
- A. All mixtures delivered to the job site shall be accompanied by a Certificate of Compliance. Deliveries not accompanied by a certificate will not be used in the work.



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

1. Mixtures delivered to the job site shall not possess signs of segregation of ingredients or surface crust.
2. The temperatures of the mixture when delivered to the spreader will be a minimum of 250 F.
3. Mixtures shall be placed only upon approved surfaces that are clean from foreign material and are dry; and when weather conditions are suitable. No mixture shall be placed when the weather is foggy or rainy, provided, however, that the Engineer may permit, in the case of sudden rain, the placing of mixture then in transit from the plant, if laid at the proper temperature and if the roadbed is free from pools of water. Such permission shall in no way relax the requirements for the quality of the pavement and smoothness of the surface. Paving materials shall not be placed upon a frozen base or when ambient air or surface temperature is less than 40 degrees Fahrenheit or when wind conditions are such that rapid cooling will prevent satisfactory compaction.
4. Wherever possible material shall be compacted using steel-wheeled rollers.
5. In areas not accessible to a roller, compaction shall be accomplished by using mechanical compactors or hand tampers, approved by the Engineer.
6. All material place shall receive final compaction before nightfall of the day placed, unless artificial light, satisfactory to the Engineer, is provided.
7. The density of completed paving shall not be less than 95% of the density obtained from laboratory compaction of a mixture composed of the same materials in like proportions.
8. The Engineer may require the Contractor to remove and replace at his own expense, any work deemed defective based on sampling and testing for composition and density, or faulty procedures.

### 3.02 CARE AND RESTORATION OF PROPERTY

- A. All streets, sidewalks, gutters, driveways and curbs that have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations.
- B. Suitable materials and methods shall be used for restoration of curbs and other types of gutters, driveways and sidewalks.

- C. Materials and method of all restoration work shall be subject to approval by the Engineer.
- D. All frames, grates, covers, street boxes, manhole rings and other castings removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations.
- E. All frames, grates, covers, street boxes, manhole rings and other castings within the limits of new paving shall be reset by the Contractor such that they are flush with the new surface.

### 3.03 PREPARATION OF SUBGRADE IN CUT AREAS

- A. After excavation to the proposed sub-grade elevation the insitu material is determined by the Engineer to be unsuitable, the Contractor shall excavate an additional 1-foot and backfill with Type 3 sand and gravel compacted to 95% of maximum dry density. Changes in the depths and limits of excavations or fills shall be an appropriate bid adjustment item.
- B. The Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which subbase and pavement material will be placed. The subgrade shall be shaped as indicated on the Contract Drawings and shall be compacted to 95% of maximum dry density.

### 3.04 PREPARATION OF SUBGRADE IN FILL AREAS

- A. The Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which embankments will be built or material will be placed for grading.
- B. After the area has been stripped and grubbed as herein specified, Type 1, 2, 3 and 4 materials or reclaimed material shall be placed thereon and built up in successive layers until it has reached the required elevation.
- C. Layers shall not exceed 6 inches in thickness before compaction. The layers shall be slightly convex toward the center. Layers shall be compacted to 95% of the maximum dry density of the particular material used.

### 3.05 PREPARATION OF SUBBASE

- A. Subbase material shall conform to Type 6 Screened Gravel or reclaimed material as described in the related sections of the specifications.
- B. Screened gravel subbase for either permanent paving shall be a minimum of 12 inches in thickness.

### 3.06 TRENCH PAVEMENT

- A. Trench paving shall be the depth as specified, or as directed by the Engineer.
- B. Prior to placing trench pavement, trenches shall have been backfilled in accordance with related sections of the specifications. The top of the trench shall be backfilled with the specified gravel subbase materials, spread and compacted as specified herein.
- C. Prior to placing trench pavement, the backfilled trenches shall be excavated and compacted to proper depth. The edges of the existing pavement, previously cut for the trenching operations, shall be retrimmed a minimum of 1 foot back along clean, straight, undamaged lines, on each side, as directed by the Engineer, and the gravel base course shall be recompacted to form a satisfactory, stable foundation.
- D. Prior to the placing of trench pavement, the cut edges of existing pavement shall be swept clean and painted with a prime or tack coat of compatible asphalt materials.
- E. Trench pavement shall be furnished, placed and compacted, as specified, to such widths necessary to meet undisturbed existing pavement. The completed pavement shall match the grade and shape of the adjoining existing surfaces.
- F. The Contractor shall continuously maintain trench pavement in good repair, flush with existing pavement, at his own expense. Should soft, damaged or broken areas develop, such areas shall be removed immediately and be replaced with new, properly compacted materials.

3.07 PERMANENT PAVEMENT

- A. Permanent top course paving is to be placed after at least 90 days has elapsed from the installation of the binder course paving for required compaction to have occurred as determined by the Engineer.
- B. Prior to permanent top course paving, the Contractor shall make all final repairs to the previously installed binder course, and raise or cause to be raised, all existing, manhole, catch basin, valve box, curb box, and utility covers, etc., to conform to the final pavement grade. All loose or damaged material on the binder course pavement shall be removed and a leveling course may be installed, as hereinbefore specified. Leveling course shall also be installed at depths and locations, as directed by the Engineer, to fill existing holes and depressions, or to improve roadway crowns. Leveling course quantities used for permanent paving shall be included for compensation under the paving item.
- C. All surfaces to receive permanent paving shall be dry and thoroughly cleaned of foreign or loose material; a compatible prime or tack coat shall be applied to the rate of 0.05 to 0.15 gallons per square yard of pavement, depending upon the condition of the existing surface. All castings and edge stones will be protected from the tack coat.

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

3.08 MAINTENANCE OF PAVING

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

3.09 SIDEWALKS, DRIVEWAY AND CURB CONSTRUCTION AND RECONSTRUCTION

- A. All granite curbs, cement concrete sidewalks, and driveways damaged during construction will be reconstructed to their original condition after construction is completed. Granite curbing to be reset shall be removed and reset to proper grade and alignment in accordance with the construction methods of Section 701 of the Massachusetts Highway Department Standard Specifications for Highways and Bridges.
- B. Curbing to be reset shall be carefully removed and stored. The Contractor shall replace any edging damaged or lost due to his negligence. The base upon which the edging is to be set shall be compacted to a firm even surface. Joints shall be pointed with mortar and the exposed portion finished with a jointer. Granite curb inlets shall be set in full mortar beds.

END OF SECTION



SECTION 02601MANHOLES, COVERS AND FRAMESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere (when applicable):
  - 1. Final sewer testing is specified in this Division.
  - 2. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

- A. Precast Manhole Base, Barrel and Top Sections:
  - 1. Conform to ASTM C478-97 except as modified herein, and on the Drawings.
  - 2. Average strength of 4,000 psi at 28 days.
  - 3. The precast concrete structure shall be sized to resist floatation. A factor of safety of 1.15 shall be used against floatation based on weights of empty structure and soil directly over footing extensions.
  - 3. Testing:
    - a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
    - b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
    - c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.
- B. Frames and Covers:
  - 1. Acceptable Manufacturers:
    - a. East Jordan Iron Works
    - b. General Foundries Inc.
    - c. Or equivalent.
- C. Masonry:
  - 1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
  - 2. Cement: ASTM C-150.
  - 3. Hydrated Lime: ASTM C-207
  - 4. Sand: ASTM C144
- D. Waterproofing:
  - 1. Acceptable Manufacturers:
    - a. Karnak #220 AF Fibered Emulsion Dampproofing, Karnak Corp., Clark, NJ.
    - b. PPS 922 Superseal, International Precast Supply.
    - c. Or approved equal.

1.3 SUBMITTALS TO THE ARCHITECT/ENGINEER

- A. Submit shop drawings and manufacturer's literature in conformance with Section 01340 and the Standard General Conditions of the Construction Contract.
- B. Precast Manhole Sections: Submit test results and receive approval from the Engineer prior to delivery to the site.
- C. Submit structural design calculations demonstrating the structural integrity of all precast concrete units for the intended use and a buoyancy analysis with a factor of safety against flotation of 1.15 with the assumptions of the ground water table at finished grade and the precast concrete tank empty. Calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in the State of Massachusetts.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

- A. Dimensions, shall be as shown on the Drawings:
  - 1. Base & Riser Sections:
    - a. Diameter: As shown on the Drawings.
    - b. Length: As required.
    - c. Wall Thickness: Not less than 5 inches.
    - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
  - 2. Tops:
    - a. Diameter: Eccentric cone type, 24] inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
    - b. Length: 4 feet.
    - c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
    - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
    - e. Exterior face of cone sections shall not flare out beyond the vertical.
  - 3. Flat Slab Tops:
    - a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
    - b. Slab thickness: Not less than 6 inches.
    - c. Constructed to support an HS-20-wheel loading.
- B. Openings:
  - 1. Provide openings in the risers to receive pipes entering the manhole.
  - 2. Make openings at the manufacturing plant.
  - 3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
  - 4. Location: To permit setting of the entering pipes at the correct elevations.
  - 5. Openings shall have a flexible watertight union between pipe and the manhole base.
    - a. Cast into the manhole base and sized to the type of pipe being used.
    - b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.

6. Acceptable Manufacturers:
  - a. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
  - b. Kor N Seal made by National Pollution Control System, Inc.
  - c. Press Wedge II made by Press-Seal Gasket Corporation.
  - d. A-Lok Manhole Pipe Seal made by A-Loc Corporation.
  - e. Or equivalent.
- C. Joints:
  1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. Install a double row of joint sealants for every manhole joint. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.  
Acceptable Materials:
    - a. Kent-Seal No. 2
    - b. Ram-Nek
    - c. Or equivalent.
  2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
- D. Waterproofing:
  1. The exterior surface of all manholes shall be given two coats of waterproofing material at an application rate as recommended by the manufacturer.
  2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
  3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.
- E. Frost Protective Wrapping:
  1. The frost protective wrap shall be constructed of an ultraviolet resistant polyethylene material and shall be a minimum thickness of 6 mils.

## 2.2 FRAMES AND COVERS

- A. Standard Units:
  1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
  2. Have machined bearing surfaces to prevent rocking.
  3. Castings shall be smooth with no sharp edges.
  4. Constructed to support an HS-20-wheel loading.
  5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
    - a. Covers -solid with "SEWER" in 3-inch letters diamond pattern.
    - b. Frame - 24-inch diameter clear opening, with flange bracing ribs.
  6. Minimum weight of frame and cover shall be 370 lbs.
- B. Water Tight Units:
  1. Same features as above for Standard Units, with 22-inch diameter minimum clear opening.
  2. Sealing features:
    - a. Inner lid held by a bronze tightening bolt in a locking bar.
    - b. Neoprene gasket
    - c. Water tight pick hole.
  3. Minimum weight of frame and cover shall be 510 lbs.



2.3 MASONRY

- A. Brick:
1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
  2. Immediately remove rejected brick from the work.
- B. Mortar:
1. Composition (by volume):
    - a. 1 part Portland cement.
    - b. 1/2-part hydrated lime.
    - c. 4-1/2 parts sand.
  2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement shall be Type II Portland cement.
- D. Hydrated lime shall be Type S.
- E. Sand:
1. Shall consist of inert natural sand.
  2. Grading:

<u>Sieve</u>	<u>Percent Passing</u>
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Precast Manhole Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
  2. Install riser sections and tops level and plumb.
  3. Make all joints watertight.
  4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.
- B. Drop Manholes:
1. The difference in elevation between the invert of the inlet pipe and outlet pipe is to be either less than 6-inches (which does not require a drop manhole) or more than 24-inches (which does require a drop manhole).
  2. Where difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe exceeds 24 inches, construct a drop manhole as shown on the Drawings or as directed by the Engineer.

- C. Adjust to Grade:
  - 1. Adjust tops of manholes to grade with brick masonry.
  - 2. Concrete rings are not acceptable for adjusting to grade.
- D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer.
- E. Invert Channels:
  - 1. After manhole and all pipes entering or exiting the manhole have been installed, construct the invert channels and shelf.
  - 2. Channels to be smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
  - 3. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
  - 4. Stop the pipes at the inside face of the manhole where changes of direction occur.
  - 5. Form invert channels and shelf with brick.
  - 6. The maximum change in elevation from the invert of the inlet pipe to the invert of the outlet pipe is 6-inches. Shape invert to make smooth transition in vertical grade.
  - 7. Slope the floor of the manhole (shelf) to the flow channel, as shown on the Drawings.
- F. Masonry:
  - 1. Laying Brick:
    - a. Use only clean bricks in brickwork for manholes.
    - b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
    - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
    - d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
    - e. Outside faces of brick masonry shall be plastered with mortar from 1/4-inch to 3/8-inch thick.
    - f. Completed brickwork shall be watertight.
  - 2. Curing:
    - a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
    - b. Protect brick masonry from the weather and frost as required.
- G. Frames and Covers:
  - 1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
  - 2. Completely fill all voids beneath the bottom flange to make a watertight fit.
  - 3. Place a ring of mortar at least one-inch-thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
  - 4. Clean the frame seats before setting the covers in place.
- H. Plugging and Patching:
  - 1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
  - 2. Touch up damaged water proofing.

- I. Cleaning:
  - 1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.
- J. Bedding and Backfilling:
  - 1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
  - 2. Backfill a minimum of 18 inches all around manhole with gravel borrow.
- K. Frost Protective Wrap:
  - 1. The Contractor shall comply with the manufacturer's instructions for the particular conditions of installations in each case.
  - 2. Clean each manhole exterior of all dirt and remove any sharp protrusions.
  - 3. Apply two (2) 6-inch wide vertical strips of bituminous waterproofing material and/or duct tape from the top to bottom of the manhole per layer.
  - 4. Prior to installing pipe through each manhole or valve pit, wrap each manhole to the maximum depth of frost penetration, but not less than 5 feet below grade, with four (4) layers of the polyethylene material by beginning the wrap at the adhesive strip and proceeding around the manhole, valve pit, etc., continuously by overlapping the adhesive strip by 24 inches on the final layer. Cut the polyethylene wrap in areas where piping exits the manhole. The size of the cut is to be equivalent to the pipes outside diameter.
  - 5. Tuck and pleat the polyethylene wrap at the top of each manhole in a continuous manner, minimizing the size of each fold. Extend the polyethylene wrap past the top of the manhole frame and temporarily tuck the remainder inside the frame, until final backfill and paving.
  - 6. In paved areas, cut the polyethylene wrap flush with the manhole rim after the pavement is in place.
  - 7. In unpaved areas, pull the polyethylene wrap together, and tie around frame with galvanized wire.
  - 8. Protect the installed frost barrier from harmful weather exposures and from possible physical abuses, where possible by prompt installation of concealing work or, where that is not possible, by temporary covering or enclosure.
  - 9. Backfill around the manhole/frost barrier with material as outlined in Section 02200 - Earthwork.

### 3.2 MANHOLE TESTING

- A. General:
  - 1. Perform either a vacuum test on all manholes.
  - 2. All testing must be performed in the presence of the Engineer.
  - 3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.
- B. Vacuum Test:
  - 1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling. Vacuum testing to be conducted prior to construction of invert channels.
  - 2. Plug all lifting holes completely with non-shrink grout.
  - 3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
  - 4. Install the testing equipment according to the manufacturer's instructions.

5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is:
    - a. Not less than 2 minutes for manholes less than 10-feet deep.
    - b. Not less than 2.5 minutes for manholes 10 to 15-feet deep.
    - c. Not less than 3 minutes for manholes more than 15-feet deep.
  6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.
- C. Manhole Repairs:
1. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
  2. The use of lead-wool or expanding mortar will not be permitted.
- D. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

END OF SECTION



SECTION 02615

DUCTILE IRON PIPE AND FITTINGS

PART 1            GENERAL

- 1.01            SCOPE OF WORK
- 1.02            RELATED WORK SPECIFIED ELSEWHERE
- 1.03            SUBMITTALS

PART 2            MATERIALS

- 2.01            DUCTILE IRON PIPE AND FITTINGS
- 2.02            PUSH-ON JOINTS
- 2.03            MECHANICAL JOINTS
- 2.04            FLANGED JOINTS
- 2.05            PIPE MARKING

PART 3            EXECUTION OF WORK

- 3.01            HANDLING AND CUTTING PIPE
- 3.02            INSTALLING PUSH-ON JOINT PIPE AND FITTINGS
- 3.03            DEFLECTION OF PIPE
- 3.04            INSTALLING MECHANICAL JOINT PIPE AND FITTINGS
- 3.05            REMOVAL / ABANDONMENT OF EXISTING DRAIN PIPE

PART 1            GENERAL

1.01            SCOPE OF WORK

- A.            The Contractor shall furnish and install ductile iron pipe, fittings, and appurtenant materials as shown on the Contract Drawings and specified herein.
- B.            The cement lined ductile iron pipe used for water pipe shall be Thickness Class 56, all else as specified herein.

1.02            RELATED WORK SPECIFIED ELSEWHERE

- A.            SECTION 02641 – PIPING SPECIALTIES
- B.            SECTION 02200 – EARTHWORK

1.03            SUBMITTALS

- A.            Submit to the Engineer six (6) sets of shop drawings detailing the type and class of materials to be furnished. The Contractor shall not purchase the pipe prior to the Engineer's approval of the shop drawings.

PART 2 MATERIALS

2.01 DUCTILE IRON PIPE & FITTINGS

- A. The Ductile Iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151. The Ductile Iron pipe shall conform to the ANSI A21.50, A21.51 Specifications for Ductile Iron Pipe. The grade of iron, from which pipe is made, shall be 60-42-10, having 60,000 psi minimum tensile strength, 42,000 psi minimum tensile strength, 42,000 psi minimum yield strength, and 10% minimum elongation.

PIPE SIZE	Thickness (inches)	Thickness Class	Rated Working Pressure
6"	0.43	56	350
8"	0.45	56	350
10"	0.47	56	350
12"	0.49	56	350
16"	0.52	56	350

- B. Pipe fittings (if required) shall conform in all respects to ANSI 21.10 and 21.11 (AWWA C110 and C111) and shall be mechanical joint. Compact fittings 3 inches through 16 inches shall conform to ANSI/AWWA C153/A21.53 and shall be mechanical joint. Compact fittings larger than 16 inches shall not be used.
- C. Pipe shall be of the push-on type, unless specified, mechanical joint or flanged as shown on the Contract Drawings.
- D. All pipe and fittings shall be furnished with a cement lining on the inside of the pipe. The lining shall be twice the thickness as specified in ANSI A21.4 (AWWA C104). Cement lining shall be double thickness. The cement lining shall be given a seal coat of asphalt material. Asphalt seal coat shall not impart taste or odor, or toxic or carcinogenic compounds to the water contained therein. Asphalt seal coat shall be a product acceptable to the U.S. E.P.A. for use in potable water and shall be so listed in the most current E.P.A. summary of approved products. The asphalt seal coat shall be applied and cured in strict conformance with the coating manufacturer's cautions and instructions. The seal coat shall be applied by the pipe manufacturer or supplier, under controlled factory conditions and field application is strictly prohibited.
- E. All ductile iron pipes for buried service shall be furnished with a minimum of 1 mil thick bituminous coating on the outside of the pipe.
- F. Fittings shall be ductile iron, with mechanical joint ends. All fittings shall be cement lined and coated inside and out, as specified hereinbefore for ductile iron pipe.

- G. All fittings shall be Class 350 and all fittings shall conform to the weights and dimensions shown in the latest edition of the CIPRA Handbook of Ductile Iron Pipe and Cast Iron Pipe.
- H. Where required, flanged fittings shall be furnished and installed. Fittings shall be ductile iron as specified or as shown, and shall have Class 125 drilled flanges and shall conform in every respect to the applicable requirements of AWWA C115 and ANSI B16.1.
- I. Joint accessories shall consist of high strength ductile iron glands, rubber gaskets, tee head or hex head bolts and nuts. Nuts and bolts shall be made of low alloy steel or stainless steel as required, where corrosive soils and/or saltwater conditions exist. Bolts and setscrews shall be torqued in accordance with the manufacturer's recommendations.

## 2.02 PUSH-ON JOINTS

- A. Push-on joints shall meet all the requirements of ANSI A21.11 and shall consist of a single continuous, molded, rubber ring gasket; a bell socket cast integrally with the pipe or fitting; and a plain end. The configuration shall be such that when the plain end is inserted into the pipefitting socket, the gasket shall be compressed radially to form a positive seal. The gasket and annular space shall be so designed and shaped that the gasket is locked in place after the plain end is inserted into the fitting socket.
- B. Push-on joints shall have the same pressure rating as the pipe or fitting of which they are a part.
- C. Gaskets for push-on joints shall be vulcanized natural or synthetic rubber. All gaskets shall be free of porous areas, foreign material and visible defects.

## 2.03 MECHANICAL JOINTS

- A. Mechanical joints shall meet all the requirements of ANSI A21.11 and consist of a bell socket cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recess; a plain end; a continuous molded, rubber ring gasket and; a follower with boltholes, tee head bolts and hexagonal nuts.
- B. Mechanical joints shall have the same pressure rating as the pipe or fitting of which they are a part.
- C. Glands for mechanical joints shall be cast or ductile iron and be stamped with the manufacturer's identification, nominal size and material type. Glands shall receive a bituminous coating at the shop.
- D. Rubber gaskets for mechanical joints shall be natural or synthetic vulcanized rubber, free of porous areas, foreign materials and visible defects.



## 2.04 FLANGED JOINTS

- A. Flanged joints shall meet all the requirements of ANSI A21.15 and ANSI A21.10 and shall consist of two threaded flanges; flange gasket and; bolts with square or hexagonal shaped heads and hexagonal nuts.
- B. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by manufacturer. Threaded flanges shall not be installed in the field. Flange faces shall be machined.
- C. Pipe furnished with flanges at each end shall have the bolt holes aligned.
- D. Flange gaskets shall be ring or full face rubber and be 1/8 inch thick.

## 2.05 PIPE MARKING

- A. The weight, class or nominal thickness and casting period shall be shown on each piece of pipe. The manufacturer's mark, year of fabrication and the letters "DI" or the word "Ductile" shall be cast or stamped on in letters and numerals not less than ½ inch in height.

## PART 3 EXECUTION OF WORK

### 3.01 HANDLING AND CUTTING PIPE

- A. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe or lining, scratching or marring machined surfaces and abrasion of the pipe coating or lining.
- B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used may be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack.

### 3.02 INSTALLING PUSH-ON JOINT PIPE AND FITTINGS

- A. Prior to assembling, the bell and plain end shall be cleaned of all foreign matter. Push-on joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special non-toxic gasket lubricant, supplied by the pipe manufacturer, uniformly over the inner surface of the gasket that will be in contact with the spigot end of the pipe. The end of the plain pipe shall be chamfered to facilitate

assembly. The end shall be inserted into the gasket and then forced passed it until it seats against the bottom of the socket. Bedding and backfill requirements shall be as shown on the Contract drawings.

3.03 DEFLECTION OF PIPE

- A. When laying ductile iron pipe, the deflection at the joints shall not exceed 5 degrees or 12 inches for a 16-foot length of pipe.

3.04 INSTALLING MECHANICAL JOINT PIPE AND FITTINGS

- A. Prior to assembling mechanical joints the bell and plain end shall be cleaned of all foreign matter and then brushed with non-toxic gasket lubricant supplied by the pipe manufacturer. With the follower gland and gasket on the plain end, seat the plain end into the bell and press the gasket evenly and firmly into the bell. Move the follower gland into position for bolting, insert all nuts and bolts, and make finger tight. The follower gland shall be tightened evenly using a torque wrench on opposite bolts until all are made up. Bedding and backfill requirements shall be as shown on the Contract drawings. All nuts and bolts shall be given a bituminous coating after bolts are tightened. All fittings shall be rodded to the other fittings or a restraining gland placed on the pipe.

3.05 REMOVE/ ABANDON EXISTING WATER, SEWER OR DRAIN PIPE

- A. All existing sewer and drain pipe and appurtenances to be replaced shall be physically removed and disposed of by the Contractor unless otherwise directed by the Engineer.
- B. Sections of existing sewer and drain pipe that are permitted to be abandoned in-place by the Engineer shall have open ends plugged with concrete or brick and mortar to prevent the entrance of soil into the pipe after backfilling.

END OF SECTION



SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS

- 2.01        PVC - PRESSURE PIPE
- 2.02        PVC - GRAVITY SEWER
- 2.03        PUSH - ON JOINTS
- 2.04        PVC BELL (INTEGRALLY CAST)
- 2.05        SOLVENT WELD JOINT
- 2.06        PIPE MARKINGS

PART 3        EXECUTION OF WORK

- 3.01        HANDLING AND CUTTING PIPE
- 3.02        PIPE BEDDING
- 3.03        INSTALLATION OF PIPE
- 3.04        PIPE ENCASEMENT
- 3.05        SEWER REPLACEMENT

PART 1        GENERAL

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

- 1.02        RELATED WORK SPECIFIED ELSEWHERE

- A.        SECTION 02200 - EARTHWORK
- B.        SECTION 02224 - FILL & BACKFILL

PART 2        MATERIALS

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

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

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

2.02 PVC PIPE - GRAVITY SEWER

- A. PVC gravity sewer 8" through 15" shall be SDR 35 unless otherwise specified and shall conform to ASTM D3034 Standard for PVC pipe. PVC gravity Sewer pipe 18" through 27" shall be Type 1 heavy wall unless otherwise specified and shall conform to ASTM F679-80 standard for PVC pipe. The PVC pipe shall be supplied in lengths of 13 or 20 feet.
- B. Except as indicated differently on the Contract Drawings or in the specifications or where specifically directed by the Engineer, gravity sewer pipe shall be furnished with standard integral bell and spigot ends and elastomeric gasket joint.
- C. PVC gravity sewer tees, wyes and tee wyes to be used for service connections shall be PVC SDR 35 fittings with ring tite joints. All fittings shall be capped.

2.03 PUSH-ON JOINTS

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

- B. Push-on joints shall have the same pressure rating as the pipe or fitting of which they are a part.
- C. Gaskets for push-on joints shall be vulcanized natural or synthetic rubber. All gaskets shall be free of porous areas, foreign material and visible defects.

2.04 PVC BELL (INTEGRALLY CAST)

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

2.05 SOLVENT WELD JOINTS

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

2.06 PIPE MARKINGS

- A. Pipe and couplings shall bear identification markings that will remain legible during normal handling, storage, installation and during the life of the pipe. Markings shall have been applied to the pipe and couplings in a manner which will not reduce strength or durability or otherwise damage the pipe.
- B. Markings for pressure pipe shall be applied at intervals of not more than 5 Feet and shall include the following: nominal size and OD base, "PVC", dimension-ratio number, AWWA pressure class, AWWA designation number for AWWA C-900, manufacturer's name or trademark and production record code, and mark or seal of pipe testing agency.

PART 3 EXECUTION OF WORK

3.01 HANDLING AND CUTTING PIPE

- A. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring its surfaces and ends.
- B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used may be perfectly sound. The cut shall be at least 12 inches from the visible limits of the crack.
- D. All cutting of PVC pipe is to be square. The pipe to be cut shall be marked around its entire circumference prior to cutting.
- E. Using a factory finished beveled end as a guide to determine the angle and length of the taper, the end of a freshly cut pipe shall be beveled similarly.

### 3.02 PIPE BEDDING

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

### 3.03 INSTALLATION OF PIPE

- A. Standard laying lengths shall be 20 feet for pressure pipe with 85% of the total footage of pipe being full lengths and the remaining 15% being furnished as random lengths. Random lengths shall not be less than 10 feet long. Standard laying lengths for gravity sewer shall be 13 feet.
- B. Prior to assembling, the bell and plain end shall be cleaned of all foreign matter. Push-on joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special non-toxic gasket lubricant, supplied by the pipe manufacturer, uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe. The end of the plain pipe shall be chamfered to facilitate assembly. The end shall be inserted into the gasket and then forced passed it until it seats against the bottom of the socket.
- C. Pipe shall be installed in such a manner that will ensure that external loads will not subsequently cause a deflection of greater than 5% in the vertical cross-section dimension.
- D. For PVC pressure pipe horizontal deflection from joint to joint shall be limited to 12 inches for PVC pipe sizes 6 inches to 12 inches based on 16 foot length.
- E. The bedding of the pipe shall conform to the trench detail as shown on the Contract Drawings. Installation precautions are also given in ASTM D 2774.
- F. Cleanouts shall be installed where shown on the Contract Drawings and at convenient points in long runs of pipe.
- G. Installed pipe shall rest flat and straight on the bedding at all locations without bridging or binding. Backfill shall be carefully placed to avoid damage to the pipe. The pipe shall be placed to the grades shown on Contract Drawings.

- H. Only laborers competent in laying plastic pipe and suitable equipment shall be employed. Pipe and fittings shall be handled with care so as to prevent scratching or other damage to the materials. All joints shall be properly cleaned and free of foreign matter. The installation instructions of the manufacturer shall be strictly followed with the exception that the pipe bedding shall be as shown on the Contract Drawings.
- I. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, hammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.
- J. Before a joint is made, the pipe shall be checked to insure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and form to the required grade.
- K. The Contractor shall take all necessary precautions to prevent flotation of the pipe from trench flooding. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary water-tight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.
- L. Any defective pipe or fitting found in the line shall be removed and replaced without cost to the Owner. All pipes and fittings shall be kept clean of all dirt and debris before being laid, and shall be kept clean until acceptance.

#### 3.04 PIPE ENCASEMENT

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

#### 3.05 SEWER REPLACEMENT

- A. The Contractor shall take the necessary precautions to support and protect existing sewer pipes from being damaged during construction of new the water main.
- B. Sewer pipes that are shown on the contract drawings or located in the field and are damaged by the Contractor shall be replaced with PVC pipe at the Contractor's expense.
- C. Should the Engineer feel that PVC is insufficient for use as a replacement pipe, based on field conditions, a different pipe material such as ductile iron pipe may be specified as directed by the Engineer.



- D. The size of the replacement pipe shall closely approximate the size of the existing section to be replaced, allowing a watertight joint to be made while maintaining the existing pipe slope.
- E. Joints between the existing pipe and replacement pipe shall be made with suitable watertight sleeve or couplings.
- F. Joints shall not be backfilled until approved for water-tightness by the Engineer.

END OF SECTION

SECTION 02641

WATER PIPING SPECIALTIES

PART 1 GENERAL

- 1.01 DESCRIPTION
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
- 1.03 APPROVAL OF MATERIAL

PART 2 MATERIALS

- 2.01 MATERIALS
  - A. Concrete for Thrust Blocks
  - B. Gate Valves
  - C. Valve Boxes
  - D. Butterfly Valves
  - E. Sleeve and "Dresser" Couplings
  - F. Insertion Valves
  - G. Tapping Sleeves and Valves
  - H. Water Services
  - I. Hydrants

PART 3 EXECUTION

- 3.01 INSPECTION
- 3.02 PREPARATION
- 3.03 INSTALLATION

PART 1 GENERAL

- 1.01 DESCRIPTION
  - A. Work Included:  
  
Furnish all labor, materials, equipment and incidentals required to install all gate valves, tapping sleeves, valves, couplings, hydrants, and appurtenances, complete as shown on the Drawings and/or as specified herein.
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
  - A. SECTION 02615 - DUCTILE IRON PIPE AND FITTINGS
- 1.03 APPROVAL OF MATERIAL
  - A. Submit to the Engineer within ten days after execution of the Contract a list of materials to be furnished, the name of the suppliers and the date of delivery of materials to the job site.

- B. Contractor shall provide to Engineer a sworn affidavit upon receipt upon receipt of valves that they comply with all applicable provisions of the reference standards and the other provisions of these specifications including the coating requirements.

PART 2      PRODUCTS

2.01      MATERIALS

A.      Concrete for Thrusts Blocks

- 1.      Concrete for thrust blocks shall have a minimum compressive strength of 3,000 psi and shall conform to the contract drawings.

B.      Gate Valves

- 1.      All gate valves shall be manufactured in full compliance with the content and intent of this specification. Gate valves shall be in accordance with AWWA Designations C111, C509 and C550.
- 2.      Gate valves shall be municipal standard as manufactured by: Mueller Co., Inc., as specified by the City of Waltham.
- 3.      Gate valves shall be iron body, resilient wedge type with 8 mil epoxy coating inside and out, with two inch operating nut. Valves shall have mechanical joint hubs. Gate valves shall conform in every respect to AWWA C509. Valves shall be designed for 200 psi working and 300 psi test pressure. Valves shall open right as specified by the City of Waltham.
- 4.      Valves shall also conform to the specifications of the AWWA as to size of stem, pitch of thread, etc. The gasket seating area shall be fully machined to fixed dimensions and tolerances as per AWWA specifications. All valves shall be provided with "O" rings. The design of the valve is under pressure in a fully open position. Cartridge O-ring type gate valves, if accepted, shall be furnished with a spare cartridge for each valve furnished.

C.      Valve Boxes

- 1.      Valve boxes shall be provided for each buried valve. They shall be cast iron, of heavy pattern, sliding adjustable type and provided with cast cover. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve. Boxes shall have barrel of not less than 5 ¼-inch diameter and be of the sliding adjustable type with a lap of least 6 inches when in the most extended position. Covers shall have the word "WATER" cast into them.
- 2.      Valve boxes shall be provided for each gate valve installed for buried service. Valves shall open right as specified by the City of Waltham. Direction arrows shall be on the valve covers.

3. Valve boxes and covers shall be by the same manufacturer and shall be manufactured in North America only.
4. Valve boxes shall be centered over the operating nut of the valve and set to be flush at final pavement or finished grade.
5. Valve boxes shall be of good quality cast iron free from all defects in material and workmanship and shall be coated with coal-tar pitch enamel or other approved coating.

D. Butterfly Valves

Butterfly Valves and operators shall conform to the requirements of AWWA C504 and with the specific requirements and exceptions to AWWA C504 which follow:

1. Manual operator shall be submersible, worm gear type (Philadelphia Gear or equal) rack and pinion traveling nut type on lead screw type suitable for buried service.
2. All operators shall have positive adjustable stops to prevent over-traveling of the disc in the open or closed positions.
3. Operators shall be equipped with two inch square operating nuts, fully gasketed and lubricated for buried service.
4. Gearing shall be totally enclosed, air tight and permanently sealed.
5. Valves up to and including 12 inch diameter shall have a rated working pressure of 200 psi. Valves larger than 12 inch shall have a rated working pressure of 150 psi.
6. The exterior of all valves shall be coated with a minimum of three applications of an approved bituminous solution over a rust free casting prior to shipment. Body rings shall be free of bitumen or defect.
7. Valve interiors shall have a 100 percent solid heat cured or fusion bonded epoxy coating system in accordance with AWWA C550.
8. The location and arrangement of the operator shall be as shown on the plans. The operator shall be designed to hold the valve disc on any intermediate position between fully opened and fully closed without creeping or fluttering. It shall be furnished with a device such as an input shaft lock device to hold the valve in a fixed position for an extended period of time. Valve operating mechanism shall be capable of transmitting sufficient torque to open and close each valve under the most adverse operating conditions. In addition, valves and their operators shall be satisfactory for application involving valve

operation after long periods of inactivity. Valve operation shall be through a precision made, high quality, totally enclosed, factory greased and sealed worm gear reducer. Primary gearing shall consist of self-locking worm gear constructed of high tensile bronze and a worm polished or travelling nut designed according to AWWA specification C-504-74, Section 11.3. The valve operator shall be so sized that a maximum input force will be necessary to develop the required operating torque. When additional gearing is required to reduce the input force to the operator, it shall consist of a combination of helical or spur gearing in the first or input stage with a self-locking worm gear unit as described above in the final or output stage. The gearing of the valve operating mechanism shall be such that the operating nut shall turn clockwise to open the valve. All gear operators shall be designed to transmit twice the required torque without permanent damage to the gear teeth. The valve shaft at the connection to the operator, shall have built-in adjustable mechanical stops to prevent over-travel of the disc. These stops shall be fully enclosed and integral with the worm gear housing. Each operator shall be equipped with a large mechanical position indicator which is positively coupled to the valve shaft. The manual operators shall contain a 2 inch square operating nut.

9. Operators shall be watertight for buried service with extension shafts in enclosed, sealed housing and valve boxes at grade.
10. Butterfly valves shall be manufactured by Mueller Co., Inc., as specified by the City of Waltham.

E. Solid Sleeve and "Dresser" Couplings

1. Solid Sleeve and "Dresser" couplings shall be mechanical joint with ductile iron glands.
2. Ductile iron "Dressers" shall conform to AWWA Specification C-110. Solid sleeves, plugs and caps shall also be ductile iron and conform to AWWA Specification C-110.
3. Coupling and bolts shall receive two coats of bituminous paint - Inertol No. 66 Special Heavy - after installation.

F. Insertion Valve

1. Insertion valves shall be first quality, free from all imperfections and defects. The sleeve shall be made of ASTM A-36 steel, epoxy coated to 10-12 mils.
2. Insertion valves shall be QuikValve as manufactured by Romac Industries of Seattle, Washington or approved equal.

G Tapping Sleeves and Valves

1. Tapping sleeves and valves shall conform to AWWA specifications for tapping sleeves and valves. Tapping sleeves shall be mechanical joint, two part castings, flanged on the vertical centerline, and come complete with all joint accessories. The surface area of each flange shall be thoroughly machined, and the sleeve flanges shall be fitted with lead gaskets. Each gasket shall cover the entire surface area of each joint for the full length of the sleeve. Bolts used to assemble the sleeves shall pass directly through each flange and through each gasket. Bolts shall be properly spaced to insure uniform gasket pressure and compression.
2. Sleeve outlets shall have counterbored flanges to insure proper centering of the tapping valve. All tapping valves shall be flanged by mechanical joint as specified by the Owner. Tapping valves shall conform with the aforementioned specifications for gate valves.
4. Tapping sleeves and valves shall be manufactured by Mueller Co., Inc., as specified by the City of Waltham.

H. Copper Water Services

1. Piping for buried water services shall be continuous Type K annealed seamless copper water tubing conforming to ASTM B88 Standard Specification for Seamless Copper Water Tube. Tubing size shall match existing service size unless otherwise indicated.
2. Service Boxes: The cast iron service box shall be the Buffalo-type extension curb box.
3. Service boxes shall be tar coated and adjustable to accommodate bury depths from five feet to six feet.
4. Required Brass Goods shall include Corporation Cocks, Curb Stops, Misc. Couplings and Fittings shall be lead free. Casting shall be sufficiently heavy to meet all service conditions without springing or leaking and be clean and free from roughness both inside and out. Waterways shall be smooth, full size and free from obstruction. All threads shall be cut sharp, clean and true.

5. Nuts shall be of commercial bronze containing not less than 89 percent copper and finished on both sides to true faces. Adjusting nuts shall also come to a true facing against the bottom of the bronze washer and proper adjustment shall be made to assure easy turning and freedom from leakage. Adjusting nuts shall be properly locked to avoid change in position in operation.
6. Curbstops and corporations shall be ball type no bleeding and have lockdown style nuts, "Pack Joint" or equal.
7. All corporation and curb cocks shall be subjected to a sustained hydraulic pressure of 200 pounds and tested in both the open and closed position.
8. All brass goods shall be individually wrapped to protect threads during shipment.
9. The inlet of corporation cocks shall have AWWA taper thread (CC) connections and the outlet shall have compression connections.
10. The inlet and outlet of curb cocks shall have compression connections.
11. Corporations shall open right as specified by the City of Waltham, and as manufactured by Mueller Co., Inc., as specified by the City of Waltham.
12. Curbstops shall open right as specified by the City of Waltham, and as manufactured by Mueller Co., Inc., as specified by the City of Waltham.

I. Water Service Boxes

1. Service Boxes: The cast iron service box shall be the Buffalo type.
2. Service boxes shall be tar coated and adjustable to accommodate bury depths from five feet to six feet.

J. Hydrants

1. Hydrants shall be American Darling B-62-B-5 Fire Hydrant. Owner has standardized on American Darling. No substitution will be allowed.
2. Hydrants shall have a 6 inch mechanical joint inlet, 5 ¼ inch valve opening and shall open right or clockwise. The hydrant barrel shall have two 2 ½ inch hose outlets and one 4 ½ inch pumper outlet with National Standard Threads. Operating nuts shall be standard pentagon. Hydrants shall be supplied with drain port plugs capable of being installed in the field during construction. The plugs shall be supplied not installed. Hydrant barrel extensions shall be repainted in the field to the City's standards prior to acceptance.

3. The hydrant main valve shall be designed to remain closed in the event of a break in the hydrant above or near grade level.
4. Crushed stone for use as drainage material for hydrant assemblies shall conform to the requirements of Part 2.07 of Section 02224, "Materials."
5. A hydrant assembly shall consist of a hydrant anchoring tee of the appropriate size, a thrust block, a gate valve with a valve box, a hydrant and generally one full length of pipe. All joints shall be mechanical with retainer glands.
6. Where a hydrant assembly is to be disconnected from the existing main and reconnected to the new main, the Contractor shall cut the existing pipe at a sufficient distance from the hydrant to allow for the connection of the new pipe to the existing using a flexible coupling. The flexible coupling shall be municipal standard as manufactured by: Dresser, Inc., Rockwell, Inc., or Smith-Blair, Inc.
5. Hydrants shall be thoroughly cleaned and given two shop or field coats of paint in accordance with AWWA C502 and the instructions of the paint manufacturer.
6. Paint color shall be the standard "Waltham Colors" hydrant colors, black and yellow, as specified by the Owner. The barrel of all hydrants shall be painted yellow, the spindle, bonnet and nozzle caps shall be painted black in accordance with the Owner's standards.
4. If the hydrants are delivered with the Owner's standard color, they shall be given one matching field coat of an alkyd gloss enamel. If the hydrants are not delivered with the Owner's standard color, they shall be given two coats of an alkyd gloss enamel.
5. Hydrant paint shall be as manufactured by Sherwin-Williams, Cleveland, OH; Tnemec Company, Inc., Kansas City, MO; or Minnesota Mining and Manufacturing Co. (3M), St. Paul, MN; or approved equal.

K. Pipe Insulation

1. The insulation shall be flame retardant, extruded polystyrene, wired on with No. 18 copper wire on 150 mm centers. The covering shall be an aluminum jacket 0.4 mm thick min., with lock-on type joints and a polycraft moisture barrier secured in place by 12.5 mm stainless steel strapping on 450 mm centers. The joint shall be sealed with Miracle Adhesive FO 400 Sealer; Foster Foamseal 30-45; Cad-a-Seal 745 or equal.
2. The Contractor shall furnish the insulation manufacturer with the exact dimensions of the pipe to be insulated, together with the type of couplings and specials to be used.



3. The insulation material shall be cut to fit the pipe so as to give a continuous thickness. The insulation shall then be wired on with No. 18 copper wire on 150 mm centers. All joints shall be sealed, and with 75 mm overlaps will be secured in place by 12.5 mm stainless steel strapping of 450 mm centers. All fittings, valves and flanges shall be insulated with the same materials securely held in place. All jacket overlaps shall be sealed and waterproofed with a sealant as noted above, or equal. The work shall be accomplished to the satisfaction of the Owner and the Engineer

INSULATION THICKNESS		WATER OR SEWER MAIN DIAMETER	
XX = MM		YY = DIAMETER	
02	50 mm	04	4 NPS
03	75 mm	06	6 NPS
04	100 mm	08	8 NPS
05	125 mm	10	10 NPS
		12	12 NPS
		14	14 NPS
		16	16 NPS
		18	18 NPS
		20	20 NPS
		24	24 NPS
		30	30 NPS
		36	36 NPS
		42	42 NPS
		48	48 NPS
		54	54 NPS
		60	60 NPS

**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. All pipe, fittings, couplings, valves, hydrants and accessories shall be carefully inspected by the Contractor for defects before installation, and all defective, unsound or damaged materials shall be rejected. The Owner shall make such additional inspections it deems necessary, and the Contractor shall furnish all necessary assistance for such inspections.
- B. No pipe joints shall be covered in any way until the joints have been inspected.

- C. Operating parts shall be operated several times to demonstrate proper operation and adjustment.

### 3.02 PREPARATION

- A. Proper implements, tools and facilities satisfactory to the Owner shall be provided by the Contractor for the proper and satisfactory execution of the Work.
- B. The interior of pipe, fittings, couplings, valves and hydrants shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations.
- C. The trench bottom and bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower quarter of pipe and valves along their entire length. Bell holes shall be excavated so that, after placement, only the barrel of the pipe receives bearing pressure from the trench bottom and bedding.
- D. Pipe, pipe fittings, couplings, valves, hydrants and accessories shall be handled, stored, installed, jointed and protected by the Contractor in strict accordance with the written recommendations of the manufacturer of the materials.

### 3.01 INSTALLATION

- A. Buried valves and boxes shall be set with the stem vertical and box vertically centered over operating nut. Valves shall be set on a firm foundation and supported and anchored as shown on the Drawings. Selected excavated material shall be placed and tamped under and at the sides of the valve. Valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.
- B. All bolts and nuts shall be heavily coated with two coats of bituminous paint comparable to Interol No. 66 Special Heavy.
- C. Pipe upon which a tapping sleeve is to be installed shall be thoroughly cleaned of all foreign matter with scraping tools and wire brushed, a minimum of six (6) inches each side of the sleeve. Sleeve bolts shall be alternately tightened from the extreme end on one side to the extreme of the opposite side with approved torque wrenches until all are securely tightened. Take care to ensure that the tapping machine is kept in leveled horizontal position and securely supported so as not to transmit any additional weight to the tapping valve.
- D. Service Connections: Connect all services to the new main as directed by the Owner, the Engineer and as specified herein. Services shall be connected after the new main has been tested, chlorinated and approved for service and the work shall result in a minimum disruption of service to the consumer. Make only "wet taps" into the new mains and install corporation cocks, copper tubing, new curb stops, new service boxes, fittings, etc., and make all joints water tight. Services shall be installed to the limits as

shown on the contract drawings or as directed by the Engineer. The Contractor shall connect the new copper tubing to the existing service pipe using an approved coupling approximately 12 inches from the new curb stop on the building side of the stop. Where transfers are being made and the existing service is lead or iron, the service shall be replaced to the limit of the City's right of way. All services shall be installed with 5 feet cover unless otherwise directed by the Engineer. Where existing curb boxes are to remain and found to be below grade, the Contractor shall raise the upper section to grade. If the upper section cannot be raised, the Contractor shall remove the existing cover, install the new extension on the existing upper section and install a new cover.

- E. Water mains shall be tapped in accordance with the manufacturer's latest published recommendations, i.e., depth of tap, number of threads exposed, allowable sizes, etc., and the Contractor shall adhere strictly to these recommendations. The Contractor shall be held responsible for all subsequent leaks or failure of the taps for one year from the date of final acceptance of the project and he shall make all necessary repairs that may be required during this period.

END OF SECTION

SECTION 02647

CONNECTIONS TO EXISTING WATER MAINS

PART 1                      GENERAL

- 1.01              DESCRIPTION
- 1.02              RELATED WORK SPECIFIED ELSEWHERE

PART 2                      MATERIALS: NOT APPLICABLE

PART 3                      EXECUTION

- 3.01              CONTRACTOR OPERATIONS
- 3.02              TAPPING CONNECTION TO EXISTING MAINS

PART 1                      GENERAL

- 1.01              DESCRIPTION

- A.                  Work Included:

This section covers connections to the existing water mains, complete. The Contractor shall furnish all pipe, fittings, valves, tapping machines, if required, and appurtenances. The Contractor shall do all excavation and backfill as required.

- 1.02              RELATED WORK SPECIFIED ELSEWHERE

- A.                  SECTION 02615 - DUCTILE IRON PIPE AND FITTINGS
- B.                  SECTION 02641 – PIPING SPECIALTIES

PART 2                      MATERIALS: NOT APPLICABLE

PART 3                      EXECUTION

- 3.01              CONTRACTOR OPERATIONS

- A.                  The Contractor shall make all connections to the existing mains as indicated on the drawings and as herein specified.

- 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 work shall be planned so as to interfere with operation of the existing facilities for the shortest period possible time and when demands on the system best permit such interference eve to the extent of working outside of normal working hours to meet these requirements.

- C. The Contractor shall have all possible 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 needs of the Owner's water supply. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed.
- E. Under no circumstances shall any customers be without water for a period of more than four (4) hours without prior approval of the Owner. Should it appear that any customer will be without water for more than four (4) hours, the Contractor shall install temporary water service where directed by the Engineer.
- F. Existing pipeline that is not to be abandoned but is damaged by the Contractor during the work shall be replaced by him at his own expense in a manner approved by the Engineer.

3.02 TAPPING CONNECTION TO EXISTING MAINS:

- A. Tapping connections to the existing mains, where indicated on the drawings, shall be made with service pressure in the main, using tapping sleeves and valves and a suitable tapping machine.
- B. Other connections to existing mains shall be made with the main out of service, unless otherwise directed by the Engineer. Such connections will not require tapping sleeves and valves but connections as indicated on the drawings.

END OF SECTION

SECTION 02675

WATER DISTRIBUTION SYSTEM, DISINFECTION AND TESTING

PART 1 GENERAL

- 1.01 SCOPE OF WORK
- 1.02 RELATED WORK SPECIFIED ELSEWHERE

PART 2 MATERIALS

- 2.01 MANIFOLD

PART 3 EXECUTION OF WORK

- 3.01 FLUSHING POTABLE WATER LINES
- 3.02 TESTING
- 3.03 DISINFECTION
- 3.04 DECHLORINATION
- 3.05 ACCEPTANCE

PART 1 GENERAL

- 1.01 SCOPE OF WORK

- A. The Contractor shall have a third party perform ALL testing, including testing of the temporary main. The Contractor shall furnish all the necessary equipment and labor for pressure testing and disinfecting the potable water distribution mains shown on the Contract Drawings in accordance with AWWA C600 Specifications.

- 1.02 RELATED WORK SPECIFIED ELSEWHERE

02615 - DUCTILE IRON PIPE AND FITTINGS  
02641 - PIPING SPECIALTIES

PART 2 MATERIAL

- 2.01 MANIFOLDS

- A. Each permanent blow-off testing and chlorinating water mains shall consist of a 1 inch corporation service or road box as required. Temporary blow-offs shall consist of a 1 inch corporation and tubing and shall be included for payment under the price of the pipe.
- B. A manifold shall be provided to connect the existing system and the new water main. Each manifold shall consist of two (2) ¾ inch gate valves, one (1) 5/8 inch

by ¾ inch water meter. Type K copper tubing ¾ inch shall be used and the new main connected to the existing system by either tapping into the pipes or utilizing hydrants.

- C. A pumping unit or proportionate feeder that delivers a hypochlorite solution to the isolated water main shall be provided. The unit used shall not enable the solution to flow back into the existing system.

### PART 3 EXECUTION OF WORK

#### 3.01 FLUSHING POTABLE WATER LINES

- A. Prior to testing and disinfecting water lines, the Contractor shall thoroughly flush all water lines with potable water. Potable water shall be supplied by the Owner. The Contractor shall furnish all equipment necessary including ancillary pumping equipment, taps, temporary piping, etc., to provide a minimum of 2.5 FPS scouring velocity in the mains being flushed for a duration of at least 15 minutes.
- B. The Contractor shall have a third party perform ALL testing, including testing of the temporary main. The Contractor with the assistance of the D.P.W. shall fill water mains as slowly as practicable so as not to cause dirty water and serious pressure drops within the existing system.
- C. Air shall be vented from the mains during the filling process and temporary or permanent blow-offs shall be made on the mains where directed.
- D. After the water mains have been filled, controlling gate valves shall be closed and the new mains kept isolated from the existing system. The Engineer may direct that a manifold be installed connecting the existing system and the new water mains, in order to maintain static system pressure within the new system for at least 72 hours. Each manifold shall contain double check valves to prevent water from the newly installed water main from backing up into the existing system through the manifold, as previously described in Section 2.01.
- E. Water mains shall be filled at least 3 days before testing to allow for absorption.

#### 3.02 TESTING

- A. The Contractor shall have a third party perform ALL testing, including testing of the temporary main.
- B. Testing and chlorinating of the pipelines shall closely follow pipe laying work. Pipelines shall be tested approximately every 2000 feet, or distances slightly greater or less, as approved by the Engineer, unless otherwise noted, as the pipeline is installed. Should the pipelines fail to be tested and chlorinated as

specified, the pipe laying work shall be suspended until the testing and chlorinating is done.

- C. The completed pipelines shall be pressure tested in the presence of the Engineer. The City of Waltham requires a pressure test which consists of applying a constant hydrostatic pressure of 200 pounds per square inch for 2 hours. This test shall be conducted for two continuous 15 minute periods. After the first 15 minute period, the pressure in the mains shall be dropped to the normal working pressure of the system, and then build back up to the required test pressure.
- D. The leakage test may be conducted independently of the pressure test. The allowable liquid lost shall not exceed the amount shown on the following table. The leakage test shall be conducted for one hour per mile of pipe but not less than ½ hour per test. The leakage shall be recorded to one-tenth of a gallon accuracy by means of a test meter or when allowed by the Engineer permission will be given to measure the drawdown in the test barrel. If the leakage is more than that specified above or in the table that follows, leak or leaks shall be located and the necessary repairs made so that the leakage will not exceed the amount specified. The Contractor shall employ qualified personnel throughout the test procedure. All records and charts shall become the property of the Owner.

NOMINAL PIPE DIAMETER (INCHES)

AVG TEST PRESSURE (PSI)	NOMINAL PIPE DIAMETER (INCHES)						
	6	8	10	12	16	20	24
Ductile, Gray Cast Iron and PVC Mains							
<u>Allowable Leakage per 1000 ft.</u>							
250	0.71	0.95	1.19	1.42	1.90	2.37	2.85
200	0.64	0.85	1.06	1.28	1.70	2.12	2.55
150	0.55	0.74	0.92	1.10	1.47	1.84	2.21
100	0.45	0.60	0.75	0.90	1.20	1.50	1.80

\*Leakage allowable based on gallons per hour per 1000 feet of Main.

- E. The contractor shall at his own expense make any taps and furnish all necessary caps, plugs, etc., as required in conjunction with testing a portion of the main between gate valves. He shall also furnish a test pump, gauges, and any other equipment required in conjunction with carrying on the hydrostatic tests. He shall at all times protect the new water mains and the existing water mains against the entrance of polluting material.



### 3.03 DISINFECTION

- A. Before being placed in service, all new water pipe-lines shall be chlorinated in accordance with AWWA C900, "Standard Procedure for Disinfecting Water Mains". The procedure shall be discussed with the Engineer before doing the work and shall be approved.
- B. The location of the chlorination and sampling points will be determined by the Engineer in the field. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.
- C. The general procedure for chlorination shall be the first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end, while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipeline for about 24 hours.
- D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities, and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be taken by an independent third party in full accordance with the AWWA Manual C601. The Contractor will be required to rechlorinate, if necessary, and the line shall not be placed in service until the requirements of the State Public Health Department are met.
- E. Upon completion of disinfection, the water main shall be dechlorinated per this specification section 3.04 and thoroughly flushed with potable water supplied by the Owner until the chlorine concentration within the main is less than 0.5 ppm.
- F. The Contractor shall engage the services of an independent testing laboratory, certified to perform the necessary testing, to obtain samples from the disinfected main and perform bacteriological tests. The results of the bacteriological tests shall be compared with the maximum contaminate levels set forth in the Primary Drinking Water Standards. Where these levels are exceeded the disinfection process shall be repeated as directed by the Engineer.
- G. The water shall be tested bacteriologically for coliform group bacteria and heterotrophic plate count. A minimum of one (1) sample location shall be used per 2,000 linear feet. On all new piping there will be at a minimum sampling locations at each end of the new pipe segment. Additional testing locations may be determined by the Engineer at no additional cost to the Owner. Testing must be done by a Massachusetts State Certified Laboratory and the results of all tests must be submitted to the Waltham Water & Sewer Division. The Contractor shall be solely responsible for all costs associated by the aforesaid test(s).

H There will be a total of two (2) rounds of sampling for each section of main tested. The first round of samples shall be taken after the 24 hour disinfection period. The second round of samples shall be taken at least 24 hours after the first round of samples. During each round of sampling, two (2) separate samples shall be drawn from each sample location and sent for laboratory analysis. In the event a sample obtained fails laboratory analysis the Contractor must restart the testing process. The cost for all additional testing shall be borne solely by the Contractor.

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### 3.05 ACCEPTANCE

- A. The Owner reserves the right to accept the water mains in sections after the satisfactory tests have been made and approved and to make full use of any part or parts of the system.
- B. The Contractor shall be held responsible, for one (1) year from the date the entire contract has been accepted by the Engineer and the Owner, to rectify any leaks, errors, or other poor workmanship which may be discovered and shall make any necessary repairs, alternations or adjustments as may be required to properly complete the work, as directed by the Engineer.

END OF SECTION



SECTION 02753TELEVISION INSPECTION OF SEWERSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish all necessary labor, materials, supervision and equipment to satisfactorily inspect gravity sewer lines and sewer service pipes as required by the Contract Documents by means of a closed circuit television (CCTV) system.
- B. Related Work Specified Elsewhere: Sewer line cleaning and sewer flow control are specified in the appropriate sections in this Division.

1.2 QUALITY ASSURANCE

- A. CCTV work shall be completed and delivered per the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) standards. Operators of CCTV equipment shall be NASSCO PACP certified.

PART 2 - PRODUCTS2.1 MATERIALS AND EQUIPMENT

- A. The cameras shall be designed and constructed for sewer line inspection work. The mechanical design of the lens shall allow it to turn and rotate 360 degrees to provide a close up view of sewer pipe walls and sewer service pipes. The camera shall be designed to maintain proper orientation of the picture while the lens is turning and rotating.
- B. The cameras shall be operative in 100% humidity conditions.
- C. The lighting for the cameras shall be suitable to allow a clear picture of service pipes and the entire periphery of the mainline sewer pipe, such that joints, root intrusions, cracks, offset joints, deposits, etc. can be seen and identified by the Engineer.
- D. The lens focus and rotational capabilities and the light intensity will be remotely controlled from an above ground television "studio".
- E. The cameras shall produce a continuous, full color picture with a quality acceptable to the Engineer.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Flow Control:
  - 1. A minimum of 75% of the periphery of the sewer line shall be visible at all times.
  - 2. The Engineer may require that the line be plugged so that the entire periphery can be inspected. For details on sewer flow control, see Section 02751.
- B. Operation:
  - 1. Perform inspection of sewer lines after lines have been suitably cleaned.
  - 2. When inspecting newly constructed sewer lines, introduce water into the sewer lines to be tested from the upstream manhole prior to the television inspection, but no more than 24 hours in advance of the inspection.
  - 3. Lines will be suitably isolated from the remainder of the sewer line as required.

4. Move the cameras through the line in either direction at a moderate rate, not to exceed 30 feet per minute, as recommended by NASSCO.
  5. The Engineer may require Contractor to pull cameras back to get a second view of a section of the pipe.
  6. Use manual winches, power winches, television cable reel powered rewinds, high-pressure hose and reels on jet-cleaning trucks, or a flexible pole, to move the camera through the sewer.
  7. If, during the inspection operation, the camera will not pass through the entire pipe section, the Contractor shall set up the equipment so that the inspection can be performed from the opposite manhole on the pipe segment.
  8. The screen monitor and winch operators shall be in full communication at all times.
  9. Remove all wires, screens, sand bags, etc. used in the television inspection process from the sewers at the completion of inspection of each sewer section.
- C. Measurement:
1. Measurement for location of defects, service connections, etc., shall be accurate to two tenths (0.2) of a foot over the length of the section being inspected.
- D. Records:
1. Printed records shall be provided, reflecting location of defects, service connections, etc., and shall be recorded per PACP standards and stored to a NASSCO-certified digital reporting software:
    - a. Keep records and supply to the Engineer when the work has been completed.
    - b. Show the exact location in relation to adjacent manholes, of each infiltration point discovered by the television camera.
    - c. Show locations of laterals, unusual conditions, roots, break-in storm sewer connections, collapsed sections, presence of scale and corrosion, and other discernible features.
  2. Inventory the houses and apparent empty lots bordering each section of sewer line that is inspected and compare results to the number and location of house services found during the inspection. Log inconsistencies and report them to the Engineer.
  3. Video / Photographs:
    - a. Two copies of the video shall be provided in DVD format, downloaded or output from a NASSCO certified software: one copy to the Engineer and one copy to the Owner.
    - b. The video shall be digitally recorded, indexed by pipe section (labeled by manhole number or other means acceptable to Engineer) and allow for printing of still photographs.
    - c. Photographs shall be printed at Engineer's request and shall be identified on the back as follows:  
Date \_\_\_\_\_; Section: MH# \_\_\_\_\_ to MH# \_\_\_\_\_  
Diameter of Sewer \_\_\_\_\_; Distance from MH# \_\_\_\_\_ is \_\_\_\_\_ LF  
Description of item photographed \_\_\_\_\_
  4. Provide owner with access database of CCTV videos on a portable hard drive.

END OF SECTION

SECTION 02755FINAL SEWER TESTINGPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
2. Perform testing at a time acceptable to the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
3. Provide all labor, pumps, pipe, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

## B. Related Work Specified Elsewhere (When Applicable):

1. Excavation, backfill, dewatering, pipe, pipe fittings and manholes are specified in the appropriate Sections in this Division and/or Division 15.
2. Manhole testing is specified in Section 02601 - Manholes, Covers and Frames.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PERFORMANCE

## A. General:

1. All sewers, manholes, and appurtenant work, in order to be eligible for acceptance by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Thoroughly clean and/or flush all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
3. Perform all tests and inspections in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes.
4. Perform testing by test patterns determined by or acceptable to the Engineer.
5. Remedial Work:
  - a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
  - b. Completely retest all portions of the original construction on which remedial work has been performed.
  - c. Perform all remedial work and retesting in a manner and at a time acceptable to by the Engineer at no additional cost to the Owner.

- B. Line Acceptance Tests (Gravity sewers with no active service connections):
1. Test all gravity sewer lines with no active service connections for leakage by conducting a low pressure air test.
  2. Equipment:
    - a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
    - b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
    - c. All air used shall pass through a single central panel.
    - d. Connect 3 individual hoses:
      - (1) From the control panel to the pneumatic plugs for inflation.
      - (2) From the control panel to the sealed sewer line for introducing the low pressure air.
      - (3) From the sealed sewer line to the control panel for continually monitoring the air pressure rise in the sealed line.
  3. Testing Pneumatic Plugs:
    - a. Seal test all pneumatic plugs prior to using them in the actual test.
    - b. Lay one length of pipe on the ground and seal both ends with the pneumatic plugs to be tested.
    - c. Pressurize the sealed pipe to 5 psig.
    - d. The pneumatic plugs are acceptable if they remain in place without bracing.
  4. Testing Sewer Pipeline:
    - a. After the sewer pipe has been cleaned and the pneumatic plugs checked, place the plugs in the sewer line at each manhole and inflate them.
    - b. Introduce low pressure air into the sealed sewer pipeline until the air pressure reaches 4 psig greater than the average groundwater pressure.
    - c. Allow a minimum of 2 minutes for the air pressure to stabilize to a minimum of 3.5 psig greater than the groundwater pressure. Groundwater is assumed to be at ground surface unless the Contractor can prove by otherwise by test pitting.
    - d. After the stabilization period, disconnect the air hose from the control panel to the air supply.
    - e. The pipeline will be acceptable if the pressure decrease is not greater than 1/2 psig in the time stated in the following table for the length of pipe being tested:

<u>Pipe Diameter</u> (inches)	<u>Time (Min.) for Length of Pipe</u>			
	<u>0-100 ft</u>	<u>101-200 ft</u>	<u>201-300 ft</u>	<u>301-400 ft</u>
4	2.0	2.0	2.0	2.0
6	3.0	3.0	3.0	3.0
8	4.0	4.0	4.0	5.0
10	5.0	5.0	6.0	8.0
12	5.5	5.5	8.5	11.5
15	7.0	8.5	13.0	17.0
18	8.5	12.0	19.0	25.0
21	10.0	17.5	26.0	35.0

5. Test Results:
  - a. If the installation fails the low pressure air test, determine the source of leakage.
  - b. Repair or replace all defective materials and/or workmanship and repeat low pressure air test at no additional cost to the Owner.
- C. Line Acceptance Tests (Gravity sewers with active services):
  1. Test all new gravity sewer lines with active services by conducting a low-pressure air test on all joints using a packer after all services have been connected or capped at the property line and all trenches backfilled but before the surface course of permanent pavement is installed.
  2. Equipment:
    - a. Closed-circuit television system.
    - b. Testing devices (packer):
      - (1) Capable of isolating individual joints by creating a sealed void space around the joint being tested.
      - (2) Constructed such that low pressure air can be admitted into the void area.
      - (3) Shall contain a pressure gauge accurate to one tenth (0.1) psi in-line with the feed line to monitor the void pressure.
      - (4) Capable of performing in sewer lines where flows do not exceed 1/4 of the pipe diameter without resorting to any method of flow control.
  3. Testing Sewer Pipeline Joints:
    - a. Test all joints except those with visible infiltration.
    - b. Procedure:
      - (1) Pull television camera through sewer line in front of the packer.
      - (2) Position the packer on each joint to be tested.
      - (3) Inflate the sleeves on each end of the packer.
      - (4) Apply four (4.0) psi pressure above the existing hydrostatic pressure on the outside of the joint to the void area created around the inside perimeter of the joint.
      - (5) Shut off the supply of air once the pressure has stabilized at the required amount.
      - (6) Monitor the void pressure for thirty (30) seconds.
      - (7) Repair the joint if the pressure drops more than one half (1/2) psi in the thirty (30) seconds.
    - c. Water or chemical pressure testing may be used in lieu of air testing subject to review and approval by the Engineer.
    - d. Re-clean and re-inspect all lines not approved by the Engineer at no additional cost to the Owner.
    - e. Repairing of Joints:
      - (1) When a joint fails the pressure test, excavate and repair the failed joint. Repairing joints with chemical grout will not be permitted.
    - f. The Engineer may request checking of the testing equipment for accuracy.
      - (1) Perform standard air test on a clean continuous section of pipe.
      - (2) Repair the equipment if the void pressure drops.
    - g. Testing Operation Inspection:
      - (1) Reset each joint, as specified herein, prior to acceptance and final payment for joint testing. Retest all joints that fail until the test requirements are met.
    - h. The contractor will supply a black and white photograph of every joint that fails the pressure test.



- D. Alignment Tests (Gravity Sewers):
1. Perform tests for the correctness of horizontal and vertical alignment on each and every length of gravity sewer pipeline between manholes.
  2. Alignment tests to be conducted after all pipe has been installed and backfilled.
  3. The observation test shall be conducted after all upstream work has been completed and the pipeline cleaned of debris.
  4. Notify the Engineer at least 24 hours in advance of the proposed observation testing.
  5. Introduce water into the sewer lines to be tested from the upstream manhole prior to the observation test but no more than 24 hours in advance of the test.
  6. Beam a source of light, acceptable to the Engineer, through the pipeline from both ends and the Engineer will directly observe the light in the downstream, and/or upstream manhole of each test section.
  7. The length of pipe between manholes, diameter of pipe and amount of light observed in the manhole at the end of each pipe section will determine acceptance of the alignment test by the Engineer.
  8. The amount of vertical and horizontal deflection shall not be greater than the ASTM allowance and (manufacturer's recommendations) for the pipe being tested.
  9. No standing water shall be allowed. The presence of standing water shall be cause for rejection of that pipe (including manhole) section.
  10. Improper alignment will be corrected by re-excavation and resetting of pipe at no additional cost to the Owner.
- E. Pipe Deflection: (Gravity Sewers)
1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
  2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
  3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.
- F. Television Inspection Tests (Gravity Sanitary Sewers and Storm Drains)
1. Where television inspection testing is required, test procedures shall be in compliance with the requirements outlined in Specification Section 02753.
  2. No standing water shall be allowed. The presence of standing water may be cause for rejection of that pipe.
  3. Any standing water, detectable leaks, improper joints or any other unacceptable feature detected by the television inspection will be corrected by re-excavation and resetting pipe at no additional cost to the Owner.
- G. Inspection of Appurtenant Installations:
1. Completely inspect, at a time determined by the Engineer, all manholes and inlets to ascertain their compliance with the Drawings and Specifications.
  2. Provide access to each manhole and inlet and check the following characteristics:
    - a. Shape and finish of invert channels,
    - b. Watertightness and finish of masonry structures,
    - c. Location, type, and attachment of stops,
    - d. Elevation and attachment of frames, covers, and openings,

- e. Pattern and machining of covers, and
  - f. Drop connection arrangements.
- H. Manhole Leakage Testing:
- 1. Specified in the "Manholes, Covers and Frames" Section in Division 2.

END OF SECTION



SECTION 02768

TEMPORARY BYPASS PIPING WITH SERVICE CONNECTIONS

PART 1 GENERAL

- 1.01 DESCRIPTION
- 1.02 QUALITY ASSURANCE
- 1.03 BYPASS PIPING PLAN SUBMITTAL

PART 2 PRODUCTS

- 2.01 TEMPORARY BYPASS PIPE WITH SERVICE HOSES
- 2.02 MATERIALS

PART 3 EXECUTION OF WORK

- 3.01 CUTTING OR OPENING PIPES
- 3.02 REPAIRING PIPES
- 3.03 SERVICES, LATERALS & BRANCHES
- 3.04 CHLORINATION OF TEMPORARY PIPING & SERVICE HOSE
- 3.05 TEMPORARY BYPASS PIPE WITH SERVICE HOSES
  - a) GENERAL
  - b) INSTALLATION
- 3.07 CLEANING UP

PART 1 GENERAL

- 1.01 DESCRIPTION

A. For each section of water main pipe to be removed and replaced, shall provide temporary bypass piping to allow for installation of new water main and shall cut or open the pipes by bypass piping, shall repair all opened pipes; and shall do all other work as necessary to set up temporary bypass piping with service connections in full accord with the Specifications.

B. Related work:

- 1. Documents affecting work of this Section Include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- 2. Section 01500 Temporary Provisions & Protection of Utilities & Properties
- 3. Section 02224 Fill & Backfill Materials

- 1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workman who are thoroughly trained and experienced in installing bypass piping systems who are completely familiar with the

specific requirements and methods needed for proper performance of the work of this Section.

- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

#### 1.03 BYPASS PIPING PLAN SUBMITTAL

- A. Proposed plans for laying all of the bypass piping shall be submitted to the Engineer for approval at the pre-construction meeting. The Engineer shall make the final decision as to the routing of all bypass lines, before any bypass is laid.
  - 1. All existing services fed by the main that is out of service must be located by the Contractor and must be fed by the bypass pipe.
  - 2. Three (3) copies of the proposed bypass plans shall be submitted to the Engineer.
  - 3. All bypass pipe and service connections shall be bubble-tight at all times. No leakage shall be acceptable.
  - 4. All bypass pipes which crosses the sidewalks, driveway entrances, parking lot entrances, intersection or extends around the radius of an intersecting street shall be installed below the surface grade.

### PART 2 PRODUCTS

#### 2.01 TEMPORARY BYPASS PIPE WITH SERVICE CONNECTION

- A. Shall be of the highest quality, and shall be fully adequate to withstand the pressures and all conditions of use.
- B. The pipe and other materials shall provide adequate water-tightness, and care shall be exercised throughout the installation of the temporary pipe and making up of all temporary connections to avoid any possible pollution of any mains or services, or contamination of the temporary bypass pipe itself.
- C. The Contractor shall chlorinate and flush, prior to placing pipeline into services, all temporary pipe and hose to prevent contamination.
- D. The temporary pipe will be activated only after negative bacteriological results are obtained.
- E. Connections shall be made to the existing services at the right of way line. The contractor shall excavate to the service, cut and connect to the existing service(s).

2.02 MATERIALS

- A. Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Resident Engineer.

PART 3 EXECUTION

3.01 CUTTING OR OPENING PIPES

- A. The Contractor shall open the pipe at each end of the section to be replaced and at other locations which may be necessary to permit satisfactory removal and replacement of the water main.
- B. Every effort must be made to prevent foreign material from entering lines adjacent to the work.
- C. Open ends of pipe shall be temporarily sealed with mechanical caps or plugs at all times when not being worked on.
- D. Openings in the pipes shall be made by burning out existing service, the Contractor shall install adequate blocking to prevent motion of the closed gate valves during the time the pipe is open.
- E. At openings adjacent to sections under pressure or in service, the Contractor shall install adequate blocking to prevent motion of the closed gate valves during the time the pipe is open.

3.02 REPAIRING PIPES

- A. The Contractor shall make water-tight all openings made in the pipe lines.

3.03 SERVICES, LATERALS AND BRANCHES

- A. Contractor shall plug, and subsequently remove plugs and debris from such services, laterals, hydrant branches, etc.
- B. All side lines, services, hydrant connections, etc., must be back-flushed immediately after reconnection to new water main, and then the main flushed before it is put back into service, or as the Owner directs.

3.04 CHLORINATION AND DECHLORINATION OF TEMPORARY PIPING AND SERVICES

- A. Upon completion of temporary piping and service hose set up operations and after the work has been approved by the Owner, chlorinate the section in accordance with the AWWA Manual C601, "AWWA Standard for Disinfecting Water Mains".

- B. All materials, equipment, labor and chlorine shall be furnished by the Contractor.
- C. The entire procedure of chlorinating the pipes shall be discussed in advance of the time the work is to be done, and the methods employed shall be fully satisfactory to the Owner.
- D. The disinfection shall be accomplished by pumping a chlorine solution into the pipe at a dose concentration of 25 mg/l.
- E. After the twenty four (24) hour retainer period, the chlorinated water shall be dechlorinated per AWWA C655-09 Field Dechlorination, and flushed from the main until the chlorine concentration in the water leaving the main is not higher than in the system or less than 1 mg/l.
- F. After final flushing and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. In the case of extremely long mains, samples shall be collected along the length of the line as well as the end of the line. The Contractor is responsible to have samples collected and tested by an independent third party.
- G. If the initial disinfection fails to produce satisfactory results, the procedure shall be repeated at the Contractor's expense until satisfactory results have been obtained.
- H. Special procedures may be outlined by the Resident Engineer where the above-outlined method is not practicable. The entire procedure of chlorinating the mains shall be such as to prevent flows of water from a section exposed to possible contamination to a section of pipe which has been completed and chlorinated. Should such water from a contaminated section be allowed to enter a previously chlorinated section as a result of the Contractor's negligence or through necessity caused by failure of the Contractor to properly schedule his work, the section or sections of pipe thus affected shall be re-chlorinated at the Contractor's own expense. Any temporary connection to the mains or other facilities required to accomplish the chlorination as just described shall be at the Contractor's expense. Any temporary connections shall be properly abandoned, as determined by the Resident Engineer at the Contractor's expense.

3.05 TEMPORARY BYPASS PIPE WITH SERVICES

A. GENERAL

1. Contractor shall furnish, install, maintain and remove bypass pipes of the size directed to satisfactorily service all dwelling, shops and trailers serviced by the mains to be lined, whether occupied at the time or not.
2. The bypass pipes shall be fed at connection points above or below ground and shall be connected thereto by the Contractor or as specified by the Owner.

3. Such portions shall be marked on the Contract plans but the Owner reserves the right to make additions or deletions as the situation warrants in field conditions.
4. Without additional compensation, Contractor shall also furnish, install, maintain and remove service hoses or pipe, of approved size, to service all consumers from gated connections on said bypass pipe.

B. INSTALLATION

1. The temporary bypass pipe shall be laid in locations satisfactory to the Owner where it will cause the least obstruction, and is less likely to be damaged.
2. Contractor will be required to cover clamps and bolts used to connect the bypass arrangement.
3. Cover material will be pavement, sand bags or any other material acceptable to or specified by the Owner.
4. At street crossings, driveways, entrances to parking lots a narrow trench shall be cut in the paving and the temporary pipe placed just below the surface at an 18" depth with temporary surfacing above it, or other satisfactory arrangements shall be made.
5. The location, method placing, materials employed and the sanitary precautions shall be fully satisfactory to the Resident Engineer.

3.07 CLEANING UP

- A. Contractor shall exercise responsible precautions to prevent contamination of the pipe line. At the conclusion of the pipe replacement work prior to reconnection to existing main, remove all debris from the pipe line, leaving it clean and ready for use to the satisfaction of the Owner.
- B. During the course of the work, keep the site of the operations in as clean and neat a condition as possible.
- C. Satisfactorily repair or restore any driveways, walks, culverts, pipes, fences, walls, poles, posts, curbs or other property damaged by the installation, maintenance, operation and removal of temporary piping and shall leave them in condition equal to that which existed at the beginning of this Contract.
- D. Removal and Cleaning Up
  1. At the conclusion of the use of temporary bypass pipes and service hoses, they shall be removed and hauled away by the Contractor and any connections which have previously been interrupted shall be completely restored by him in full



compliance with the precautions which are required to prevent the possibility of contamination.

2. Contractor shall also remove and haul away any surplus material, broken pavement, lumber, equipment and any other refuse remaining from the temporary piping operations.

END OF SECTION

SECTION 02910

ESTABLISHMENT OF GROWTH

PART 1        GENERAL

- 1.01        SCOPE OF WORK
- 1.02        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS

- 2.01        LOAM BORROW
- 2.02        TOPSOIL
- 2.03        LIMESTONE
- 2.04        FERTILIZER
- 2.05        GRASS SEED
- 2.06        TREE PAINT
- 2.07        GENERAL PLANTING AND NURSERY STOCK

PART3        EXECUTION OF WORK

- 3.01        PLACING LOAM OF TOPSOIL
- 3.02        TOPSOIL REHANDLED AND SPREAD
- 3.03        PREPARATION OF AREAS ON WHICH LOAM OR TOPSOIL ARE TO BE PLACED
- 3.04        SURFACE DRAINAGE AND SEASONAL LIMITS
- 3.05        ROUGH FINISHED GRADE
- 3.06        APPLICATION OF LIMESTONE
- 3.07        APPLICATION OF FERTILIZER FOR GRASS
- 3.08        SEEDING GRASS
- 3.09        SEEDING GRASS BY SPRAY MACHINE
- 3.10        CARE DURING CONSTRUCTION
- 3.11        REFERTILIZATION AND APPLICATION OF FERTILIZER
- 3.12        PREPARATION FOR MULCHING
- 3.13        PLACING MULCH

PART 1        GENERAL

- 1.01        SCOPE OF WORK
  - A.        The Contractor shall furnish all labor, materials, and equipment necessary to do all loaming and seeding and planting, as indicated on the Contract Drawings and as herein specified.
- 1.02        RELATED WORK SPECIFIED ELSEWHERE
  - A.        SECTION 01300 – SUBMITTALS
  - B.        DIVISION 2 – SITE WORK

PART 2 MATERIALS

2.01 LOAM BORROW

- A. Loam borrow shall consist of a fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials, and shall be obtained from a well-drained site. It shall be such a mixture of sand, silt and clay particles as to exhibit sandy and clayey properties in and about equal proportions. It shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.
- B. Prior to stripping, the loam shall have demonstrated by the occurrence upon it of healthy crops, grass or other vegetative growth that it is reasonably well drained and that it does not contain toxic amounts of either acid or alkaline elements.

2.02 TOPSOIL

- A. Topsoil shall consist of fertile, friable, natural topsoil, reasonably free of stumps, roots, stiff clay, stones larger than 1" diameter, noxious weeds, sticks, brush or other litter.
- B. Prior to stripping the topsoil from the construction project, it shall have demonstrated by the occurrence upon it of healthy crops, grass or other vegetative growth, that it is reasonably well drained and capable of supporting plant growth. Material classified as topsoil can only be obtained within the project limits.

2.03 LIMESTONE

- A. Limestone shall consist of pulverized limestone obtained by grinding either calcareous or dolomitic limestone so that 95% of the material will pass a no. 20 sieve and at least 50 % of the material will pass a No. 100 sieve. The limestone shall have a neutralizing value satisfactory to the Engineer.

2.04 FERTILIZER

- A. Fertilizer shall be complete starter fertilizer, at least 70 percent of the nitrogen of which is derived from natural organic sources of ureaform. It shall contain the following percentages by weight:

Nitrogen 15%	Phosphorous 15%	Potash 15%
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Fertilizer shall be delivered mixed as specified above, in standard size, unopened containers showing weight, analysis, and names of manufacturers. They shall be stored in a weatherproof storage place in such a manner that the fertilizer will be kept dry and its effectiveness shall not be impaired. Fertilizer shall be applied at a rate of 800 pounds per acre.

2.05 GRASS SEED

- A. Grass seed shall be of the previous year's crop and in no case shall the weed seed content exceed 1 percent by weight. The grass seed shall conform to the requirements of the following tables:

	<u>Proportion</u>	<u>Germination Minimum</u>	<u>Purity Minimum</u>
-Baron Kentucky Bluegrass	50%	85	98
-Creeping Red Fescue	20%	85	98
-Yorktown Rye	15%	90	98
-Jamestown Fescue	15%	90	98

- B. The mix shall be Loft Seed Company – Turf Supreme or approved equal.

2.06 TREE PAINT

- A. The paint furnished under this specification shall be suitable for application by brushing on sawed, cut or bruised surfaces of living trees, for the purpose of disinfection and protection of these surfaces.

- B. The new materials from which this paint is manufactured shall be as follows:

- 1) Asphalt: Shall conform to the requirements of AASHTO-M 18, Grade A.
- 2) Creosote: Shall be a distillate of coal-gas tar or coke-oven tar.
- 3) Fibrous magnesium silicate pigment: not less than 97% passing through #325 screen.

Composition:

Asphalt	40-70%
Creosote	20-30%
Fibrous Magnesium Silicate	10-15%
Volatile Thinner	0-15%

- C. The proportions of the various ingredients shall be chosen within the above limits to yield a paint of medium brushing consistency.

## 2.07 GENERAL PLANTING AND NURSERY STOCK

- A. Materials to be used in this work shall conform to “The American Standards of Nursery Stock” as sponsored by the American Association of Nurserymen, Inc. These standards shall determine all requirements of acceptable shrub and seeding nursery stock.
- B. All plants shall be packed so as to arrive at the delivery point in good growing conditions.
- C. Delivery of plants and seedlings shall be made to site, only according to the Contractor’s ability to handle and properly care for them.
- D. All nursery stock shall be grown at nurseries in the northern area of the United States.
- E. All nursery stock shall conform to the “American Standards for Nursery Stock” as sponsored by the American Association of Nurserymen, Inc., U.S. Patent Office A60.1-1969.
- F. All plants shall be fully representative of their normal species or varieties unless otherwise specified. All plants must have a good, healthy, well-formed upper growth; a fibrous compact root system; and must be free from disease, injurious insects, mechanical wounds either fresh or healed, broken branches, decay or any other defect; and shall be legible tagged with their proper names.
- G. All plant materials shall be dug with reasonable care and skill immediately previous to shipment. Special precautions shall be taken to avoid any unnecessary injury to or removal of fibrous roots. Each species or variety shall be handled and packed in the approved manner for that particular plant, having regard to the soil and climactic condition at the time and place of digging, transit and delivery, and to the time that will be consumed in transit. All precautions that are customary in good trade practice shall be taken to insure the arrival of the plants at the site of the project in good condition for successful growth.
- H. The roots of bare rooted material shall be carefully protected with wet straw, moss or other suitable material which will insure the arrival of the plants at the site of the work in good condition.
- I. The sizes of these trees shall be as called for on the plans and measurements shall be made by calipering at a point 12 inches above the collar.
- J. Non-flowering trees shall have been transplanted 3 times, the last transplanting within 2 years. With the exception of *Ulmus Americana*, they shall have a single straight leader not cut back. They shall have symmetrical development of strong, healthy branches beginning 5 feet to 6 feet from the ground; and below this point, the trunk shall be clean for street trees, although park trees will be permitted to branch lower.

- K. Flowering trees shall have been transplanted twice, the last transplanting within 2 years. The trunk shall be clean and straight up to the first branch, which shall be about 4 feet from the ground where directed. Flowering trees shall be balled and burlapped and kept moist for delivery.
- L. Deciduous shrubs shall be fully representative of their species and variety. They shall have been transplanted twice; the last transplanting within 2 years. They shall have 4 to 6 branches coming from the roots, and shall have a well-branched root system and shall be a good weight for the height specified.
- M. Evergreen shrubs shall have been transplanted 3 times, the last transplanting within 2 years. They shall have a good colored top growth and shall be balled and burlapped and kept moist for delivery. Pyramidal type evergreen trees shall have a spread equal to  $\frac{3}{4}$  of their height.
- N. Evergreen shrubs shall have been transplanted twice and shall be of the size indicated on the plans and, except where noted, each clump shall have not less than 4 stems. Plants shall be balled and burlapped and kept moist for delivery.

PART 3 EXECUTION OF WORK

3.01 PLACING LOAM OR TOPSOIL

- A. The loam or the topsoil obtained from stacked piles shall be hauled, deposited and spread to the directed depths on the areas shown on the plans or designated by the Engineer. The loam or topsoil shall be spread to a depth of not less than 4 in. All grass and weed growth on the areas designated to be loamed, shall be cut to a maximum height of 2 inches before the loam is placed thereon. After the loam or topsoil has been spread, it shall be carefully prepared by spading or harrowing, and lumps, large stones, brush, roots, stumps, litter and other foreign material shall be removed from the loamed, topsoil or processed planting materials areas and disposed satisfactorily.
- B. The compaction shall be equivalent to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. The compaction may be obtained by rolling, dragging or any method that produces satisfactory results. All depressions caused by settlement or rolling shall be filled with additional materials and the surfaces shall be regraded and rolled until it presents a reasonably smooth and even finish and is up to the required grade.
- C. During hauling operations, the roadway surface shall be kept clean and any loam or other dirt which may be brought upon the surface shall be removed promptly and thoroughly before it becomes compacted by traffic. If necessary, the wheels of all vehicles used for hauling shall be cleaned frequently and kept clean to avoid bringing any dirt upon the surface. The Contractor shall take all reasonable precautions to avoid injury to existing or planted growth.

### 3.02 TOPSOIL REHANDLED AND SPREAD

- A. Topsoil which is obtained on the site, from piles of topsoil previously excavated and stacked and designated as topsoil to be re-handled and spread, shall be used as required, and as directed by the Engineer, on areas to be seeded. The topsoil must be approved before it is spread and the Contractor will be required, without compensation, to take corrective action as directed, in order to make the topsoil suitable for its intended use.
- B. The Contractor is required to adjust the acidity by the addition of limestone as determined by testing as required and to apply the fertilizer as required.

### 3.03 PREPARATION OF AREAS ON WHICH LOAM OR TOPSOIL ARE TO BE PLACED

- A. The area upon which the above materials are to be placed shall be raked, harrowed or dragged to form a reasonably smooth surface, all stones larger than 2 inches, undesirable growth over 2 inches and debris shall be removed from the area and disposed of by the Contractor outside the location.
- B. When directed by the Engineer, additional suitable material shall be spread as required to repair gullies or depressions. The labor, equipment and materials necessary to place, compact and grade the additional material shall be paid for under the respective item from which the material is obtained.
- C. The Contractor shall not proceed with the work of seeding until permission of the Engineer has been obtained.
- D. Before the application of limestone, fertilizer and seed, the Contractor shall harrow or roto-till to a depth of 3 inches, when directed, all areas where loam or topsoil has been placed under a previous contract. When loam borrow is placed, or topsoil is re-handled and spread; and they are paid for under the respective items of a contract, they will not require harrowing or rototilling.
- E. The Contractor shall remove all debris and stones having any dimensions greater than 2 inches before the application of limestone, fertilizer and seed.

### 3.04 SURFACE DRAINAGE AND SEASONAL LIMITS

- A. The Contractor shall provide and maintain uniform grades, slopes, crowns and ditches on all excavations and fills to insure satisfactory drainage at all times during the construction period.
- B. The Contractor shall be responsible for protecting adjacent properties, completed work and work in progress from siltation and mud. Finished grades and surfaces for all work under this heading shall shed water to catch basins as per drawings.

- C. No fill material or topsoil shall be placed, spread or rolled during unfavorable weather conditions such as interruption by heavy rains. Fill operations shall not be resumed until approved by the Engineer.

### 3.05 ROUGH FINISHED GRADE

- A. Grading shall be accomplished as necessary to bring topsoil and sand surfaces to grades shown on the drawings or to prepare the subgrade to receive paving or construction as specified or shown on drawings.
- B. After completion of pavements and structures, surfaces of earth mounds and planting areas shall be rough finished graded and shaped by blading, dragging or other means. Surfaces shall be uniform and smooth, true to slopes and grades. Soils in plating areas shall be graded level with the edge of headerboards, pavement or walks. Particular attention shall be given to surface drainage around sump catch basins.
- C. The rough finished surface of the grading plane at any point shall not vary more than 0.10 feet above or below the grade indicated on the drawings.
- D. Upon completion of earthwork, the Contractor shall remove all surplus construction materials, earth and debris resulting from his work so that the entire job site is left in a neat and orderly condition.

### 3.06 APPLICATION OF LIMESTONE

- A. Limestone may be applied in dry form or hydraulically. Limestone where necessary shall be spread and thoroughly incorporated in the layer of loam or topsoil to adjust the acidity of the loam or topsoil. The rate of application of the limestone will vary up to a maximum of 1 pound per square yard depending on the results of laboratory tests performed by an independent professional testing laboratory acceptable to the Engineer, at the Contractor's own expense. The limestone shall be thoroughly incorporated into the layer of loam or topsoil and the upper 1-inch of the underlying subsoil by harrowing or other methods satisfactory to the Engineer so as to provide a layer of thoroughly mixed material for the seedbed.

### 3.07 APPLICATION OF FERTILIZER FOR GRASS

- A. Fertilizer may be applied in dry form or hydraulically. After the application in dry form or hydraulically and after the application of limestone, if found necessary, on the seed bed, starter fertilizer shall be spread on the top layer of loam or topsoil at the rate of 800 pounds per acre and worked into the seed bed. The full depth of loam or topsoil shall then be spaded or harrowed and graded to the required cross-section.



### 3.08 SEEDING GRASS

- A. After the loamed or topsoil areas have been prepared and treated as before described, grass seed conforming to the respective formulas before specified shall be carefully sown thereon at the rate of approximately 175 pounds per acre. Seeding shall be done in two directions at right angles to each other. Seeding on level areas and on slopes up to and including 4:1 slopes shall be done by means of an approved seeder that will seed and roll in one operation. On shoulders and other narrow areas, the seeding may be done longitudinally in one application.

### 3.09 SEEDING GRASS BY SPRAY MACHINE

- A. The spray machine will be restricted for use only on slopes steeper than 4:1. The application of limestone as necessary, fertilizer and grass seed may be accomplished in one operation by the use of limestone as necessary, fertilizer and grass seed may be accomplished in one operation by the use of an approved spraying machine. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The spraying equipment shall be so designed that when the solution is sprayed over an area the resulting deposits of limestone, fertilizer and grass seed shall be equal in quantity to those quantities specified before.
- B. A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of limestone, fertilizer, and grass seed, per 100 gal. of water.
- C. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the limestone, fertilizer and seed as before specified.

### 3.10 CARE DURING CONSTRUCTION

- A. The Contractor shall be responsible for the watering of all seeded and grassed areas which shall be kept moist. The Engineer's decision will prevail in the event a dispute develops with the Contractor as to whether or not the seeded and grassed areas are moist. Seeded areas on which growth has started shall be watered to a minimum depth of 2 inches to assure continuing growth. Watering shall be done in a manner which will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment to apply one complete coverage to the seeded areas in an 8 hour period.
- B. If necessary, suitable signs and barricades of brush or other materials shall be placed to protect the seeded areas. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas shall be seeded repeatedly until all areas are covered with a satisfactory growth of grass.

- C. The Contractor shall care for all of the seeded areas until the work has been physically accepted, without compensation in addition to the amount regularly to be paid under this item as hereinafter provided. Care shall include all regrading, refertilizing, reseeding and mowing which may be necessary.
- D. Prior to the acceptance of the project the Contractor will be responsible for mowing the grass when necessary on all flat or rolling slopes from level to and including 4 to 1 slopes to a height of 3 inches when the grass has attained a height of eight inches. The grass on all slopes steeper than 4 to 1 shall be cut when necessary to a height of 3 inches at such a time as a stable turf has been established in the Engineer's judgement.

### 3.11 REFERTILIZATION AND APPLICATION OF FERTILIZER

- A. This work shall be done in April, May, August or September. No permission will be granted to re-fertilize in months other than herein prescribed. Areas recently seeded shall be re-fertilized only after one season of growth of two months duration.
- B. The fertilizer shall have a composition of 10-10-10 and be applied at a rate of 500 pounds per acre. In addition, organic fertilizer derived from any commercial source shall be applied at the rate of 135 pounds of N per acre. Seed as before specified shall be included with the fertilizer at a rate of 10 pounds per acre.

### 3.12 PREPARATION FOR MULCHING

- A. The areas upon which mulch is to be spread shall be prepared by raking, harrowing or dragging to form a reasonably smooth surface. All stones larger than 2", undesirable growth over 2' in height and all debris shall be removed from the area and disposed by the Contractor in a satisfactory manner. The disposal area shall be outside the location limits of the project, when required by the Engineer and shall be responsibility of the Contractor.
- B. When required by the Engineer, the Contractor shall spread, compact and grade additional acceptable material to repair gullies or depressions. Such additional material shall be obtained from suitable excavation or furnished by the Contractor.

### 3.13 PLACING MULCH

- A. Hay mulch shall be loosely spread to a uniform depth over all areas designated on the plans, at the rate of 4 ½ tons per acre. Hay mulch may be applied by mechanical apparatus, if in the judgement of the Engineer the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be

capable of spreading at least 80% of the hay or straw in lengths of 6" or more, otherwise it shall be spread by hand.

- B. Wood chip mulch and aged pine bark mulch shall be loosely spread to uniform depth over all acres designated on the plans, at the rate of 390 cubic yards per acre (approximately 3" in depth), or as otherwise directed.
- C. Wood chip mulch and aged pine bark mulch may be applied by mechanical means, except that if the equipment breaks the mulch into small pieces or changes its desired texture, as determined by the Engineer, it shall be spread by hand.

END OF SECTION

SECTION 02995

MISCELLANEOUS WORK

PART 1      GENERAL

- 1.01      SCOPE OF WORK
- 1.02      RELATED WORK SPECIFIED ELSEWHERE

PART 2      MATERIALS

- 2.01      GENERAL

PART 3      EXECUTION OF WORK

- 3.01      INCIDENTAL WORK
- 3.02      RESTORATION OF CROSS COUNTRY AREAS
- 3.03      PRECAUTIONS UNDER ELECTRIC LINES
- 3.04      PUBLIC SAFETY

PART 1      GENERAL

- 1.01      SCOPE OF WORK

- A.      The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to complete the miscellaneous work under this Section and as noted on the contract drawings.
- B.      When applicable, the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable Specification exists, the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.
- C.      The work of this Section includes, but is not limited to, any incidental work not specifically identified elsewhere.

- 1.02      RELATED WORK SPECIFIED ELSEWHERE

- A.      DIVISION 1 THROUGH 16 - As Appropriate

PART 2      MATERIALS

- 2.01      GENERAL

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

- B. The materials provided by the Contractor shall meet all requirements as specified herein, of the applicable specification, or to the satisfaction of the Engineer.
- C. All material not furnished, in the opinion of the Engineer, in accordance with the Contract Drawings and Specifications shall be removed immediately. Suitable material, which is satisfactory, shall be furnished at no additional compensation to the Contractor.

PART 3 EXECUTION OF WORK

3.01 INCIDENTAL WORK

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

3.02 RESTORATION OF CROSS COUNTRY AREAS

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

3.03 PRECAUTIONS UNDER ELECTRIC LINES

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

3.04 PUBLIC SAFETY

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

END OF SECTION

SECTION 04100

MORTAR

PART 1        GENERAL

- 1.01        CONTRACT DOCUMENTS
- 1.02        DESCRIPTION OF WORK
- 1.03        RELATED WORK SPECIFIED ELSEWHERE

PART 2        MATERIALS

- 2.01        MORTAR MATERIALS

PART 3        EXECUTION OF WORK

- 3.01        MIXING

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        DESCRIPTION OF WORK

- A.        The Contractor shall provide all necessary labor, tools, materials, and equipment as required for performing all operations relating to the placement of mortar as indicated on the Contract Drawings and as specified herein.

1.03        RELATED WORK SPECIFIED ELSEWHERE

- A.        SECTION 01300—SUBMITTALS
- B.        SECTION 04200—UNIT MASONRY

PART 2        MATERIALS

2.01        MORTAR MATERIALS

- A.        Portland cement shall conform to all the requirements of ASTM Designation C-150, Type I or II.
- B.        Hydrated lime shall conform to all the requirements of ASTM Designation C-207, Type "S."
- C.        Masonry cement shall conform to all the requirements of ASTM Specification C-91, Type II, and with the approval of the Engineer may be used in place of cement and lime mortar. Masonry cement shall be Louisville Cement Company brixment, Lehigh Masonry Cement, or equal. Any lime contained in masonry cement shall be Type "S" only.

- D. Sand shall be clean, hard siliceous, siliceous, in accordance with ASTM Specifications C-144, free from loam, silt or other impurities, composed of grains of varying sizes within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Natural Sand</u>	<u>Manufactured Sand</u>
No. 4	100	100
No. 8	95-100	95-100
No. 16	70-100	70-100
No. 30	40-75	40-75
No. 50	10-35	20-40
No. 100	2-15	10-25
No. 200		0-10

- E. Mortar specimens made with sand shall have compressive strength at 28 days of not less than 90 percent of the compressive strength of specimens made with Ottawa sand.
- F. Water shall be fresh, clean, and free from acids, alkali, sewage, organic materials, and other deleterious substances.
- G. Water repellants and other admixtures shall be used only where specified or with written approval of the Engineer. When used they shall be the product of a manufacturer who can demonstrate successful usage of his product for a period of not less than 3 years prior to being offered for the work and shall be used in strict accordance with the printed directions of the manufacturer.
- H. Coloring Pigments, if required, shall be alkali-resistant, non-staining, non-fading pigments, manufactured specifically for mortar coloring, subject to approval of the Engineer.
- I. Unless otherwise specified, or required by building codes, mortar shall conform to ASTM C-270, Type "N", composed, by volume of one part Portland cement,  $\frac{1}{2}$  to  $1 \frac{1}{4}$  part hydrated lime, with sand not less than  $2 \frac{1}{4}$  nor more than 3 times the sum of volumes of cement and lime used. Alternate—1 part approved masonry cement,  $2 \frac{1}{4}$  to 3 parts sand.
- J. Where specifically shown or noted, or where required by building codes for the indicated construction mortar shall conform to ASTM C-270, Type "S", composed by volume of one part Portland cement,  $\frac{1}{4}$  to  $\frac{1}{2}$  part hydrated lime, with sand not less than  $2 \frac{1}{4}$  nor more than 3 times the sum of the volumes of cement and lime used. Alternate— $\frac{1}{2}$  part Portland cement, one part masonry cement;  $3 \frac{1}{2}$  to  $4 \frac{1}{2}$  parts sand.
- K. Fire wall mortar for fire walls shall be 3 parts sand, one part Portland cement, and 15 percent lime by cement volume, conforming to Underwriters Laboratories, Inc., requirements.
- L. Tuck pointing or prehydrated mortar of the same composition as the laying mortar shall be used as follows. Mix dry materials thoroughly; remix, adding only enough water to produce a damp workable mix which will retain shape when pressed into a ball; after one to two hours, add water as required for proper point consistency.

- M. Colored mortar shall be used only if required and will be specified under the specific wall construction elsewhere herein.

PART 3 EXECUTION

3.01 MIXING

- A. Mortar materials shall be measured by weight or by volume and the methods of measurement shall be such that the proportions can be controlled with an error not over 2 percent. One bag of Portland cement weighing not less than 94 pounds shall be considered as one cubic foot. Mortar shall be mixed in a mechanical batch mixer, not less than 3 minutes after all the materials are in the mixer. Hand mixing will be permitted for small batches provided the quantities of materials and water are accurately controlled and that the method of mixing is approved by the Engineer. Hand mixing for small batches shall be continued until the mortar is completely and uniformly mixed. Mortar shall be used within 30 minutes after it leaves the mixer and no retempering of mortar in which the cement has begun to set will be allowed.





SECTION 04200

MASONRY WORK

PART 1 GENERAL

- 1.01 SCOPE OF WORK
- 1.02 RELATED WORK SPECIFIED ELSEWHERE

PART 2 MATERIALS

- 2.01 GENERAL
- 2.02 PORTLAND CEMENT
- 2.03 ADMIXTURES
- 2.04 WATER
- 2.05 AGGREGATE
- 2.06 MORTAR MATERIALS
- 2.07 BRICK

PART 3 EXECUTION OF WORK

- 3.01 MIXING
- 3.02 TRIMMING AND CLEANING

PART 1 GENERAL

- 1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals for performing all operations required for the masonry work as indicated on the Contract Drawings, as specified hereinafter, and as evidently necessary to complete the work.

- 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. SECTION 01300 – SUBMITTALS
- B. SECTION 02728 – MODIFICATION AND CONNECTIONS TO EXISTING STRUCTURES
- C. SECTION 03300 – CAST-IN-PLACE CONCRETE
- D. SECTION 03400 – PRECAST CONCRETE STRUCTURES AND MANHOLES

PART 2 MATERIALS

- 2.01 GENERAL

- A. All concrete shall be site-mixed or ready-mixed as produced by a plant acceptable to the Engineer. Class A and Class B concrete shall be used as indicated by contract drawings or specified herein.

## 2.02 PORTLAND CEMENT

- A. Portland cement shall be Type II and shall conform to ASTM Standard Specifications for Portland Cement, Designation C150-77.
- B. All cement shall be American made Portland Cement from a reputable manufacturer. Cement shall be supplied from one mill through the construction phase and shall be of uniform color.
- C. Cement shall be free from water-soluble salts or alkalis which may cause efflorescence on exposed surfaces. Cement shall be free from all lumps and from all partially or wholly set cement.
- D. High-early-strength cement may be used only with the permission of the Engineer, but no additional payment will be made to the Contractor for the use thereof. Such cement shall meet all specification of Type III cement.
- E. All cement used by the Contractor shall be subject to testing to determine compliance to specifications. The test methods shall conform to appropriate ASTM methods and specifications; however, the place, time, frequency and method of sampling shall be determined by the Engineer as applicable to site conditions and construction progress.

## 2.03 ADMIXTURES

- A. Admixtures acceptable to the Engineer shall be added to the concrete as shown by the Contract Drawings or specified herein so as to create air-entrained concrete.
- B. If admixtures are added to the concrete in solution form, the quantity of solution shall be considered in the computation of the water – cement ratio.
- C. Admixtures causing the accelerated setting of cement in concrete shall not be used in any class of concrete.
- D. The use of admixtures to concrete other than concrete exposed to the elements will not be permitted without the written consent of the Engineer.
- E. Combinations of types of cements, admixtures and concrete shall be clean, fresh and free from injurious materials such as oil, acid, alkali, organic matter or deleterious materials. Testing of water shall be in accordance with AASHTO T26.

2.04 WATER

- A. Water use in the mixture of cements, admixtures and concrete shall be clean, fresh and free from injurious materials such as oil, acid, alkali, organic matter or deleterious materials. Testing of water shall be in accordance with AASHO T26.

Water quality shall be within the following guidelines:

pH	3.0 – 11.7
Total Solids	
Organic	.01 % (Max)
Inorganic	.10 % (Max)
Sulphate	.05 % (Max)

2.05 AGGREGATE

- A. Fine Aggregate –

Fine aggregate for cement mortar shall be well graded and conform to the following sieve analysis:

Sieve Size	% Passing
3/8 "	100
# 4	95 – 100
# 16	55 – 80
# 50	10 – 25
# 100	2 – 8
# 200	0 – 2

- B. Coarse Aggregates

Course Aggregate for cement concrete shall consist of crushed rock or screened gravel and shall be composed essentially of clean, hard, strong and impermeable particles, resistant to wear and frost and free from deleterious amounts of organic matter, loam, clay, salts, mica and soft, thin, elongated, laminated or disintegrated stone, and it shall be inert to water and cement. Coarse aggregate shall consist of well graded gravel and crushed stone conforming to the ASTM Standard Specifications for Concrete Aggregates, Designation C33-77, and then conforming to the following detailed requirements.

NOMINAL SIZE

SIEVE SIZE	1 ½ inches	¾ inches	3/8 inches
1 ½ inch	90 – 100		
¾ inch	35 – 60	90 – 100	
½ inch	--	--	90 – 100
3/8 inch	10 – 25	20 – 50	30 – 70
# 4	0 - 5	0 - 10	0 - 15
# 8		0 - 5	0 - 5

2.06 MORTAR MATERIALS

- A. Portland cement shall conform to all the requirements of ASTM Designation C-150, Type II.
- B. Hydrated lime shall conform to all the requirements of ASTM Designation C-207, Type "S".
- C. Masonry cement shall conform to all the requirements of ASTM Specification C-91, Type II, and with the approval of the Engineer may be used in place of cement and lime mortar. Masonry cement shall be Louisville Cement Company brixment, Lehigh Masonry Cement, or equal. Any lime contained in masonry cement shall be Type "S" only.
- D. Sand shall be clean, hard siliceous, in accordance with ASTM Specification C-144, free from loam, silt or other impurities, composed of grains of varying sizes within the following limits:

PERCENT PASSING

<u>Sieve Size</u>	<u>Natural Sand</u>	<u>Manufactured Sand</u>
No. 4	100	100
No. 8	95 – 100	95 – 100
No. 16	70 – 100	70 – 100
No. 30	40 – 75	40 – 75
No. 50	10 – 35	20 – 40
No. 100	2 – 15	10 – 25
No. 200	--	0 – 10

- E. Mortar specimens made with sand shall have compressive strength at 28 days of not less than 90 percent of the compressive strength of specimens made with Ottawa sand.
- F. Water repellents and other admixtures shall be used only where specified or with written approval of the Engineer. When used, they shall be the product of a manufacturer who can demonstrate successful usage of his product for a period of not

less than 3 years prior to being offered for the work and shall be sued in strict accordance with the printed directions of the manufacturer.

2.07 BRICK

- A. Clay brick shall conform to the requirements of AASHO-M91 with the following exceptions:
1. The size of brick furnished shall be 8 inches long by 3  $\frac{3}{4}$  inches wide by 2  $\frac{1}{4}$  inches deep.
  2. The average absorption of 5 representative samples shall not exceed 15 % and the absorption of any individual sample shall not exceed 17  $\frac{1}{2}$  %.
  3. The average compressive strength of 5 representative samples shall not be less than 3000 pounds per square inch and the compressive strength of any individual sample shall not be less than 2500 pounds per square inch.
- B. All bricks shall be good, sound, hard and uniformly burned. Under burned or salmon bricks shall not be acceptable. Broken or cracked bricks or bricks which are not regular and uniform in shape and size or otherwise unsatisfactory to the Engineer shall not be accepted. Bricks which are unsatisfactory to the Engineer shall be rejected and immediately removed from the site of the work by the Contractor and replaced with bricks satisfactory to the Engineer all at no additional compensation to the Contractor.
1. Bricks for the channels and shelves shall conform to ASTM C32 Grade specifications for Grade SS, Sewer Brick, except that the mean of five tests for absorption shall not exceed 8 percent and no individual brick exceed 11 percent.
  2. Bricks for building up and leveling manhole and catch basin frames shall conform to ASTM C62.
- C. The Contractor shall furnish the Engineer with the Manufacturer's Certification that units supplied meet all AASHO and ASTM specifications. Verification by additional testing shall be conducted by the Contractor at no additional cost as deemed necessary by the Engineer.

PART 3 EXECUTION OF WORK

3.01 MIXING

- A. Mortar materials shall be measured by weight or by volume and the methods of measurement shall be such that the proportions can be controlled with an error not over 2 percent. One bag of Portland cement weighing not less than 94 pounds shall be considered as one cubic foot. Mortar shall be mixed in a mechanical batch mixer, not less than 3 minutes after all the materials are in the mixer. Hand mixing will be

permitted for small batches provided the quantities of materials and water are accurately controlled and that the method of mixing is approved by the Engineer. Hand mixing for small batches shall be continued until the mortar is completely and uniformly mixed. Mortar shall be used within 30 minutes after it leaves the mixer and no retampering of mortar in which the cement has begun to set will be allowed.

### 3.02 TRIMMING AND CLEANING

- A. Masonry shall be cleaned with trisodium phosphate and detergent,  $\frac{1}{2}$  cup of each to each gallon of water. Before cleaning, all dirt, excess loose mortar shall be scraped or brushed off and masonry saturated on with stiff brushes as required and rinsed off thoroughly with clean water until all mortar, dirt and cleaning solution are removed.
- B. As the cleaning progresses, all joints shall be examined for cracks, holes and imperfect pointing. Defective joints shall be cut out and repaired by tuck pointing.

END OF SECTION

## **SPECIAL PROVISIONS**

### **MONTCLAIR AVE WATER MAIN REPLACEMENT**

### **CITY OF WALTHAM ENGINEERING DEPARTMENT**

#### **SCOPE OF WORK**

The work to be done under this Contract consists of the installation of approx. 1700 feet 8" and 350 feet of 12" CLDI water on Montclair Ave and Trimount Ave in Waltham.

The work to be performed will include excavation, installation of new water main in the same trench as the existing water main, replacing existing water services, hydrants, installation of valves, and related appurtenances, hot mix asphalt patching of streets and sidewalks, resetting of curb, pavement milling and paving with hot mix asphalt, and other incidental work as required.

Work under this Contract shall be paid for at the Contract unit bid prices, which shall constitute full compensation for all material, labor, equipment, etc., required to satisfactorily complete the work.

All work under this Contract shall be done in conformance with the Massachusetts Highway Department *Standard Specifications for Highways and Bridges* dated 1988, the *Supplemental Specifications* dated July 1, 2015, and the *Interim Supplemental Specifications*; the *2015 Construction Standard Details*, the *1990 Standard Drawings for Signs and Supports*; the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* with *Massachusetts Amendments* and the *Standard Municipal Traffic Code*; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; the latest edition of *American Standard for Nursery Stock*; the latest edition of the American Water Works Association Standards, the Plans and these Special Provisions

#### **WORK SCHEDULE**

Work on this project is restricted by City Ordinance to a seven (7) hour day between the hours of 7:00am and 5:00pm. Work week is restricted to a five (5) day week Monday through Friday, with the Contractor and all subcontractors working on the same shift. No work shall be done on this Contract on Saturday's, Sunday's, or holidays without the prior written approval by the City. Weekly work schedules shall be delivered to the Engineer no later than noon on the Friday before the following work week.

No work shall be performed on the entire length of any street or roadway listed below during the hours of 7:00am to 9:00am and 4:00pm to 6:00pm. Also no construction vehicles shall be parked waiting to perform work during these hours. In case of emergency, exceptions to this rule can be made by the Consolidated Public Works Director or their designee. Any non-emergency work would be reviewed on a case-by-case basis and approval may be issued by the Consolidated Public Works Director or his/her designee. Street or roadways restricted are as follows: Bacon St., Bear Hill Rd., Beaver St., High St., Lexington St., Linden St., Main St., Maple St., Moody St., Newton St., Pine St., Prospect St., River St., Second Ave., Smith St., South St., Stow St., Totten



Pond Rd., Trapelo Rd., Waverley Oaks Rd., Weston St., Winter St., and Wyman St.

### **CHANGES IN SCOPE**

The City of Waltham reserves the right to increase or reduce the amount of this Contract. Any changes in scope may involve adding work on the streets listed above or on streets yet to be identified, or deleting all or some of the work on a specific street or portion of a street. Changes in scope may be ordered at any time up to project acceptance at the Contract unit bid prices.

### **DEFINITIONS**

Except for specific reference to Department Standards and Operations, the usage of the term Engineer shall mean the Waltham City Engineer or his/her duly authorized Agent.

### **RESPONSIBILITY FOR DAMAGE CLAIMS**

The Contractor shall indemnify, defend and save harmless the Municipality and all of its or their offices, agents and employees against all suits, claims or liability of every name and nature, for or on account of any injuries to persons or damage to property arising out of or in consequence of the acts of the Contractor in the performance of the work covered by the Contract or failure to comply with the terms and conditions of said Contract, whether by themselves or his/her employees or Subcontractors, but only in respect of such injuries or damages sustained during the performance and prior to the completion and acceptance of the work covered by the Contract.

The Contractor will be held responsible for any and all claims for damage to underground structures such as, but not restricted to, water or gas mains, pipes, conduits, manholes or catch basins, due to his/her operation or to the operations of any of his/her Subcontractors.

### **COOPERATION BY CONTRACTOR**

Attention is directed to the provisions relating to rights of public corporations and municipal departments to enter the site of the improvement and alter, replace, and/or install facilities at such times when the Contractor will be prosecuting other required work contiguous thereto.

### **INSPECTION OF WORK**

The Contractor is advised that the Waltham City Engineer will be provided with a schedule of operations and will at various times during the construction of the project be on-site to inspect procedures and give directions. For the purpose of observing work that affects their respective properties, inspectors for public agencies and utility companies shall be permitted access to the work, but all official orders and directives to the Contractor will be issued by the Waltham City Engineer or his/her duly authorized agent.

## **NOTICE TO OWNERS OF UTILITIES AND PUBLIC SERVICE DEPARTMENTS:**

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of Public or Private Utilities and Departments of his/her intentions to commence operations affecting such utilities and Departments at least one (1) week in advance of the start of such operations and the Contractor shall at the same time file a copy of said notice with the Engineer.

The names of the principal City Departments and Utilities which may be affected will be provided to the Contractor at the pre-construction meeting.

**The Contractor shall notify “Massachusetts DIG SAFE” and procure a DIG SAFE number 72 hours prior to disturbing existing ground in any way. DIG SAFE Call Center – PHONE - 811.**

**The City of Waltham is not a part of “DIG SAFE.” The Contractor must request Water, Sewer, and Drain utility markings from the City Water & Sewer Department at least 72 hours prior to disturbing existing ground in any way.**

Before the Contractor begins any work on operations which might result in damage to utility pipes or structures the Contractor shall verify the locations of existing overhead and subsurface utilities in the vicinity of the work with the listed Departments and Utility Companies and conduct his/her operations so as to avoid any damage to them.

## **PROTECTION OF EXISTING UTILITIES AND STRUCTURES**

Excavation and backfill operations shall be carried out in a manner that will prevent cave-in of excavations or the undermining, damage or disturbing of existing utilities and structures or of new work.

Any excavations improperly backfilled, or where settlement occurs, shall be reopened to the depth required, then refilled with new materials and compacted, and the surface restored to the required grade and condition at no additional expense to the Owner.

Any damage due to excavation, backfilling or settlement of the backfill, or injury to persons or damage to property occurring as a result of such damage, shall be the responsibility of the Contractor. All costs to repair such damage, in a manner satisfactory to the Owner, shall be borne by the Contractor at no additional expense to the Owner.

Where existing subsurface utilities or other facilities adjacent to or crossing through the excavation require temporary support or protection, such temporary support or protection shall be satisfactorily provided by the Contractor at no additional expense to the Owner. All necessary measures shall be taken by the Contractor to prevent lateral movement or settlement of existing facilities or of work in progress.

The plans indicate the approximate location of existing overhead and subsurface utilities in the vicinity of the work and the bidders are advised to verify this information, as its accuracy and completeness are not guaranteed by the Owner or Engineer.

## **PROTECTION OF UTILITIES AND PROPERTIES**

The Contractor's attention is directed to the location of underground utilities in the existing and proposed roadways.

The Contract Drawings indicate the approximate location in plan of existing overhead and subsurface utilities in the vicinity of the work. Whatever measures are necessary to protect these lines during the work shall be included in the Contract unit price for the various items involved.

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

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

## **PROVISIONS FOR TRAVEL AND PROSECUTION OF THE WORK**

Prior to commencement of work, the Contractor shall be responsible for obtaining all necessary construction permits. Permits will include, but are not necessarily limited to, a NPDES Notice of Intent from the Environmental Protection Agency (including the preparation of a Storm Water Pollution Prevention Plan) and a Street Opening / Trench Permit from the Consolidated Public Works.

Access shall be maintained for all abutters so that they may use the driveways and approaches adjacent to their properties. Pedestrian access to abutting property and access for emergency vehicles shall be provided at all times.

All construction equipment, material and debris shall be removed from the traveled way at the end of each working day and shall be stored in such manner as not to interfere with the flow of driveway traffic or pedestrians.

The Contractor shall coordinate his/her work with the work to be done by other Contractors on the site, public utilities or other agencies, and he/she shall so schedule his/her operations as to cause the least interruption to the normal flow of all traffic types. Reasonable facilities shall be provided by the Contractor for the safe and convenient passage of pedestrians and vehicles through and within the project area.

Particular care shall be taken to establish and maintain methods and procedures which will not create unnecessary or unusual hazards to public safety. The placement of necessary devices will be for daily work periods and shall be removed after the completion of work operations. Signs having messages that are irrelevant to normal traffic conditions shall be removed or properly covered at the end of each work period. Signs are to be kept clean at all times and legends shall be distinctive and unmarred.

## **TEMPORARY BYPASS WATER MAIN PLAN**

The Contractor shall prepare and submit a Temporary Bypass Water Main Plan for approval by the Engineer. The Temporary Bypass Water Main Plan shall be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The Plan shall include layout of bypass piping, temporary service lines to all customers, specified bypass pipe diameter to be used in each location, location of temporary valves, and the type and location of temporary fire hydrants.

## **TRAFFIC MANAGEMENT PLAN**

The Contractor shall prepare and submit a traffic management plan to the Engineer for review and approval by the Engineer and the Waltham Police Department Traffic Safety Officer. The Traffic Management Plan shall be prepared for all streets in the Contract, unless specifically directed otherwise by the Engineer. The Traffic Management Plan shall contain information on proposed detour routes if requested, location and type of detour and warning signs, barricades and other safety and traffic control means and devices to ensure a safe, orderly flow of vehicular and pedestrian traffic.

All temporary and permanent signs, traffic control devices, and pavement markings shall conform to the latest relevant sections of the Manual on Uniform Traffic Control Devices (MUTCD), and the Massachusetts Standard Specifications for Highways and Bridges.

The Traffic Management plan shall be submitted for review at least fourteen (14) days prior to any work being performed on the project roadways. No work would be allowed until the Traffic Management Plan is approved by the City and implemented by the Contractor.

Temporary pavement markings and other traffic control devices shall be provided in accordance with the Contractor's Traffic Management Plan and as directed by the Engineer.

Temporary traffic control devices shall include the provision of variable message sign boards to supplement other traffic control measures as directed by the Engineer. The cost of preparing the traffic management plan and providing and maintaining temporary traffic control devices shall be borne by the Contractor.

## **TRAFFIC POLICE DETAILS**

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

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

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

If uniformed policemen are required for traffic control, as determined by the Owner, the Contractor shall arrange for the police detail by contacting the Police Department at least 24 hours in advance of the time the detail will be required. The Contractor will be responsible for coordinating with the Police Department when details are required.

### **RAILROAD FLAGGING SERVICE**

If any of the work required to be done by the Contractor may obstruct the tracks of a railroad or in any way endanger the operation of its trains, and the services of a flagger or flaggers or other railroad employees are required by the Chief Engineer of the railroad company and personnel are assigned by that Chief Engineer for the protection of the property and traffic of the Railroad against hazards, the cost of all such flagging services will be paid by the Contractor to their employers, subject to the rules and regulations of the railroad company. The Contractor shall provide to the City proof of payment to the Railroad for the cost of the flaggers required. The City shall reimburse the Contractor for the flaggers under item 999.2 Railroad Flagging. The City shall not pay any administrative charges associated with the costs of flaggers charged by the railroad nor shall the Department pay charges for debit accounts if such accounts are required by the railroad.

### **METHOD OR SEQUENCE OF CONSTRUCTION**

The Contractor shall obtain approval for his/her proposed method and sequence of construction, including procedures for maintaining traffic, from the City Engineer or his/her duly authorized agent, prior to performing the work. The Contractor is responsible for filling out and submitting to the Engineer the one page checklist included at the end of this section prior to commencing a new segment or phase of work. The checklist describes the type of work to be done and identifies a series of notifications and preliminary steps that are to be addressed prior to commencing a new segment or phase of work.

### **OSHA REQUIREMENTS**

The work to be performed under this Contract by the General Contractor and any and all subcontractors is to be performed in compliance with the Occupational Safety and Health Act of 1970, including any and all amendments thereto.

### **PRECAUTIONS UNDER ELECTRIC LINES**

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

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

### **OVERLOADED TRUCKS**

Materials delivered to the project in motor vehicles or semi-trailer units that exceed the legal maximum gross weight allowed for the particular class as specified in section 19a of chapter 90 of the general laws of Massachusetts will not be accepted.

### **PUBLIC SAFETY AND CONVENIENCE**

Trenches shall not be excavated in traveled ways until all materials and equipment required for such work are at the site and available for immediate use. When work is not in progress, trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining a 36.5-ton truckload with impact without additional compensation. The work in each trench shall be practically continuous, with the placing of pipe, backfilling, and paving of the roadway surfaces closely following each preceding operation. Payment for steel plates will be included under the unit bid price per linear foot for the respective pipe or conduit item, regardless of width of trench.

The Contractor shall take every measure necessary for the protection of personnel and property.

The Contractor shall at all times, until written acceptance of the physical work by the Owner, be responsible for the protection of the work and shall take all precautions for preventing injuries to persons or damage to property on or about the project.

### **BARRICADES AND WARNING SIGNS**

All automotive equipment not protected by traffic cones or flares that is working on the project in areas open to traffic shall have one amber flashing or strobe warning light mounted on the cab roof or on the highest practical point of the machinery. These lights shall be in operation whenever the equipment is working or traveling in the project work area at a speed less than 25 M.P.H. Flashers must be visible to both oncoming and overtaking vehicular traffic and shall have a light source of 32 minimum candlepower and a flashing frequency of 50-60 times per minute.

All personnel who are working in areas open to traffic shall wear MHD approved safety vests.

All vehicles except passenger cars which are assigned to the project which operate at speeds of 25 MPH or less shall have an official SLOW MOVING VEHICLE emblem displayed in accordance with the provisions of Section 7 of Chapter 90 of the General Laws as amended by Chapter 684 of the Acts of 1970.

### **STEEL PLATES IN CONSTRUCTION ZONES**

At the end of each working day where trenches in areas of public travel are covered with steel plates, each edge of such plates shall be either beveled or protected by a slope of 2-feet horizontally to 1-inch vertically. Temporary bituminous concrete patching material shall be used to construct the ramps. The cost of necessary patching materials and their

maintenance and removal will be considered incidental to the item involved with no separate payment.

### **DISPOSAL OF SURPLUS EXCAVATED MATERIALS**

All surplus excavated material not required or suitable for reuse on the project, or otherwise not wanted by the City, shall become the property of the Contractor and removed and disposed of outside and away from the limits of the project at no additional cost to the City in accordance with all local rules and the approval of local governmental authorities having jurisdiction over the disposal of such materials. Any excess material that the City decides to keep shall be transported to and stored at a location within City to be identified by the Engineer. Loading, transporting, and unloading shall be done by the Contractor without additional compensation.

Payment for this work shall be included in the unit price under the applicable item from which the material was obtained.

### **PROMPT PAYMENT AND RELEASE OF RETAINAGE TO SUBCONTRACTORS**

The Contractor agrees to pay each subcontractor under this Contract for satisfactory performance of subcontract work not later than 10 business days from the receipt of each payment the Contractor receives from the City. Failure to comply with this requirement may result in the withholding of payment to the Contractor until such time as all payment due under this provision has been received by the subcontractor(s) and/or referral to the Prequalification Committee for action which may affect the Contractor's prequalification status.

### **ARCHITECTURAL ACCESS BOARD TOLERANCES**

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA/PROWAG rules, regulations, standards and guidelines (Rules and Regulations).

All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR - Rules and Regulations of the Architectural Access Board (AAB) and the Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG)

The Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimensions less than the minimum dimensions.

Contractors shall establish grade elevations at all wheel chair ramp locations, and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans).

All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked and checked prior to placing cement concrete. All grade changes are to be made at joints.

## **DEBRIS IN DRAINAGE AND SEWER STRUCTURES**

The Contractor shall exercise care when conducting his/her operations so that the debris does not enter any structures. All structures and pipes shall be kept clean and operable. All costs of debris removals, damages due to back-ups, and cleaning by others due to operations of the Contractor shall be borne by the Contractor.

## **PROCEDURES FOR SHOP DRAWING SUBMITTALS**

The following procedure shall be followed when making shop drawing submittals for this project:

1. The Contractor shall submit four (4) sets of drawings directly to the Engineer for preliminary review.
2. The Engineer will send a written reply, returning two (2) sets to the Contractor within seven (7) working days of receipt of the drawings.
3. If the Engineer's reply indicates rejection or advises corrections or additions to the drawings, steps 1 and 2 are repeated until the Engineer indicates that approval will be given.
4. The Contractor shall then submit four (4) sets of drawings to the Engineer for approval and distribution by the Engineer per the standard operating procedures of the Department.
5. The Contractor shall take care that every separate document in each set of every submittal shall carry the following identifying information:

### **Information Required**

- a. Project No.
- b. Identifying Item Number from proposal, if applicable
- c. Locations where material is proposed to be used, if applicable
- d. Name of submitting Contractor
- e. Personal signature and title of an official of the Contractor authorized to make shop drawings submittals
- f. Date of signature or submittal

The Contractor shall not receive payment for nor will he/she be allowed to install any item or materials which require shop drawing approval unless and until he/she receives shop drawing approval for that item.

Within 15 days after receipt of an approved shop drawing for any item, the Contractor shall provide the Engineer written proof that he/she has ordered such approved materials required on the subject Contract and a written confirmation on such order and delivery schedule from the manufacturer of the item. This delivery schedule shall be appropriate for timely completion of this project.

## **SAWCUTS**

Sawcuts shall be made in existing pavements to provide a neat, square edge at limits of excavation and to provide a clean joint where new pavement and sidewalks are to match existing. Sawcuts shall also be made where shown on the Contract Drawings, or



otherwise directed by the Engineer. Sawcuts shall be made to the depth directed and shall be clean and even. All cuts shall be made using an approved power driven saw. All sawcuts shall be considered incidental and compensation will be included in the Contract bid prices for the related work items.

### **CONCRETE COLLARS**

Concrete collars, as per the standard construction details, shall be placed around drainage and sewer and telephone structures, water service boxes, and utility boxes that are located in pavement areas as directed by the Engineer. High early strength concrete shall be used if required by the Engineer. Concrete used for collars shall not be measured for payment. Compensation shall be included in the Contract bid price for the respective items.

### **ASPHALT JOINTS**

Tack coat and sand shall be applied to all joints composed of hot mix asphalt immediately after paving, or as required by the Engineer. Tack coat and sand, when applied to joints as described, shall be considered incidental and compensation shall be included in the Contract bid price for the respective hot mix asphalt items.

### **DEWATERING**

Where excavations become inundated with water, whether from groundwater or surface runoff, the Contractor shall be responsible for dewatering the excavation prior to installing structures and/or pipes and backfill. Dewatering activities shall be performed in accordance with the details shown on the plans. Locations of materials and methods used for dewatering shall be approved by the Engineer prior to use. Costs associated with dewatering activities shall be considered incidental to the overall project, and no additional compensation shall be made.

### **PROTECTION OF EXISTING TREES**

Trees and shrubs that are not designated on the plans, or by the Engineer, to be cut, removed, destroyed or trimmed shall be saved from harm and injury. The Contractor shall provide measures to prevent any harm and injury caused during construction operations.

### **DISTURBANCE OF EXISTING BOUNDS**

Where existing bounds are disturbed by the Contractor's activities, they shall be reset by a Registered Land Surveyor at the Contractor's expense. Where the existing bounds conflict with the proposed construction, removal and resetting of the bounds shall be paid for under Item 711 - Bound Removed and Reset.

A certification by the Registered Land Surveyor performing the work shall be made and submitted to the Engineer for all bounds reset.

## **MATERIALS TESTING**

All materials used in the construction of the project shall be subject to inspection, examination, or testing, by a certified materials testing laboratory as determined necessary by the Engineer.

## **RECORD DRAWINGS (AS-BUILT) DOCUMENTS**

At the conclusion of construction and prior to final payment the Contractor shall submit ties to all curb stops, bends, valves and other water appurtenances installed as well as invert elevations for all drainage or sewer structures installed or altered as part of the Work under this Contract. Copies of legible and detailed field notes or marked up design plans shall be provided to the Engineer.

**ITEM 120.1****UNCLASSIFIED EXCAVATION****CUBIC YARD**

The work to be done hereunder consists of removing and disposing of materials in accordance with the relevant provisions of Section 120 as amended and supplemented by the following: all materials obstructing the execution of other required work as shown on the plans and/or as directed except those materials for which payment is made as part of other items of this Contract.

The Contractor's attention is directed to the fact that materials shall be disposed of in accordance with the provisions written hereinbefore under the heading "Disposal of Surplus Excavated Materials".

Materials encountered in the excavation may include but are not necessarily limited to, earth, bituminous or cement concrete pavements and curb, Class A Rock, ledge, masonry, pipe, timber, cobblestones, stone pavers, cinders, trees and stumps, and other materials from previous constructions.

Where, in the opinion of the Engineer, the present roadway foundation is of suitable material, it shall only be excavated to a depth determined by the Engineer. Should unsatisfactory subgrade material be encountered, the Engineer may direct that excavation be carried to satisfactory material and the area be backfilled with gravel borrow, or other material, as directed by the Engineer. Payment for gravel borrow, if used, will be made under Item 151, Gravel Borrow.

Any work done or materials used for backfilling in excess of the depth authorized shall be at the Contractor's expense and will not be paid for under the Contract items involved.

The accepted quantity of Unclassified Excavation will be paid for at the Contract unit price per cubic yard under Item 120.1, Unclassified Excavation.

**ITEM 129.****PAVEMENT MILLING****SQUARE YARD**

This work to be performed under this Item shall conform to the relevant provisions of Section 120, supplemented by the following:

The adjusting of all drainage, utility, and municipality structures, gate boxes, and service boxes within the limits of areas to be cold planed and overlaid shall be done at the direction of the engineer. Payment for the adjustment of castings work is to be made at the unit bid price for the respective items.

Excavated material resulting from the milling operation shall be disposed of by the Contractor in accordance with the requirements of "DISPOSAL OF SURPLUS EXCAVATED MATERIALS", payment for which is to be included in the unit bid price for Item 129.

The accepted quantity of Pavement Milling will be paid for at the Contract unit price per

square yard under Item 129.

**ITEM 141.1.**                      **TEST FOR EXPLORATION**                      **CUBIC YARD**

Excavate test pits, as shown on the plan or at the direction of the Engineer, to locate underground utilities or structures in advance of the construction. Backfill test pits immediately after their purpose has been satisfied and restore and maintain the surface in a manner satisfactory to the Engineer.

Payment for test pits will be based on the material removed which will be paid for at the Contract unit price per cubic yard. No additional compensation shall be made for the test pits not directed by the Engineer, or shown on the plan but is carried out at the discretion of the Contractor to benefit the installation.

The work to be performed under this Item shall conform to the relevant provisions of Section 140, amended or supplemented as follows:

The work to be performed under this Item consists of all work required to excavate test pits, as required, and as approved by the Engineer, to locate structures and utilities within the proposed work area. Also included is work required to backfill test pits with excavated material and compacting.

Work required to place and compact backfill to replace unsuitable material in test pits shall be paid for under Item 151, Gravel Borrow. Gravel borrow for pavement subbase will be paid under the same item.

Test pit for exploration shall be measured in accordance with Section 140 of the Standard Specifications.

Payment for test pit for excavation shall be at the contract unit price per cubic yard, which shall Be full compensation for all labor, material, tools and equipment necessary or incidental to complete the work including patching the test pit with Hot Mix Asphalt.

**ITEM 144.**                      **CLASS B ROCK EXCAVATION**                      **CUBIC YARD**

The work to be performed under this Item shall conform to the relevant provisions of Section 140 and the following:

The Contractor's attention is directed to the fact that materials shall be disposed of in accordance with the provisions written hereinbefore under the heading "Disposal of Surplus Excavated Materials".

Where, encountered in the construction of water, sewer and drain pipes and structures the removal and satisfactory disposal of all ledge and boulders greater than 1 cubic yard shall be measured and paid for under item 144. The removal shall be by blasting or power tools such as a hoe ram or jack hammer. Removal operations shall be so prosecuted that no damage will be caused to the adjacent structures.

Payment for Class B Rock Excavation will be based on the material removed within the pay limits as shown on the plans, which will be paid for at the Contract unit price per cubic yard. Payment shall include all necessary labor, materials, and equipment required to satisfactorily complete the work, including excavation, removal and disposal of rock (ledge) within the same trench. No additional compensation shall be made for the rock excavated outside of the pay limits or not directed by the Engineer, or shown on the plan but is carried out at the discretion of the Contractor to benefit the installation.

**ITEM 151.** **GRAVEL BORROW** **CUBIC YARD**

Refer to the Massachusetts Highway Department Standard Specifications for Highways and Bridges dated 1988, the Supplemental Specifications dated July 1, 2015, and the Interim Supplemental Specifications; the 2015 Construction Standard Details.

**ITEM 153.** **CONTROLLED DENSITY FILL** **CUBIC YARD**

The work to be performed under this Item shall conform to the relevant provisions of Section 150 and the following:

Excavatable Controlled Density Fill (CDF) shall be used as backfill material in trenches, abandoned structures or other locations if required by the Engineer. Materials shall meet the requirements specified in the following subsection of Division III, Materials: Controlled Density Fill, Type 2E M4.08.0.

Controlled Density Fill shall be placed in a manner such that no damage will occur to utility lines, pipes or structures. The material shall be placed so that no voids are left upon completion of the backfilling process.

Controlled Density Fill shall be measured in place by the cubic yard. Payment for Controlled Density Fill will be paid for at the Contract unit price per cubic yard. No additional compensation shall be made for material placed beyond the limits of excavation as shown in the plans or as determined by the Engineer.

**ITEM 156.** **CRUSHED STONE** **CUBIC YARD**

Refer to the Massachusetts Highway Department Standard Specifications for Highways and Bridges dated 1988, the Supplemental Specifications dated July 1, 2015, and the Interim Supplemental Specifications; the 2015 Construction Standard Details.

**ITEM 182.2** **REMOVAL OF ASBESTOS CEMENT PIPE** **FEET**

This section specifies the requirements for handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule  
29 CFR 1910 Section 134 Respiration Protection  
29 CFR 1926 Construction Industry  
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records  
29 CFR 1910 Section 1200 Hazard Communication  
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule  
40 CFR 61 Subpart A Regulation for Asbestos  
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos  
U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations Massachusetts Department Of Transportation Highway Division Project No. 605353.

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments and Fire Departments.

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a Contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor and Industries. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet

any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Abatement Supervisor and Asbestos Abatement Project Designer as required by 453 CMR 6.00.

Asbestos removal work shall be coordinated with all other work under the Contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the HASP may pose a safety hazard to the workers.

#### NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

#### STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.
2. Proper protective clothing and respiratory protection prior to entering the work spaces.
3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.
4. Proper exit practices from the work space through the showering and decontamination facilities.
5. Removing asbestos containing material in ways that minimize release of fibers.
6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.
9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

## REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLI certification of proposed Supervisors and Foreman responsible for asbestos work.
2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLI, EPA and OSHA standards. Massachusetts
3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.
4. Written plan of action and standard operating procedures to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.
5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.
6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.
7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.



Asbestos Cement Pipe removal shall be measured in linear feet. Payment for Asbestos Cement Pipe removal will be paid for at the Contract unit price per linear feet. No additional compensation shall be made for material removed beyond the limits excavation as shown in the plans or as determined by the Engineer.

<b><u>ITEM 220</u></b>	<b><u>DRAINAGE STRUCTURE ADJUSTED</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 220.2</u></b>	<b><u>DRAINAGE STURCTURE REBUILT</u></b>	<b><u>VLF</u></b>
<b><u>ITEM 220.7</u></b>	<b><u>SANITARY STRUCTURE ADJUSTED</u></b>	<b><u>EACH</u></b>

The work to be performed under this Item shall conform to the relevant provisions of Section 220, supplemented by the following:

Structures to be adjusted shall be identified by the Contractor and approved by the Engineer prior to commencing with the work. Castings that are damaged due to the actions of the Contractor shall be replaced with new castings at his own expense. Structures that are adjusted will be paid for at the unit price per each, regardless of the number of times that structure is to be adjusted to a temporary or final grade. Payment for structures to be adjusted shall include modifications to the structure in line and/or grade of up to 3 feet. Adjustment of double inlet catch basins shall be counted as one unit.

If the Engineer determines that any castings require replacement, the Contractor shall install new castings as required under Items 221.1. If new castings are to be installed, payment for adjustment of the new castings shall be included under the item for the new casting.

Existing frames and grates or covers identified to be replaced shall be transported to the Public Works maintenance yard located at 169 Lexington St and stockpiled in a location identified by the engineer at no additional cost. Any frames and grates or covers determined by the Engineer to be of no further value to the City shall become the property of the Contractor and be disposed of off the project site by the Contractor without additional compensation.

Limits of drainage structures to be rebuilt shall be pre-approved by the Engineer. When in the judgment of the Engineer the masonry shows deterioration the structure shall be re-built in accordance with the provisions of Section 220.6.

Payment for the adjustment of structures shall include payment for all necessary labor, materials, and equipment required to satisfactorily complete the work, including removing and stacking existing castings to be replaced if required by the Engineer, initial setting of the new castings, adjustments to temporary grades, and adjustments to the final grade.

Drainage Structure Rebuilt will be measured by the vertical lineal foot, complete in place and will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work including

removal of deteriorated portions of the structure, brick, block and mortar as required to rebuild the structure.

**ITEM 221.1**                    **FRAME AND COVER - MUNICIPAL STANDARD**                    **EACH**

The work to be performed under these Items shall conform to the relevant provisions of Sections 201 and 220, supplemented by the following:

Frames, grates and covers shall be LeBaron Foundry, Neenah Foundry or approved equivalent. The following model numbers refer to LeBaron products:

Frame and Cover for Drain and Sewer Manhole – LK 110A

Frames and Grates for Catch Basins and Gutter Inlets – LF 248.

Manhole covers shall have a diamond pattern; pick holes and the appropriate word “DRAIN” or “SEWER” cast in 3-inch letters to match the corresponding utility. Where 36” frames and covers are required, they shall be provided and installed at no additional cost. Casting frames shall be set in a full mortar bed with bricks, a maximum of 8 inches thick. All castings shall be set in a full concrete collar, conforming to Standard Detail 202.9.0.

Existing frames and grates or covers identified to be replaced shall be transported to a location Waltham identified by the Engineer at no additional cost. Any frames and grates or covers determined by the Engineer to be of no further value to the City shall become the property of the Contractor and be disposed of off the project site by the Contractor without additional compensation.

Frames and grates (or covers) - municipal standard will be measured for payment per each, complete in place and will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work including initial setting of the new casting, adjustments to temporary grades, and adjustments to the final grade.

**ITEM 238.12**    **12 INCH DUCTILE IRON PIPE**    **FOOT**

The work to be done under this Item shall conform to the relevant provisions of Section 230 and the following:

Pipes shall be installed on a firm bedding of crushed stone if required by the Engineer. Extra depth excavation for installation of the crushed stone and the crushed stone itself shall be included in the payment for the drainage pipe being installed.

The removal of existing pipes within the same trench, excavation, backfill, the connection to existing or proposed drainage structures or pipes, crushed stone, the plugging of old pipes or holes in drainage structures, and the cutting of the ends of pipe to conform to the slopes of embankments shall be considered as incidental work under this Item at no additional compensation.

Limits of drainage structures to be rebuilt shall be pre-approved by the Engineer. When in the judgment of the Engineer the masonry shows deterioration the structure shall be re-built in accordance with the provisions of Section 220.6.

Payment for the 12 inch ductile iron pipe shall be made at the Contract unit price per foot, which price shall be full compensation for the removal and disposal of existing pipe (excluding Asbestos Cement) and appurtenances encountered during construction, cutting and plugging the existing pipe, and furnishing all materials, preparation and installation, including all excavation, backfilling and compaction, pipe bedding, testing, buried pipe identification tape, 12" of gravel roadway subbase, and for all labor, equipment, tools and incidentals necessary to complete the item. Crushed Stone used to replace unsuitable bottom material for water main bedding shall be paid for under Item 156.

**ITEM 241.15**                      **15 INCH REINFORCED CONCRETE PIPE**                      **FOOT**

The work to be done under this Item shall conform to the relevant provisions of Section 230 and the following:

Pipes shall be installed on a firm bedding of crushed stone if required by the Engineer. Extra depth excavation for installation of the crushed stone and the crushed stone itself shall be included in the payment for the drainage pipe being installed.

The removal of existing pipes within the same trench, excavation, backfill, the connection to existing or proposed drainage structures or pipes, crushed stone, the plugging of old pipes or holes in drainage structures, and the cutting of the ends of pipe to conform to the slopes of embankments shall be considered as incidental work under this Item at no additional compensation.

Measurement and payment for 15 Inch Reinforced Concrete Pipe shall be at the contract unit price per foot, which shall be full compensation for all labor, material, tools and equipment necessary or incidental to complete the work.

Payment for the 15 inch reinforced concrete pipe shall be made at the Contract unit price per foot, which price shall be full compensation for the removal and disposal of existing pipe (excluding Asbestos Cement) and appurtenances encountered during construction, cutting and plugging the existing pipe, and furnishing all materials, preparation and installation, including all excavation, backfilling and compaction, pipe bedding, testing, buried pipe identification tape, 12" of gravel roadway subbase, and for all labor, equipment, tools and incidentals necessary to complete the item. Crushed Stone used to replace unsuitable bottom material for pipe bedding shall be paid for under Item 156.

**ITEM 250.04**                      **4 INCH POLYVINYL CHLORIDE SANITARY SEWER PIPE**                      **FOOT**

The work to be done under this Item shall conform to the relevant provisions of Sections 201, 230 and the following:

The Contractor shall furnish, lay, join and test all gravity sewer pipe and appurtenant materials and equipment as indicated on the drawings and as specified herein.

## 1.0 MATERIALS

### SANITARY SEWER PIPE

Gravity sanitary sewer pipe and fittings shall be SDR 35 (standard dimension ratio) Polyvinyl Chloride (PVC) gravity sewer pipe conforming to current ASTM standards. Joints shall be elastomeric gasket joints, providing a watertight seal, conforming to ASTM D3212 (Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals).

## 2.0 EXECUTION OF WORK

### 2.1 SEWER BYPASS

Prior to starting any sewer work, the Contractor shall submit to for approval a written sewer bypass plan indicating the proposed method of controlling and managing flows in the existing sewer during construction. Temporary service shut downs for individual residences shall only occur during normal working hours, with service restored at the end of each work day, and the work shall be scheduled so that temporary shut downs will not be required for more than one day per service.

### 2.2 LINES AND GRADES

A. Pipes shall be laid to the lines and grades shown on the drawings or as directed by the Engineer. The grade shown on the profile is that of the invert of the pipe. The work shall conform to this grade. A variation of one-eighth (1/8) inch or more from the true invert grade on gravity sewers laid on grades above one percent will be deemed sufficient reason to cause the work to be rejected. Work so rejected shall be corrected by the Contractor at his/her own expense.

B. The Contractor will establish the location of the pipe, manholes and other appurtenances, prior to construction for verification by the Engineer. The Engineer will establish bench marks along the route of the pipeline at convenient intervals for the use of the Contractor and for his/her own reference in checking the pipe and manhole inverts and other elevations throughout the project.

C. The grade and alignment of the pipe may be maintained, with the approval of the Engineer, by the use of laser beams if the Contractor can demonstrate that he/she possesses sufficient equipment and employs with sufficient experience, to utilize such method.

D. The Contractor shall furnish all labor, material, surveying equipment and tools to establish and maintain all lines and grades from basic control points furnished by the Engineer.

## 2.3 FOUNDATIONS

A. All pipes to be laid in open trench excavation shall be bedded and uniformly supported over their full length on foundations of the types specified and shown on the drawings. Flat-bottomed trenches shall be excavated and dewatered prior to preparing the specified bedding. All work shall be performed in a dry trench.

B. All pipe shall be supported on a stable soil foundation. The trench shall be excavated to a depth 6" minimum below the bottom of the pipe. Crushed stone bedding shall be furnished and placed in the trench for its full width to uniformly support the pipe at the required line and grade. Suitable recesses shall be provided in the bedding to permit adequate clearance for bells, couplings, or similar projections. The bedding shall extend upward around the pipe barrel to a height of 12" above the pipe. Bedding material shall be spread in 6 inch layers, and each layer shall be compacted with twenty pound hand tampers or pneumatic tampers until the required total depth of bedding has been built up.

C. Where unstable soil conditions are encountered, the pipe shall be supported on a special foundation. The foundation shall be installed where a suitable supporting soil or rock stratum occurs at a depth greater than 6" minimum. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. The trench bottom and walls shall be covered with a geotextile fabric. Crushed stone shall then be furnished as bedding and placed in the trench for its full width. The bedding shall be spread in 6 inch layers, and each layer shall be compacted with twenty pound hand or pneumatic tampers. The bedding shall carry vertically from the supporting stratum up to an elevation 12" minimum above the top of the pipe. The special foundation shall extend for a minimum of 5'-0" beyond poor subgrade conditions.

D. Where required by the Engineer, check dams within the trench shall be constructed with an impervious soil material to prevent migration of groundwater around the sewer pipe along the backfilled trench. Check dams shall extend the width of the trench to undisturbed earth for a length of 3 feet along the pipe line, and shall extend to the top of the crushed stone bedding material, one foot above the pipe.

E. Manhole structures shall be installed on a firm bedding of 12" crushed stone. Extra depth excavation for installation of the crushed stone and the crushed stone itself shall be included in the payment for the structure being installed.

## 2.4 INSPECTION OF PIPE BEFORE INSTALLATION

A. All pipes and fittings shall be carefully inspected in the field before placing the trench. Cracked, broken, warped, out-of-round or otherwise defective pipe, fittings as determined by the Contractor or Engineer, shall be pulled and not installed. Such rejected pipe shall be pulled and not installed. Such rejected pipe shall then be removed from the job site by the Contractor at his/her own expense.

## 2.5 INSTALLATION OF PIPE AND FITTINGS

A. After the trench has been brought to the proper grade, as hereinbefore specified, the pipe shall be laid. Unless otherwise approved by the Engineer in writing, pipe laying shall be done only in the presence of the Engineer. The Contractor shall give ample notice of his/her schedule for pipe laying operations to the Engineer.

B. All pipe and fittings shall be carefully lowered into the trench with ropes, slings and proper equipment. Pipe cracked or otherwise damaged during or following installation shall be marked by the Contractor or Engineer and removed from the site as required.

C. Pipes shall be laid true to the grades shown on the drawings. Blocking will not be permitted except where the pipe is to be encased in concrete. Any pipe that has its grades or joints disturbed after laying shall be taken up and relayed. The interior and ends of all pipe shall be thoroughly cleaned during laying operations by means of plugs or other approved methods. Under no circumstances shall pipe be laid in water and no pipe shall be laid when trench conditions or the weather is unsuitable for such work except by permission of the Engineer.

D. Sanitary sewer cleanouts shall be installed at the property line to within 4-inches below the final grade and shall be capped with a cast iron ring and cover, fitted over the plugged PVC riser to provide protection from damage and allow future access for cleaning and inspection.

## 2.6 INSPECTION

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

B. Any section of sewer pipe which does not comply with these inspection criteria, as determined by the Engineer, shall be promptly corrected, replaced or repaired by the Contractor at his/her own expense. Methods used for the correction shall be approved by the Engineer.

## 3.0 TESTING

## 4.0 MEASUREMENT AND PAYMENT

### SANITARY SEWER PIPE

PVC sanitary sewer pipe will be measured in feet, from end of pipe to end of pipe installed including fittings, and paid for at the Contract unit bid price per foot of the respective pipe item. Payment shall include all necessary labor, materials, and equipment required to

satisfactorily complete the work, including excavation, removal and disposal of existing pipes within the same trench, crushed stone bedding, geotextile fabric where required, trench check dams, the connection to existing or proposed sanitary sewer structures or pipes, fittings, backfill, 12" of gravel roadway subbase, and testing.

Chimneys will be paid for under the respective pipe diameter item per vertical foot of chimney no separate payment will be made for polyethylene pipe, fittings, concrete, sand or other materials required to satisfactorily install the chimney to the specifications and detail drawings.

There will be no additional payment for cutting and plugging existing sanitary sewer lines as shown on the Contract Drawings.

Rock excavation when encountered in the trenching operation shall be paid for under Item 144.

**ITEM 252.15**                      **15 HIGH DENSITY POLYETHYLENE PIPE**                      **FOOT**

The work to be done under this Item shall conform to the relevant provisions of Section 230 and the following:

Pipes shall be installed on a firm bedding of crushed stone if required by the Engineer. Extra depth excavation for installation of the crushed stone and the crushed stone itself shall be included in the payment for the drainage pipe being installed.

The removal of existing pipes within the same trench, excavation, backfill, the connection to existing or proposed drainage structures or pipes, crushed stone, the plugging of old pipes or holes in drainage structures, and the cutting of the ends of pipe to conform to the slopes of embankments shall be considered as incidental work under this Item at no additional compensation.

Payment for the 15 High Density Polyethylene Pipe shall be made at the Contract unit price per foot, which price shall be full compensation for the removal and disposal of existing pipe (excluding Asbestos Cement) and appurtenances encountered during construction, cutting and plugging the existing pipe, and furnishing all materials, preparation and installation, including all excavation, backfilling and compaction, pipe bedding, testing, buried pipe identification tape, 12" of gravel roadway subbase, and for all labor, equipment, tools and incidentals necessary to complete the item. Crushed Stone used to replace unsuitable bottom material for pipe bedding shall be paid for under Item 156.

**ITEM 301.1**  
**ITEM 301.2**

**TEMPORARY WATER MAIN BYPASS (BASE BID)**  
**TEMPORARY WATER MAIN BYPASS (ADD ALT)**

**LUMP SUM**  
**LUMP SUM**

The work to be done under these Items shall conform to the relevant provisions of Section 301 and the following:

The work to be performed under these items shall include furnishing all equipment, materials, labor and other materials required to install and maintain temporary water service for all sections of the water system which may be temporarily out of service due to construction. Temporary water service is anticipated to be needed for the entire neighborhood to maintain water service until the new main is in operation.

Compensation for the preparation and submittal of Temporary Bypass Plan to the Engineer for approval, including addressing Engineer's comments and resubmittals shall be considered included in the Lump Sum payment under the respective item.

**1.0 MATERIALS**

**1.1 GENERAL**

A. The temporary service pipe, temporary hydrants and all other connecting materials shall be of the best quality materials and shall be capable of withstanding the required pressures and all other conditions of use. The temporary by-pass water main shall be a minimum size of four (4) inches unless otherwise approved by the Fire Department.

**1.2 TEMPORARY BY-PASS WATER MAINS**

A. The temporary by-pass water main, herein referred to as temporary service pipe, shall be steel water pipe with steel or victaulic couplings and all other necessary appurtenances. Certain types of plastic pipe may be used if approved by the Engineer prior to construction. Submittals to the Engineer will be required for approval of any plastic piping.

B. Pressure reducing valves shall be used in all areas as required.\

**1.3 TEMPORARY HOUSE SERVICE CONNECTIONS**

A. Temporary house service hose connections shall be standard industry 3/4-inch hard rubber hose capable of withstanding the usual water system pressures. No plastic or soft rubber hose shall be allowed. Polyvinyl chloride (PVC) pipe is not acceptable for temporary house service pipe.

**1.4 EMERGENCY FIRE CONNECTIONS**

A. Valves for emergency fire connections shall be installed and maintained on the 4-inch temporary water main where existing hydrants are taken out of service. At location shown



in the plan or at locations directed by the engineer, a 4-inch temporary fire hydrant shall be provided which has a 2 ½ -inch standard fire connection set in a horizontal position. Contractor shall supply Waltham Fire Department with ten wrenches or tools needed to operate temporary fire connections.

## 2.0 EXECUTION OF WORK

### 2.1 GENERAL

A. The work of providing suitable safety precautions to prevent any interruptions of water service during the period of temporary water service shall be the responsibility of the Contractor.

B. Before starting any work that will affect service to any customers, the Contractor shall notify the Owner and affected customers at least 48 hours in advance.

C. The Water and Sewer Division and the Contractor shall shut off curb stops and valves to individual services after the Contractor has installed all temporary services to the satisfaction of the Owner and prior to starting any work which will affect existing water service.

### 2.2 TEMPORARY BY-PASS WATER MAIN

A. The Contractor shall furnish, install, maintain and remove the by-pass piping to adequately supply potable water to all consumers currently supplied by the existing water main. Whether it is being installed, in service, or being removed, the amount of temporary service pipe kept on the job shall be the minimum that will allow the work to continue at a reasonable rate.

B. The by-pass piping shall be connected to the existing hydrants. The Contractor shall do all the work necessary to place the by-pass pipe in operation including all required connections and appurtenances. Gate valves and pressure reducing valves shall be provided at the connections to all existing hydrants.

C. Temporary service pipe construction shall not be installed without prior approval of the Engineer. The Engineer shall work with the Contractor on the field layout of all temporary water service pipe.

D. The Contractor shall do all the necessary excavating for any connections of the temporary service pipes to existing live water mains and make all such connections as shown on the Drawings or as directed by the Engineer in the field. The Contractor shall also furnish, install, maintain, connect, disconnect and remove individual temporary service lines to all water customers.

E. Generally, the temporary service pipe shall be laid in the gutters or off the road at the back of sidewalks or beyond the edges of the existing pavement. At street intersections,

driveways, walkaways and other locations when crossing the road, the temporary service pipe shall be buried and temp patched as shown on the plans and details. Hot mix asphalt shall be used to cover all temporary service pipe at all street crossings. No cold patch, gravel, crushed stone, or stone dust shall be used for trench surfacing unless previously approved by the Engineer in writing.

## 2.3 VALVES

A. All service pipe shall be suitably valved at designated places which meet with the approval of the Engineer. Individual shutoff valves shall be provided at each temporary house service or building connection. Line valves shall be located no further than one block or 1,000 feet apart, whichever is less. Suitable valved emergency fire connections shall be installed and maintained on the four-inch temporary water main adjacent to each existing fire hydrant which is scheduled to be out of service.

## 2.4 PROTECTION

A. The pipe and all other connections shall provide adequate water tightness and be free from excessive leaks. Care shall be exercised during the installation of the temporary pipe and especially during the connection to all house services such that pollution of all water mains and house services is prevented and contamination of the by-pass pipe itself is avoided.

## 2.5 DISINFECTION

For Disinfection of Temporary Water Main Bypass refer to the Specification for Item 302 Ductile Iron Water Pipe under Disinfection and Flushing.

Pipe disinfection shall be performed in accordance with AWWA C651 – Disinfecting Water Mains.

## 2.6 MAINTENANCE

A. The Contractor shall be responsible for the maintenance of the temporary by-pass pipe at all times especially after the end of the normal work day, any non-work day, and on all weekends and holidays without exception. He shall be responsible for the immediate correction of any interruption of service caused by any vandalism, physical damage or other condition and shall provide a plan suitable to the Engineer and Water Superintendent for immediate corrective action in writing. This plan shall include the name, address and telephone number of the principle personal and an alternate to be contacted after normal working hours in the event any temporary service interruption occurs. Such information shall be given to the Town Engineer, Water Superintendent, Fire Chief, and Police Dispatch Personnel. It shall be current at all times.

B. If service interruption occurs and the designated personnel or the Contractor cannot be reached for any reason, or if they fail to respond to the emergency situation, then any

costs associated with other personnel responding to remedy the situation shall be back-charged to the Contractor and deducted from any monies due him. In no case will any home or facility (building) be without adequate water supply at the end of any work day, weekend or holiday.

C. The Contractor shall maintain the temporary service pipe crossings at all streets with hot mix asphalt as required.

### 3.0 MEASUREMENT AND PAYMENT

Item 301.1 and 301.2 Temporary Water Main Bypass will be measured and paid for as lump sums. Payment shall include all necessary labor, materials, and equipment required to satisfactorily complete the work including pipe, fittings, appurtenances used for testing including corporations and copper or plastic tubing, valves, temporary water services, excavation, backfill, disinfection, flushing, laboratory testing of water samples, maintenance of the system, removal of the system at completion of the work, and all other equipment and materials considered incidental to the satisfactory completion of the Item.

Compensation for the preparation and submittal of Temporary Bypass Plan to the Engineer for approval, including addressing Engineer's comments and resubmittals shall be considered included in the Lump Sum payment under the respective item.

Temporary hot mix asphalt used to create asphalt pad where the temporary service pipe crosses streets shall be included in the lump sum bid price for the respective Temporary Water Main Bypass item.

After completion of the waterline work and removal of the bypass water main, the asphalt pads at cross streets and driveways shall be removed and the surfaces restored to its original condition. If the removal of the asphalt pad causes damage to the streets or driveways the surface shall be permanently patched with hot mix asphalt. No additional payment shall be award for this item.

At the Engineer's discretion, temporary patching with hot mix asphalt may be used in locations where subsequent roadway paving will occur after completion of the water main work. In this case, temporary patching will be measured and paid for under Item 472.1 Hot Mix Asphalt for Patching.

<b><u>ITEM 302.06</u></b>	<b><u>6 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)</u></b>	<b><u>FOOT</u></b>
<b><u>ITEM 302.08</u></b>	<b><u>8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)</u></b>	<b><u>FOOT</u></b>
<b><u>ITEM 302.12</u></b>	<b><u>12 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)</u></b>	<b><u>FOOT</u></b>
<b><u>ITEM 302.16</u></b>	<b><u>16 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)</u></b>	<b><u>FOOT</u></b>
<b><u>ITEM 309</u></b>	<b><u>DUCTILE IRON FITTINGS FOR WATER PIPE</u></b>	<b><u>POUND</u></b>

Under these items, the Contractor shall furnish, lay, joint, test and disinfect all water pipe and fittings, as indicated on the Contract Drawings and in accordance with the relevant provisions of Section 140 and Section 300 of the Standard Specifications, the American Water Works Association Standards, and in accordance with the current practice and standards of the Waltham Water & Sewer Division.

The Contractor shall be responsible for notifying the Waltham Water & Sewer Division and the Engineer of service shutdown 48 hours prior to the actual shutdown. The shutdown of the water services will be performed only by personnel of the Waltham Water & Sewer Division. Valves, hydrants, corporations and curb stops will be operated by the Waltham Water & Sewer Division personnel only.

No water main or service supplying any home, place of business or fire hydrant shall be shut down for more than four hours unless an approved temporary means of supply is provided. Such temporary provisions will be considered as being for the convenience of the Contractor and as much will not be measured for direct payment.

The Contractor will be responsible to flyer affected areas prior to planned water service interruption 48 hours in advance. In the event of an emergency shutdown during and after normal hours of operation the Contractor shall contact Waltham Water & Sewer Division 781-314-3855 immediately to affect shutdown. During normal hours of operation Contractor will make every attempt to notify the abutters affected by the emergency water service interruption with sensitive receptors such as schools, day care providers, restaurants and businesses receiving priority status in notification.

Data relative to existing water mains, services, etc. shown on the plans has been compiled from plans and field information but such data is not guaranteed as to exact location or elevation.

**Lines and Grades**

Piping shall be installed at the locations indicated on the Contract Drawings and as designated in these Specifications. Unless otherwise shown or stated, the minimum total finished cover over the top of the barrel of all installed pipe shall be 5 feet. Where pipe is installed at less than the required cover, the Contractor shall furnish and install insulation as directed by the Engineer.

All excavation necessary for the pipe installation shall be included in the cost of the pipe. The location of the pipe is to be marked with an identification tape buried 2 feet below finished grade. The tape shall be 6 inches in width by 0.004 inches in thickness and shall read "Caution - Water Line Buried Below".

### Pipe Foundations and Backfilling

All pipes, fittings and appurtenances to be laid in open trench excavations shall be bedded in and uniformly supported over its full length as shown on the Contract Drawings.

Backfill to an elevation 12 inches over the top of the pipe shall be a sand blanket placed in layers not to exceed 6 inches. The sand shall conform to Section M1.04.0 Type A for sand borrow. The sand blanket may be omitted, and suitable excess excavated material used for backfilling over the pipe, provided that no stone larger than 2 inches is in contact with the water pipe. The sand blanket shall be considered incidental to the water pipe items.

Unsuitable trench backfill material shall be replaced with suitable excess excavated material. Gravel borrow or another material approved by the Engineer shall be used for backfill if suitable excess material is not available.

### Inspection of Pipe Before Installation

All pipe, fittings and appurtenances shall be carefully inspected in the field by the Engineer before lowering into the trench. All pieces found to be defective as determined by the Engineer, shall be pulled out and not installed. Such rejected pipe shall be clearly tagged in such a manner as not to deface or damage it, and the pipe shall be removed from the job site.

### Installation of Pipe and Fittings

The Contractor shall maintain at least 10 feet horizontally from any existing or proposed sewer pipe. If this separation is not attainable, then the elevation of the crown of the sewer shall be at least 18 inches below the invert of the water line.

All pipe and fittings shall be carefully handled by equipment of sufficient capacity and proper design to avoid damage to the pipe and fittings. No defective pipe or fittings shall be laid or placed in the trench. Any piece discovered to be defective after having been laid shall be removed and replaced by a sound and satisfactory piece at the expense of the Contractor.

Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.

Pipe and fittings shall be laid accurately to the lines and grade indicated on the drawings or as required. Care shall be taken to ensure alignment both horizontally and vertically, and to give buried pipe a firm bearing along its entire length. Pipes shall not be laid in water, nor shall water be allowed to flow through them. The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench.

Backfilling of the pipe trench shall be done as specified under Section 300 of the Standard Specifications.

### Connection to Other Facilities

The water pipe shall be connected to existing or new structures and/or piping by the Contractor as shown on the Contract Drawings. Test pits shall be dug as directed by the Engineer to verify the size and the type of existing pipe where connections are to be made. The Contractor shall furnish and install all such fittings and appurtenances as are necessary to make the connections shown whether all such fittings are detailed or not. Couplings, where required, shall be of a type equal to HYMAX® by Krausz; Smith Blair, Style 441; Dresser, Style 253 or equal approved by the Water Superintendent. Couplings shall be provided with plain, Grade 27 rubber gaskets and with black, steel, track-head bolts and nuts.

All fittings relative to the water pipe shall be paid for under Item 309. All concrete for thrust blocks shall be considered incidental to the pipe and fitting items. The other means of restraint (method of restraining may either be of an interlocking type or mechanical joint with retainer and as specified by the Waltham Water & Sewer Division) shall be installed in addition to or in lieu of thrust blocks as directed by the Water Superintendent. Pipe anchors shall be used when and as directed.

### Laying Pipe and Fittings

Gasket type joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special non-toxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe. The end of the plain pipe shall be chamfered to facilitate assembly. The end shall be inserted into the gasket and then forced passed it until it seats against the bottom of the socket. A metal feeler shall then be used to make certain the gasket is properly located.

A minimum of two brass wedges shall be installed per pipe joint and fitting to maintain conductivity and facilitate locating pipe in the future. Restrained type joints shall be used where straight pipe joints are deflected to bend pipe line on a curve. The method of restraining may either be of an interlocking type or mechanical joint with retainer gland as specified by the Waltham Water & Sewer Division.

Reaction or thrust blocks of concrete shall be constructed at all tees, plugs and bends, as directed or as detailed on the drawings. The blocks shall be poured against undisturbed original ground and shall be so placed that pipe joints will be accessible for any possible future repairs. Joints must be protected by felt roofing paper prior to placing concrete. Method of restraint may be either locking joint or mechanical restraint as approved by the Water Superintendent.

Hydrant connections are to be restrained for the full length of the pipe from the main to the hydrant.

### Ductile Iron Pipe and Fittings

All material shall be new, conform to the current standards of the Waltham Water & Sewer Division and be approved by them.

All ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151.

The ductile iron pipe shall be **Thickness Class 56** cement lined seal coated and conform to the ANSI A21.50, A21.51 Specification for Ductile Iron Pipe. Pipe joints and gaskets shall be of the push-on joint type in accordance with ANSI A21.11 and shall conform to AWWA C111.

Ductile iron fittings shall be Thickness Class 56, Pressure Class 350, cement lined, and shall meet the requirements of AWWA C153, ANSI A21.4 and A21.10. All fittings are required to be equipped with mechanical joints and retainer glands. Mechanical joint fittings in sizes 6 inches through 24 inches shall be ductile iron compact fittings.

Gaskets, glands, nuts, bolts and accessories shall conform to AWWA C111 or C153 as appropriate. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe. Glands shall be ductile or cast iron. Bolts and nuts shall be high strength alloy.

Hydrant tees shall be anchor type and have line bells conforming to the requirements of the main pipe. The branch shall have a plain end with an integral gland and rotating mechanical joint gland to provide a restrained connection.

Pipe and fittings shall be furnished with approved joint restraining appurtenances as specified herein, or as indicated on the drawings, to keep the piping from pulling apart under pressure.

### Flexible Couplings:

The Contractor shall use solid sleeve coupling fittings for joining pipe. With the approval of the Engineer, sleeve-type flexible couplings may be substituted.

All sleeve-type couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.

Couplings shall be cast or ductile iron and shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

Joint Restraints:

Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, anchoring and joint restraint methods shall be utilized. Methods shall be restrained joint systems. The number of joints to be restrained shall be as shown on the construction plans or provided by the Engineer.

Restrained joint system for standard mechanical joint or push on joint pipe shall be Megalug™ by EBAA Iron Sales Inc.; 1400 Series by Ford; StarGrip 3000 Series by Star Pipe Products; or approved equal. Methods that rely on the use of friction clamps and/or retainer glands with set screws alone are not acceptable.

Concrete thrust blocks may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Use of concrete thrust blocks shall be installed with the minimum bearing area (in square feet) against undisturbed material in accordance with the following:

Size of Main	90° Bends, Tees, Caps and Plugs	45° Bends and Wyes	22½° Bends	11¼ ° Bends
6 & 8 in	5	4	2	2
10 & 12 in	12	9	5	2

Tie rods may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Bolts shall have adequate length to allow nuts on both sides of the gland. Tie bolts shall have the same diameter as the tie rods and be in accordance with the following:

Pipe Size	Tie Rod	
	Number	Diameter
6	2	½"
8	2	¾"
10	2	¾"
12	4	¾"

Lining Coating

The inside of ductile iron pipe and fittings shall be given a cement lining and bituminous seal coat in accordance with AWWA C104/ANSI A21.4. Cement lining shall be double the thickness that is specified in AWWA C104.



The outside of ductile iron pipe and fittings shall be coated with bituminous varnish as required by AWWA C104/ANSI A21.4.

Machined surfaces shall be cleaned and coated with a suitable rust preventive coating at the shop immediately after being machined.

### Handling and Cutting Pipe

The Contractor's attention is directed to the fact that the cement lining is comparatively brittle. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe or lining, scratching or marring machined surfaces, and abrasion of the pipe coating or lining.

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

If any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved by the Engineer, may be cut off before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack. The cracked portion shall not be included as part of the measurement for payment under this section.

### Temporary Plugs

At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

### Deflection of Pipe

In laying ductile iron pipe, the following deflections, based upon a 20 foot length of pipe, shall not be exceeded.

<u>Nominal Size of Pipe (inch)</u>	<u>Gasket Type Jacket Deflection (inch)</u>
6 to 12	12
16 to 24	10

## Field Testing

The testing shall conform to AWWA Standard C600, and all equipment shall be approved by the Waltham Water & Sewer Division. The water pipe shall be given pressure and leakage tests in sections of approved length. For these tests, the Contractor shall furnish a water measuring device and a pressure gage. The Contractor shall also furnish and install suitable temporary testing plugs or caps for the pipeline; all necessary pressure pumping equipment, pipe connections, and other similar equipment; and all labor required; all without additional compensation. Compensation for testing shall be included in the unit price for pipe and fittings. The meter and gage shall be installed by the Contractor in such a manner that all water entering the section under test will be measured and the pressure in the section indicated, and equipment shall be kept in use during both tests.

The scheduling of pressure and leakage tests shall be as approved by the Engineer.

Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If air release assemblies are not available at high points for releasing air, the Contractor shall make the necessary excavations and do the necessary backfilling and shall make the necessary taps at such points and install corporation stops. Corporation stops shall be capped with brass or bronze caps upon completion of the test and left in place.

The pressure and leakage tests shall be as specified in Section 301.60 L of the 1988 Standard Specifications for Highways and Bridges and the American Water Works Association Standard C600, Section 4.1. The test pressure shall be 200psi, the test duration shall be 2 hours.

The lengths of joint to be used in determining the allowable leakage shall be based on the nominal diameter of the pipe.

If the section shall fail to pass the pressure test, the leakage test, or both, the Contractor shall do everything necessary to locate, uncover, even to the extent of uncovering the entire section, and repair or replace the defective pipe, fitting, or joint, all at no additional cost to the owner and without extension of time for completion of the work.

A report containing calculations and documentation pertaining to the pressure and leakage testing shall be submitted to the Waltham Water & Sewer Division

If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modification in the procedures shall be made as required or approved, but in any event the Contractor shall be responsible for the ultimate tightness of the line within the above leakage requirements.

The Owner, at its own expense, may test the water pipe independent of or in place of the Contractor's test. The Owner, or its agent, shall schedule such test so as to minimize any delay to the Contractor. The Contractor is notified that this test may cause delay in his/her work and he/she shall not receive reimbursement for costs incurred during a reasonable delay. Should any section of pipe fail, the Contractor shall have no claim for any expenses incurred during the delay required to schedule and complete a new test.

#### Insulation: Direct Buried Pipe

Insulation shall be cellular glass type. The insulation shall be a cellular glass product that is made specifically for thermal insulation of piping and is compatible with the piping material. Insulation shall be a minimum of 2 inches thick, unless otherwise shown on the drawings.

Insulation shall be composed of all glass sealed cells having no binders or fillers. The completed product shall be rigid and impermeable, with an ultimate compressive strength of at least 90 psi. The thermal conductivity of the cellular glass shall be no higher than 0.29 BTU-in.1hr e ft<sup>2</sup> CII OF @ 75°F and 0.28 BTU-in.1hr iii ft<sup>2</sup> CII OF @ 50°F.

The cellular glass insulation shall comply with all requirements of ASTM C552. The cellular glass shall be fabricated in half sections whenever possible.

Bands for securing the insulation to the pipe shall be 0.5 inches wide by 0.020 inches thick made of stainless steel.

The jacketing for the insulation shall be one of the following methods:

1. A 125 mil (3mm) thick, heat sealed high polymer asphaltic membrane with an integral glass scrim and integral 1 mil (.02mm) aluminum foil and a thin Mylar film on the surface, equal to Pittwrap Jacketing as manufactured by Pittsburgh Coming or equal.
2. Mastic - asphalt cutback mastic, equal to Pittcote 300 Finish, as manufactured by Pittsburgh Coming or equal.
3. Reinforcing fabric - an open mesh polyester fabric with a 6 x 5.5 mesh/inch configuration, equal to PC Fabric 79, as manufactured by Pittsburgh Coming or equal.

The insulation shall be "Foamglass" with jacketing as manufactured by Pittsburgh Coming Corporation, Pittsburgh, P A, or an approved equal. A minimum of 6" layer of fine sand shall surround the insulated pipe before rock free backfill is used in the trench.

The Foamglass and jacketing shall be installed per the manufacturer instructions included in the approved shop drawings.

Tees, valves, and bends shall be covered with form fitting factory made sections.

Cellular glass shall not be applied to the piping until the piping has been wiped clean and supported so that there is adequate space to apply the full thickness of insulation and the covering completely around the pipe. The Contractor must obtain the Engineer's approval before the installation begins.

Cellular glass insulation and jacketing shall be applied in accordance with the manufacturers installation procedures included in the approved shop drawings.

There shall be at least three 0.50-inch wide stainless steel bands secured around each joint and these bands shall be placed not over 9 inches on center on straight sections of pipe. Tees, valves, and bends shall be covered with form fitting factory made sections.

All testing of the piping system, such as hydrostatic, x-ray or other such testing, shall be accomplished prior to application of insulation.

### Disinfection and Flushing

After a section of the main has been pressure tested and found acceptable, it shall be flushed free of all heavily treated water by the Contractor. After completion of the flushing operation, the Contractor shall disinfect the water mains with a solution consisting of 50 ppm of chlorine in accordance with the AWWA C651 Specifications for Disinfecting Water Mains. The preferable point of chlorine application shall be at the source of the water for the section being sterilized. The chlorine solution shall be fed into the pipe through a corporation stop, using a hypo chlorinator. This work shall be done with the attendance of a representative of the Waltham Water & Sewer Division.

The water shall be tested bacteriologically for coliform group bacteria and heterotrophic plate count. A minimum of one (1) sample location shall be used per 2,000 linear feet. On all new piping there will be at a minimum sampling locations at each end of the new pipe segment. Additional testing locations may be determined by the Engineer at no additional cost to the Owner. Testing must be done by a Massachusetts State Certified Laboratory and the results of all tests must be submitted to the Waltham Water & Sewer Division. The Contractor shall be solely responsible for all costs associated by the aforesaid test(s).

There will be a total of two (2) rounds of sampling for each section of main tested. The first round of samples shall be taken after the 24 hour disinfection period. The second round of samples shall be taken at least 24 hours after the first round of samples. During each round of sampling, two (2) separate samples shall be drawn from each sample location and sent for laboratory analysis. In the event a sample obtained fails laboratory analysis the Contractor must restart the testing process. The cost for all additional testing shall be borne solely by the Contractor.

The contact period for the disinfection shall be at least 24 hours and a longer period will be required if tests of residual chlorine show it to be necessary for proper disinfection. All valves and hydrants shall be operated during treatment to insure their thorough contact with the disinfecting solution.

Following chlorination, the mains shall be flushed again to remove any evidence of contamination, as determined by the bacteriological analysis. The quality of water shall remain acceptable for at least two days after the flushing.

A report containing amounts of water flushed, amounts of chlorine used and chlorine residuals after the test period must be submitted to the Waltham Water & Sewer Division. If the initial treatment fails to produce the desired result, the chlorination procedure must be repeated.

For this work, the Contractor shall furnish all equipment, materials, and labor required.

Water pipe shall be measured in feet, in place, along the axis of the pipe, excluding, however, the length occupied by new iron fittings and gate valves. Where two pipes join, measurement will be made to the intersection of the axis, excluding the length occupied by new ductile iron fittings.

New ductile iron fittings including socket clamps and tie rods shall be measured by the pound and the quantity to be paid for shall be the weight stated on the invoice of the supplier, or the manufacturer's rated weight as listed in the catalog, whichever is the least weight.

Payment for ductile iron pipe shall be made at the Contract unit price per foot for water main of the size shown, which price shall be full compensation for the removal and disposal of existing water pipe (excluding Asbestos Cement) and appurtenances encountered during construction, cutting and plugging the existing water pipe, and furnishing all materials, preparation and installation, including all excavation, backfilling and compaction, pipe bedding, testing and disinfecting, appurtenances used for testing purposes including corporations and copper or plastic tubing, brass caps and wedges, buried pipe identification tape, cement lining, 12" of gravel roadway subbase, and for all labor, equipment, tools and incidentals necessary to complete the Item. Crushed stone used to replace unsuitable bottom material for water main bedding shall be paid for under Item 156.

Payment for new ductile iron fittings shall be made at the Contract unit price per pound of fitting installed and accepted, which price shall be full compensation for furnishing all materials, and for all labor, equipment, tools and incidentals necessary to complete the Item, including all excavation, backfilling and compaction, pipe bedding and sand blanket, testing and disinfecting.

Rock excavation when encountered in the trenching operation shall be paid for under Item 144.

The cost of the sand blanket over the water main shall be considered incidental to the cost of the ductile iron water pipe.

The cost of furnishing and installing concrete for thrust blocks shall be incidental to the pipe and fitting items

**ITEM 347.1**                      **1 INCH COPPER TUBING TYPE K**                      **FOOT**

The Contractor shall install new water services and remove and dispose of existing water services as directed and in accordance with the relevant provisions of Section 140 and Section 300 of the Standard Specifications, amended and/or supplemented as follows:

Services shall be replaced with new 1 inch tubing up to the property line.

The depth of the service trench shall be at least 5 feet below the established finished grade and not more than 2.5 feet wide. All excavation, bedding and backfilling shall be included in the cost of the pipe.

Care shall be exercised to prevent dirt and other foreign matter from entering pipe and fittings. Corporation stops shall be left open (turned on) when the trench is backfilled.

The length of furnished and installed service pipe shall be measured beginning at the center of the corporation stop key. No deductions in length shall be made for curb stops or unions. to be paid for shall be measured by the foot, laid by the Contractor.

Payment shall be made at the Contract unit price per foot for furnishing and laying the service pipe complete in place and accepted by the Engineer. The prices shall include excavation, removing and disposing of existing services and unsuitable material from trenches, laying and connecting the new service, providing a three part union needed to connect the new service to the existing, fittings, goosenecks, bends, adapters, sand for bedding and backfill, 12" of gravel roadway subbase, and compactions.

Gravel borrow required to replace unsuitable backfill material as deemed by the Engineer shall be paid for under Item 151.

<b><u>ITEM 350.6</u></b>	<b><u>6 INCH GATE AND BOX</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 350.8</u></b>	<b><u>8 INCH GATE AND BOX</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 350.12</u></b>	<b><u>12 INCH GATE AND BOX</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 356.16</u></b>	<b><u>16 INCH GATE AND BOX</u></b>	<b><u>EACH</u></b>

Under these Items, the Contractor shall furnish and install new valves, valve boxes and appurtenant materials and equipment, all as indicated on the drawings and as herein specified. Valves shall be applicable for a design working pressure of 250 psi.

Valves shall be equipped with mechanical joint ends and mechanical joint restraints as specified for Items 309 unless otherwise specified by the Water Superintendent. All internal and external surfaces must be epoxy coated, and the seal between the stem and bonnet must be composed of a cartridge.

Butterfly valves (16 inch and larger) for buried service shall conform to AWWA C504, except as hereinafter provided. Butterfly valves shall be rated for class 150b and both valve operators shall be especially designed for services buried in ground and be totally enclosed type. The unit shall be permanently lubricated with grease or oil. A standard AWWA 2-inch square operating nut shall be provided on the input shaft. Valves shall open to the right (clockwise)

Gate Valves shall be Resilient seat, wedge type gate valves shall be manufactured to meet all applicable requirements of AWWA C509 or AWWA C515. All valves shall be bubble-tight at 200 psi water working pressure, tested in both directions.

Valve bodies shall be of cast or ductile iron and shall have non-rising threaded bronze stems acting through a bronze stem nut. Opening nuts shall be 2 inches square and shall open right, clockwise. All buried valves shall have mechanical joint ends.

Valve wedges shall be of ductile iron with resilient seating surfaces permanently bonded to the wedges in strict accordance with ASTM D429 or attached to the face of the wedges with stainless steel screws. Each valve shall have a smooth, unobstructed water way free from sediment pockets.

Valves shall have low friction, torque-reduction thrust bearings. All O-rings and gaskets shall be removable without taking the valves out of service.

An NSF 61-approved epoxy coating, which is safe for potable water, shall be applied to exterior and interior valve surfaces.

Valves for horizontal applications shall have Delrin wedge covers, and be specifically designed for horizontal installation.

Resilient seat gate valves shall be as manufactured by Mueller Co., Decatur, IL; or approved equal.

Post indicating valve assemblies shall have a post and indicator as an integral part of the resilient seated gate valve assembly. The unit shall be provided with a detachable crank which OPENS the valve in a clockwise (RIGHT) direction. Shafts shall be Type 304 stainless steel. Post indicators and valves shall be UL listed, FM approved. Post indicators and valves shall be as manufactured by Mueller Co.; or approved equal."

#### Valve Boxes And Extensions:

Valve boxes shall be manufactured in North America. The minimum outside diameter of the boxes shall be 5¼ -inches and the lengths shall be as necessary to suit the ground elevation and the depth of each valve operator, regardless of the depth of cover.

When there is more than 6 feet of cover, valve operators shall have non-rising extension stems which raise the operating nut to a depth of approximately 4 feet below grade. The extension stem shall have a centering support ring at the upper end. The lower socket shall be tapped with a set screw into the valve nut to prevent the extension stem from lifting off the valve nut.

Each valve shall be provided with a box which has a close fitting cover and is substantially dirt-tight. Covers shall provide minimum overlap of 6 inches. The top of the cover shall be flush with the top of the box rim. The word "WATER" shall be cast in the top of the cover.

Valve boxes shall be of cast iron and of the adjustable sliding, heavy pattern type. They shall be so designed and constructed as to prevent direct transmission of traffic loads to the pipe or valve. The upper or sliding section of the box shall be provided with a flange on the top of the section (not on the bottom) having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and to rest on the backfill. The boxes shall be adjustable through at least 6 inches vertically without reduction of lap between sections to less than 8 inches.

Valve boxes shall be set plumb, flush with the ground or paved surface, and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the valve boxes to a distance of 4 feet on all sides of the boxes or to the undisturbed trench face, if less than 4 feet.

Valves shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify proper operation of all valves in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.

Payment for gates and gate boxes shall be made at the Contract unit price for each unit installed which price shall be full compensation for furnishing all material, including excavation and backfilling, valve box and cover, and for preparation and installation, removal of existing valves and pipes, setting valve box to final grade, labor, equipment, tools, and incidentals necessary to complete these items.

**ITEM 358**

**GATE BOX ADJUSTED**

**EACH**

The work to be done under these Items shall conform to the relevant provisions of Section 301 and the following:

Gate boxes, including service boxes, to be adjusted shall be identified by the Contractor and approved by the Engineer prior commencing with the work. Gate boxes and service boxes that are adjusted will be paid for at the unit price per each, regardless of the number of times that structure is to be adjusted to a temporary or final grade.

Service boxes and gate boxes are to be kept accessible during the construction period



for use in an emergency. Any existing boxes which are broken, damaged, or cannot be adjusted, shall be excavated to the depth of the existing gate valve and removed. The replacement box shall be set plumb at the same location. Gravel borrow backfill will be used and shall be thoroughly compacted with a power tamper. Adjustment to final grade shall be done just prior to placing the final pavement course or sidewalk material. Any castings determined by the Engineer to be of no further value to the Owner shall become the property of the Contractor and be disposed of off the project site by the Contractor without additional compensation.

Payment for the adjustment of gate boxes shall be at the contract unit price per each, complete in place, which price shall be full compensation for all necessary labor, materials, and equipment required to satisfactorily complete the work, including adjustments to temporary grades and adjustments to the final grade.

Work under this item will only be accepted if the water crew is able to operate the valve after the box has been replaced and/or reset.

**ITEM 363.1**

**1 INCH CORPORATION COCK**

**EACH**

Under these items the Contractor shall furnish and install corporation cocks on all service lines as shown on the Plans and in accordance with the Relevant Provisions of Section 140 and Section 300 amended as follows.

Corporation cocks shall be of bronze, made from castings, the materials of which conform to ANSI/ASTM Standard Specification B61-76 or B62-76, latest issue.

Couplings shall be of bronze, made from castings, the material of which conforms to ANSI/ASTM Standard Specification B61-76 or B62-76, latest issue.

Each cock shall be individually tested under a hydrostatic head of 250 psi and a statement of the manufacturer shall be supplied to the Engineer prior to installation certifying that each stop supplied has been found to be watertight prior to leaving the factory.

Each corporation cock shall have a solid plug which freely operates and has a full, round, smooth, reamed waterway. Cocks shall have plugs hand ground into the body of the fittings. Cocks shall be opened by turning right, clockwise, and shall be marked on the fitting accordingly.

Corporation cocks shall be screwed firmly into the water mains. They shall be placed with the key upward and the inlet ends projecting at least 1/8 inch beyond the inside face of the main, unless otherwise permitted by the Engineer. All corporation cocks shall be easy turning, non-binding, open right and turned on before the trench is backfilled around them, so as to allow examination of connections for leaks.

All joints between cocks, fittings and service pipe shall be made watertight.

All corporation cocks for 1 inch service pipe shall be heavy pattern, solid plug, easy turning and meet the standards of the Water & Sewer Division. The inlet shall be an AWWA (CC) thread. The outlet shall be male iron pipe thread, one size larger than the inlet.

New services and services to be reconnected shall be joined to the water mains by means of a corporation stop inserted into a new tap in the main. The main, where service connections are necessary, shall be tapped by means of a tapping machine manufactured for that purpose and furnished by the Contractor. The tap and drill of the tapping machine must be kept sharp. The taps generally shall be so located that the corporation stops, when inserted in a tap, will be at or above the horizontal diameter of the pipe and the service pipe must have a cover of at least 4 feet at all points. Any additional service pipe needed for the connection to the water mains shall be paid for under the appropriate service pipe item.

Payment shall be made at the contract unit price per each for furnishing and installing corporation cocks and such payment shall include connecting services to the new water mains; all drilling and tapping of the new mains; furnishing and installing new corporation stops, clamps, and couplings where required to connect the new services to the new corporation stops; all at locations directed on the Plans, or as required by the Engineer. Also included in these items is the abandoning of the existing corporation stops.

<b><u>ITEM 371.06</u></b>	<b><u>6 INCH COUPLING</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 371.08</u></b>	<b><u>8 INCH COUPLING</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 371.12</u></b>	<b><u>12 INCH COUPLING</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 371.16</u></b>	<b><u>16 INCH COUPLING</u></b>	<b><u>EACH</u></b>

Couplings shall only be allowed when connecting standard outside diameter pipe to oversize or pit cast pipe. HYMAX® by Krausz; Smith Blair, Style 441; Dresser, Style 253 or equal approved by the Water Superintendent. Couplings shall be provided with plain, Grade 27 rubber gaskets and with black, steel, track-head bolts and nuts. There shall be zero gaps between proposed water mains and existing water mains within proposed couplings.

Payment for couplings shall be made at the Contract unit price for the size unit installed which price shall be full compensation for furnishing all material, including excavation and backfilling, and for preparation and installation, labor, equipment, tools, and incidentals necessary to complete this item.

<b><u>ITEM 376</u></b>	<b><u>HYDRANT</u></b>	<b><u>EACH</u></b>
------------------------	-----------------------	--------------------

The Contractor shall furnish, install, and test fire hydrants and appurtenant materials and equipment all as indicated on the drawings and as herein specified.

Hydrants shall conform to the requirements of AWWAC502. The hydrant shall be of the anti-freeze and compression type. They shall be equipped with a 5-1/4-inch main valve and 6-inch mechanical joint inlet. Hydrants shall open right (clockwise). Valves shall open

right (clockwise).

Hydrants shall have one 4-1/2-inch pumper and two 2-1/2-inch hose connections. Threads shall be NST. Hydrant operating and nozzle cap nuts shall be of pentagonal shape and measure one and one half inches from flat to point. The height of the nut shall not be less than one inch.

All internal operating parts including main valve, main valve seat, drain valve mechanism, operating rod, etc., shall be removable without excavating.

Main valve seats shall be made of brass or bronze, and shall screw into a seat ring or sub-seat, which shall also be made of brass or bronze. Hydrants shall be traffic models with frangible bolts or breakaway couplings. Details of hydrant design shall meet the requirements of the Owner.

For purposes of standardization, hydrants shall be dry barrel American-Darling model B-62.

Depth of earth cover over the main line shall be normally 5 feet. All hydrants shall meet the requirements of the Waltham Water & Sewer Division.

Pressure ratings must not be less than 350 psi. Hydrant connections are to be restrained for the full length of the pipe from the main to the hydrant. All hydrants shall be painted to conform to the Waltham Water & Sewer Division Standards.

Hydrants shall be set plumb. The hydrant connecting pipe shall have at least the same depth of cover as the distribution main. The hydrants shall be bedded on a firm foundation set upon a slab of stone or concrete not less than 4 inches thick and 15 inches square. The side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with a concrete thrust block, which is considered incidental to the item, as indicated on the drawings. Not less than 4 cubic feet of crushed stone shall be placed around the base of each hydrant to 6 inches above the drain holes.

Broken stone shall be placed around the base of the hydrant at the location of the drain hole, and backfill around the hydrant shall be thoroughly compacted to the grade line in a satisfactory manner.

Hydrants shall have the interiors cleaned of all foreign matter before installation, and shall be inspected in both the open and closed positions.

The body of the hydrant shall be of sufficient length to allow the hydrant to be set at the proper elevation, as shown on the drawings or as directed by the Engineer. Extensions shall be furnished and installed at the Contractor's expense, when required for greater depths.

The length of the hydrant barrel shall be such that when installed with the proper depth of cover on the branch pipeline, the hydrant will be set with the normal ground line of the

barrel within 3 inches of the actual finished ground surface.

In the work of removing hydrants which are to be replaced with new hydrants, the castings shall be exposed, care being taken that they are not damaged by excavating or other machinery. The joints shall then be opened and the casting carefully removed. Any materials damaged during this work due to the Contractor's negligence shall be replaced by the Contractor at no additional cost to the owner. The removed hydrant shall be delivered by the Contractor to the Waltham Water & Sewer Division. If the Owner decides not to keep the hydrants the removal and disposal of the units will become the responsibility of the Contractor at no additional cost to the Owner

Payment for this item will be at the Contract unit price per each, which price shall include full compensation for furnishing all labor, materials, tools, and equipment necessary and for furnishing, installing and/or setting hydrants as specified including testing, excavation, crushed stone, backfilling, filter fabric, disposal of surplus material, connection to existing, tie rods, connection couplings, restraining glands, megalugs and extension sections, concrete thrust blocks, and all other work necessary for a complete hydrant.

**ITEM 381.01**                      **SERVICE BOX MUNICIPAL STANDARD**                      **EACH**

The work to be done under this Item shall conform to the relevant provisions of Section 300 of the Standard Specifications amended and supplemented as follows:

The Contractor shall furnish and install new service boxes as indicated on the Contract Drawings or as directed by the Engineer.

For purposes of standardization, service boxes on ¾" & 1" curb stops shall be standard 1" Erie style having an extra heavy cover with brass pentagon plug and 36" rod. 4 ½' to 5 ½' bury only. Service boxes on 1 ½" & 2" curb stops shall be standard 4" Buffalo sliding style having a brass pentagon cover nut with proper footpiece for curbstop valve 4 ½' to 5 ½' bury.

The new service boxes shall meet the requirements of the Water & Sewer Division and be the extendable type. The cover shall be counter sunk with a brass pentagonal plug that features a course "rope" thread to enable quick and easy removal.

The existing service boxes shall be removed and delivered to the Water & Sewer Division. If the Owner decides not to keep the castings the removal and disposal of the units will become the responsibility of the Contractor at no additional cost to the Owner.

Payment for the above shall be at the contract unit price per each, which price shall include full compensation for furnishing all labor, materials, tools and equipment necessary to complete the work and for furnishing and installing service boxes. Also included under this item is the removal and disposal of existing curb stops.

**ITEM 384****CURB STOP****EACH**

The work to be done under this Item shall conform to the relevant provisions of Section 300 of the Standard Specifications amended and supplemented as follows:

The Contractor shall furnish and install new curb stops as indicated on the Contract Drawings or as directed by the Engineer.

The existing curb stops shall be removed and disposed of by the Contractor. The new curb stops shall meet the requirements of the Waltham Water & Sewer Division. The curb stop shall have a quarter turn stop with check, solid tee head and no waste. Curb stops with plugged wastes will not be accepted. Curb stops shall open right (clockwise).

Payment for the above shall be at the contract unit price per each, which price shall include full compensation for furnishing all labor, materials, tools and equipment necessary to complete the work and for furnishing and installing curb stops. Also included under this item is the removal and disposal of existing curb stops.

If required by the Engineer, new service boxes shall be provided by the Water & Sewer Division.

The cost of resetting existing service boxes on new curb stops shall be considered incidental to the cost the curb stop.

**ITEM 460****HOT MIX ASPHALT****TON**

The work to be done under this Item shall conform to all the relevant provisions of Section 460 and the following:

Item 460 Hot Mix Asphalt, shall conform to the requirements of Section 560.00 of the current Edition of the "Standard Specifications for Highways and Bridges," Commonwealth of Massachusetts, Department of Public Works, including any addenda or amendments thereto. The City of Waltham has the option of requesting a modified state top when deemed necessary.

Bituminous concrete shall be spread at a temperature of not less than 225 degrees Fahrenheit and all initial rolling or tamping shall be performed when the temperature of the mixture is such that the sum of the air temperature plus the temperature of the mixture is between 300 and 375 degrees Fahrenheit. All mixtures shall be placed only when the atmospheric temperature is above 40 degrees Fahrenheit.

Bituminous concrete for wearing surfaces and base courses shall be spread in individual layers and compacted to the required lines, grades and cross section.

Rolling shall commence at the lower edges and shall progress toward the highest portion. Under no circumstances shall the center be rolled first. Each completed surface shall be thoroughly compacted, smooth and free from ruts, humps, depressions, or irregularities. Where new bituminous meets existing bituminous surfaces, an emulsifying agent shall be

applied to seal the joint. A sand overcoat shall then be applied over the emulsifying agent.

All bituminous used for roadway and sidewalk bases and surfaces will be paid for on the basis of weight and shall be measured by tickets delivered with each load. The tickets shall be signed by a certified weigher and shall be countersigned by the OWNER. The tickets shall clearly show the total, tare, and net weights. Loads represented by tickets not showing the weights as specified above will not be accepted for payment. Only bituminous concrete placed at the required depth and within the limits specified by the OWNER will be accepted for payment.

**PAYMENT:** Payment for bituminous concrete shall be made for the number of tons as determined above at the Contract unit price for ITEMS 460 as set forth in the Bid. Said price and payment shall be full compensation for all fine grading and compaction, for furnishing, spreading and compacting bituminous concrete, emulsifying and sanding of all joints, and for furnishing all tools, labor, materials, equipment, and all else incidental thereto.

**ITEM 464**

**BITUMEN FOR TACK COAT**

**GALLON**

The work to be done under this Item shall conform to all the relevant provisions of Section 400 and the following:

A tack coat of asphalt emulsion, grade RS-1 shall be uniformly applied to existing or new pavement surfaces prior to placing pavement courses as specified below. The existing surface shall be swept clean of all foreign matter and loose material using a mechanical sweeper and shall be dry before the tack coat is applied.

A pressure distributor shall be used to apply the tack coat. The tack distributor system shall be equipped with the following to control and monitor the application:

- System for heating the asphalt emulsion uniformly to specified temperature.
- Thermometer for measuring the asphalt emulsion temperature.
- Adjustable full circulation spray bar.
- Positive controls including tachometer, pressure gauge, and volume measuring device.

**Tack Application Requirements.**

The tack coat material shall be applied by a pressure distributor. All nozzles on the distributor shall be open and functioning. All nozzles shall be turned at the same angle to the spray bar. Proper nozzle angle shall be as determined by the manufacturer of the distributor spray bar. The spray bar shall be adjusted so that it is at the proper height above the pavement surface to provide a double overlap spray for a uniform coverage of the pavement surface. A double lap application requires that the nozzle spray patterns overlap one another such that every portion of the pavement receives spray from exactly two nozzles.

When an HMA pavement course is placed on an existing tight smooth pavement surface,

a tack coat shall be applied at the rate of 1/20 gal/sy. All existing surfaces subjected to milling shall receive a tack coat at the rate of 1/15 gal/sy. Tack coat shall be applied to cover approximately 90% of the pavement surface.

Any new HMA pavement course that has been open to traffic, or that was placed 30 days prior to placement of the subsequent pavement course, shall receive a tack coat at an application rate of 1/20 gal/s.y.

When the surface of a new HMA pavement course is in a condition which in the Engineer's judgment is unsatisfactory for the direct placement of the subsequent pavement course, a tack coat shall be applied at the applicable rate specified above for the particular pavement surface condition.

In addition to the requirements above, all vertical surfaces of cuts for patches, curbs, edging, utilities, and drainage structures shall receive a thorough tack coat application immediately prior to placing each HMA pavement course.

#### Tack Inspection.

The asphalt emulsion temperature and application rate shall be periodically measured. If the temperature or application rate is determined to not be in conformance with the specification requirements above, the Contractor shall make appropriate adjustments to the tack application operations.

#### METHOD OF MEASUREMENT

Item 464., Bitumen for Tack Coat, will be measured by the square yard and the quantity to be measured shall be the actual number of gallons of bitumen for tack coat applied to the as required by the Engineer. Bitumen for Tack Coat, will be paid for at the Contract unit price per gallon which shall include full payment for all labor, materials, equipment, fuel and incidentals to properly complete the work to the satisfaction of the Engineer.

### **ITEM 472                      HOT MIX ASPHALT FOR MISCELANEOUS WORK                      TON**

The work to be done under this Item shall conform to all the relevant provisions of Section 472 and the following:

Where this work is performed within existing roadways, a gravel subbase of 12" compacted depth shall be installed flush with the bottom of the pavement. In place of the gravel subbase, excess reclaimed pavement borrow material may be used.

All areas that are to be patched as described above shall be marked out in the field after the milling operation and approved by the Engineer prior to excavation.

Payment for Hot Mix Asphalt for Miscellaneous Work shall be at the contract unit price per square yard, complete in place, which price shall be full compensation for sawcutting, excavating, installation of the gravel base, compacting, grading, paving and all labor,

equipment and materials necessary to complete the work.

**ITEM 472.2      HOT MIX ASPHALT FOR PERMANENT PATCH (5")      SQUARE YARD**

The work to be done under this Item shall conform to all the relevant provisions of Section 472 and the following:

Item 472.2 Hot Mix Asphalt For Permanent Patch (5") shall consist of making roadway pavement repair patches on City roads. The areas for patching shall be identified by the Engineer. Areas to be patched shall be saw cut and the pavement removed, a gravel base of 12" compacted depth shall be installed and compacted hot mix asphalt shall be installed to be flush with the top of the adjacent roadway surface.

The bituminous concrete surface shall be laid in two courses to a depth after rolling of 5 inches. The binder course shall be 2.5 inches thick and parallel to the proposed grade of the finished surface. The top course shall be 2.5 inches in thickness after rolling and flush with the adjacent pavement surface.

In place of the 12" gravel base, excess reclaimed pavement borrow material may be used at no additional cost.

All areas that are to be patched as described above shall be marked out in the field and approved by the Engineer prior to excavation.

Payment for Item 472.2 shall be at the Contract unit price per square yard, complete in place, which price shall be full compensation for sawcutting, excavating, installation of the gravel base, compacting, grading, paving and all labor, equipment and materials necessary to complete the work.

**ITEM 518                                      CONCRETE CURB INLET                                      EACH**

**GENERAL**

Work under these items shall conform to relevant provisions of Section 500 of the Standard Specifications and the following:

The work shall consist of furnishing and installing concrete curb inlets conforming to lines, grades, dimensions and details shown on the Plans. Care must be taken when handling and placement of curb. Any damaged curb inlet shall be replaced by the Contractor at his/her own expense.

Item 518, Concrete Curb Inlet – Straight- Municipal Standard, will be measured per each complete in place, and will be paid for at the contract unit price each, which price shall include all labor, tools, equipment, materials, transportation, and incidental work required to install the curb inlet complete in place, to the satisfaction of the Engineer.



**ITEM 570.2****HOT MIX ASPHALT CURB TYPE 1, 2 OR 3****FOOT**

The work to be done under these Items shall conform to the relevant provisions of Sections 501, 580, and the following:

Hot mix asphalt curb shall be constructed in accordance with the details shown in the plans, where required by the Engineer, and shall be measured per linear foot. Where noted on the plans, and at the Engineer's direction, hot mix asphalt berm shall be used in place of curb at no additional cost.

The work under this item shall include sawcutting the existing pavements, excavation, installation of gravel and binder course HMA berm foundation, and the installation of top course pavement patch. Removal and disposal of existing bituminous shall be considered incidental to the installation of new curbing, and no separate payment will be made.

Payment for Item 570.2 will be made at the contract unit bid price per foot of HMA curb and/or HMA curb, complete in place, which price shall be full compensation for all labor, equipment and materials necessary to satisfactorily complete the work.

**ITEM 580****CURB REMOVED AND RESET****FOOT**

The work to be done under these Items shall conform to the relevant provisions of Sections 501, 580, and the following:

The work under these items shall include saw cutting existing pavements, excavation, gravel foundation and backfilling, curbing, and cement concrete, as shown on the details. Removal and disposal of existing bituminous or concrete curbing shall be considered incidental to the installation of new curbing, and no separate payment will be made.

All new curb and edging will be paid for under Items 506 whether or not the pieces are curved or straight, no distinction made for curved pieces for payment purposes. Resetting of existing edging, curb inlet stones, splayed end transition stones, and wheelchair ramp transition stones shall be included under Item 580 – Curb Removed and Reset, and no additional payment will be made for the resetting of these curb stones.

All work requiring chamfering or cutting of curb or edging shall be considered incidental and shall be included in the unit bid price of the respective item. All existing curb or edging determined suitable for reuse on the project which is not reset at its present location shall be removed and stacked by the Contractor at a designated location within the City for further reuse on the project at such location or locations as directed by the Engineer. Costs of transporting and stacking all such curb or edging to be re-used on the project shall be included in the Contract bid price for Item 580 – Curb Removed and Reset as applicable.

All existing curb or edging that is not to be re-used on the project shall be transported to a location within City to be identified by the Engineer at no additional cost to the City. Any

curb determined by the Engineer to be unsuitable for further reuse shall become the property of the Contractor and be disposed of off the project site by the Contractor without additional compensation.

New or existing curb stones may be used for wheelchair ramp transition curbs. Curbs shall be cut in such a way so that a flush joint is formed where the transition curb meets the adjacent curb at all locations. The length of the transition is to be in accordance with the Massachusetts Architectural Access Board's requirements.

Splayed end transition stones shall be used at vertical curb to sloped edging transitions and shall be as detailed on the plans.

Payment for the above items shall be at the Contract unit price per linear foot, complete in place, which price shall be full compensation for curbing, cutting and chamfering of curb as required, excavation, gravel for foundation and backfill, installation, concrete, and all labor, equipment and materials necessary to complete the work.

**ITEM 697.1**

**SILT SACK**

**EA**

The work to be done under this Item shall conform to the relevant provisions of Sections 670, 767, and the following:

During construction and until disturbed soils are stabilized, sediment control silt sacks shall be installed in catch basins located in areas subject to stormwater runoff from disturbed areas, and where required by the Engineer. Silt sacks shall be installed in accordance with the details shown on the plans and this special provision.

Silt sacks shall be manufactured from a specially designed woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread. Silt sacks shall be manufactured to fit the opening of the catch basin and shall have integral straps or handles to facilitate lifting and emptying the sack. Silt sacks shall also have a marking or other visual means of indicating when the sack should be emptied.

Where the catch basin to be protected has an adjacent curb inlet, the silt sack shall also have an integral foam block insert that will fit into the curb inlet opening to prevent runoff from bypassing the silt sack. The cost of these foam blocks is to be included in the unit cost of the silt sack, no separate payment will be made.

Silt Sack will be measured per each catch basin that has a silt sack installed. Payment for silt sacks will be made at the Contract unit bid price per each, complete and in place, which price shall be full compensation for all labor, equipment and materials necessary to install, inspect, maintain, clean, reinstall, and remove the silt sack until disturbed areas have been stabilized, or until otherwise determined by the Engineer.

**ITEM 701**  
**ITEM 702**  
**ITEM 703**

**CEMENT CONCRETE SIDEWALK**  
**HOT MIX ASPHALT WALK SURFACE**  
**HOT MIX ASPHALT DRIVEWAY**

**SQUARE YARD**  
**SQUARE YARD**  
**SQUARE YARD**

The work to be done under this Item shall conform to the relevant provisions of Section 701 and the following:

In meeting existing sidewalks and driveways in the above areas, the Contractor shall saw cut by mechanical means using an approved power driven saw a neat straight line to permit the new work to blend satisfactorily with contiguous existing surfaces.

The work under these items shall include saw cutting existing pavements, excavation, fine grading and compacting, placing an 8" gravel foundation, and installing the cement concrete, or hot mix asphalt. Wire mesh reinforcement shall be used in construction of cement concrete sidewalks and wheelchair ramps as detailed in the plans

Where the existing subbase material is deemed suitable by the Engineer, it may be left in place and re-used. Reclaimed pavement borrow material may be substituted for gravel borrow for sidewalk foundations, where directed by the Engineer, however no additional payment will be made for this substitution.

Payment for work under these items shall be made at the unit Contract price per square yard of cement concrete sidewalk, HMA walk surface, and HMA driveways, and shall be full compensation for all necessary labor, equipment, and materials required to satisfactorily complete the work including saw cutting, excavation, gravel borrow, and fine grading.

**ITEM 751.2**

**LOAM BORROW AND SEEDING**

**SQUARE YARD**

The work to be done under this Item shall conform to the relevant provisions of Sections 751, 765, and the following:

The work under this item shall include placing a minimum of 6" of loam borrow and seeding disturbed areas beyond the edge of pavement and behind curbs and sidewalks, as directed by the Engineer.

Payment will be made at the Contract unit price per square yard of loam placed and seeded, and will include all necessary labor, equipment, and materials to satisfactorily complete the work including loam borrow, limestone, grass seed, and fertilizer.

**ITEM 850.1**  
**ITEM 850.2**

**TRAFFIC CONTROL**  
**TRAFFIC CONTROL**

**LUMP SUM**  
**LUMP SUM**

The work to be done under this Item shall conform to the relevant provisions of Sections 751, 765, and the following:

The work to be done under this Item shall conform to the relevant provisions of Sections

800, 824, 828, 840, 850 and the following:

The Contractor shall furnish, illuminate, and maintain such signs as directed or as necessary for the safe and/or regulation convenience of traffic; shall provide, erect and maintain barricades, warning lights, etc. as needed or as directed to keep people and vehicles from equipment, obstacles, etc; and take such other reasonable means and precautions as the Engineer or the Owner may direct or as may be needed to prevent damage or injury to persons, vehicles, or other property, and to minimize the inconvenience and danger to the public by his/her occupancy of the street or highway or other areas of work. He/she shall arrange his/her operations and the spaces occupied by him/her, so far as possible, to provide access to property along the street, particularly driveways and entrances, to fire hydrants, manholes, gate boxes, etc., of other utilities. Whenever any equipment obstructs traffic in or to any public street, private driveway or property entrance, the Contractor shall take such means as may be necessary to maintain traffic and access so far as the requirements of this article are applicable, they shall also apply to work in private ways and public and private lands other than streets and highways. The Contractor shall confine his/her occupancy of public or traveled ways to the smallest spaces compatible with efficient performance of the work contemplated by the Contract, and particularly to such limits as may be set out in Drawings or Specifications.

The Contractor shall furnish and maintain 3 variable message boards as part of the Traffic Control item and compensation shall be considered included in the lump sum price. Message boards shall be placed 1 week prior to the commencement of work and shall be maintained for the duration of the project. Message boards shall be placed at the following locations: westbound Lake St., northbound Lexington St., and southbound Lexington St. Locations of message boards shall be indicated on Contractor's traffic management plan to be submitted for approval.

**ITEM 999**

**POLICE DETAILS**

**HOUR**

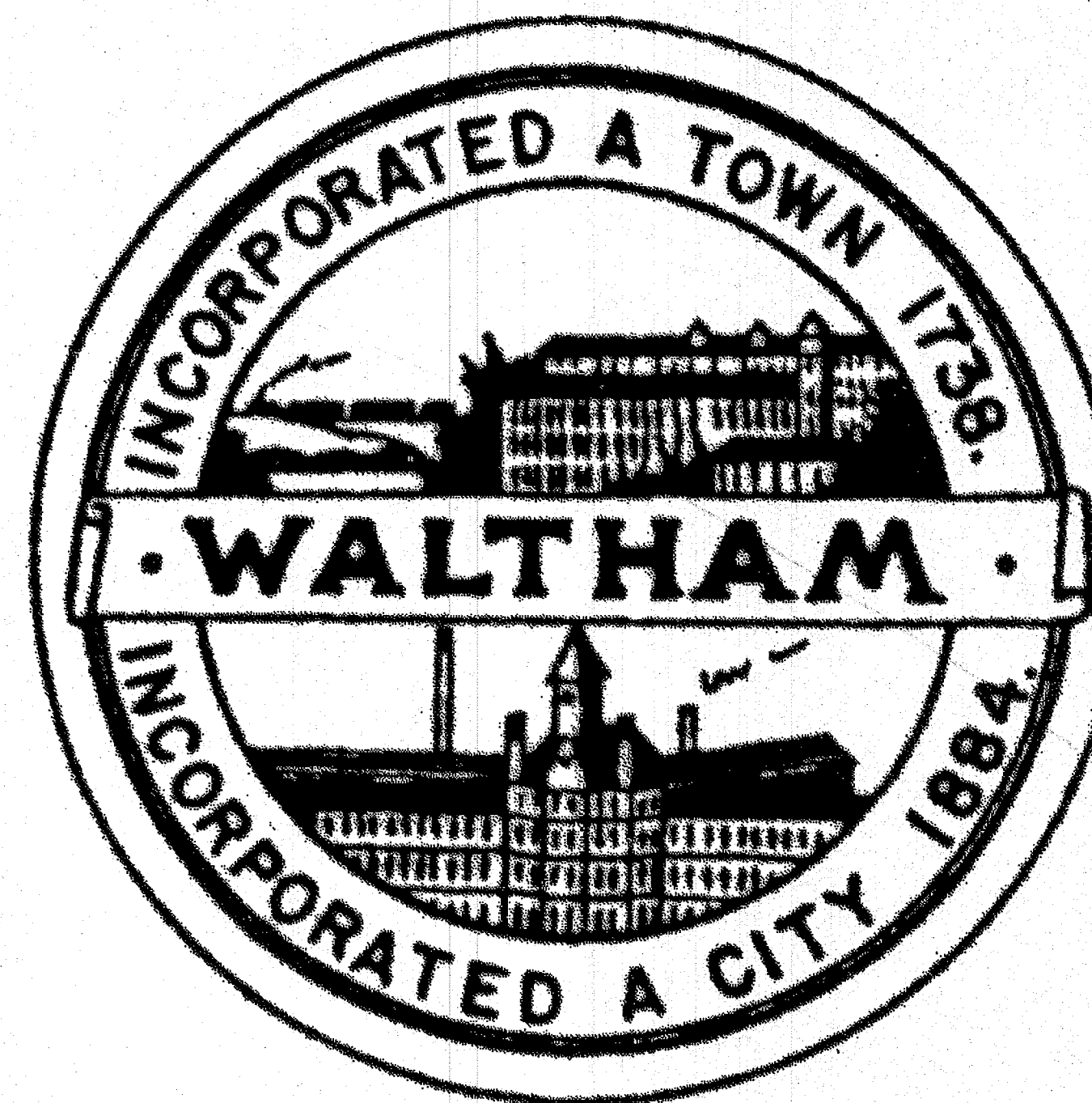
Refer to page SP-5 of these specifications along with the Massachusetts Highway Department Standard Specifications for Highways and Bridges dated 1988, the Supplemental Specifications dated July 1, 2015, and the Interim Supplemental Specifications; the 2015 Construction Standard Details.

END OF SECTION

PLANS SHOWING  
**CHRISTOPHER ROAD**  
**WATER MAIN REPLACEMENT**  
**CITY OF WALTHAM, MASSACHUSETTS**  
 APRIL 2018

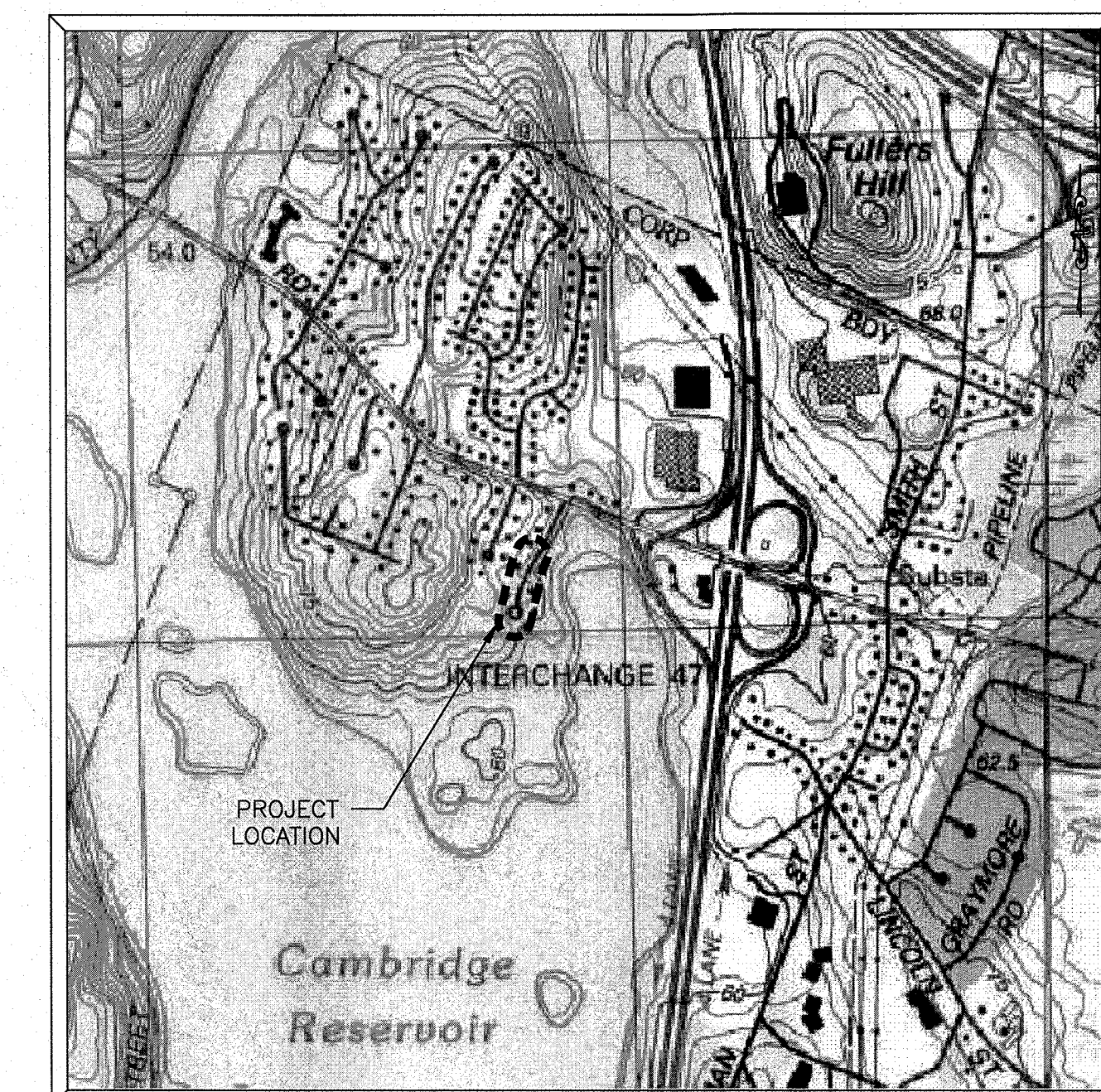
PREPARED BY  
 CITY OF WALTHAM  
 ENGINEERING DEPARTMENT  
 119 SCHOOL STREET  
 WALTHAM, MA 02451

CITY ENGINEER  
 STEPHEN A. CASAZZA, PE.



DRAWING INDEX

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1.	COVER SHEET
2.	CONSTRUCTION NOTES
3.	TEMPORARY BYPASS PLAN
4.	CHRISTOPHER RD. WATER MAIN STA. 5+50 - 9+00
5.	CHRISTOPHER RD. SEWER MAIN EXTENSION ADD ALT. 1
6.	ROADWAY RECLAMATION PLAN
7.	CONSTRUCTION DETAILS I
8.	CONSTRUCTION DETAILS II
9.	CONSTRUCTION DETAILS III



LOCUS MAP  
 N.T.S.

**ABBREVIATIONS:**

AC _____ ASBESTOS CONCRETE	MB _____ MAIL BOX
APPROX _____ APPROXIMATE	MH _____ MANHOLE
BIT _____ BITUMINOUS CONCRETE	MIN _____ MINIMUM
BM _____ BENCHMARK	N/F _____ NOW OR FORMERLY
BLDG _____ BUILDING	NTS _____ NOT TO SCALE
BOL _____ BOLLARD	OHW _____ OVERHEAD WIRE
BND _____ BOUND	PC _____ POINT OF CURVATURE
BRK _____ BRICK	PROP _____ PROPOSED OR PROPERTY
CL _____ CENTERLINE	PT _____ POINT OF TANGENCY
CB _____ CATCH BASIN	PVC _____ POLYVINYL CHLORIDE
CI _____ CAST IRON	R _____ RIM OR RADIUS
CLDI _____ CEMENT LINED	RCP _____ REINFORCED
DUCTILE IRON	CONCRETE PIPE
CLF _____ CHAIN LINK FENCE	REC _____ RECORD
CMP _____ CORRUGATED METAL PIPE	RET WALL _____ RETAINING WALL
CONC _____ CONCRETE	ROW _____ RIGHT OF WAY
DH _____ DRILL HOLE	SB _____ STONE BOUND
DI _____ DUCTILE IRON	SMH _____ SEWER MANHOLE
DMH _____ DRAIN MANHOLE	SN _____ SIGN
DRV _____ DRIVEWAY	STA _____ STATION
EMH _____ ELECTRIC MANHOLE	SW _____ SIDEWALK
EX _____ EXISTING	TBM _____ TEMPORARY BENCHMARK
FNC _____ FENCE	TEMP _____ TEMPORARY
FND _____ FOUND	TMH _____ TELEPHONE MANHOLE
EOP _____ EDGE OF PAVEMENT	TOC _____ TOP OF CURB
GG _____ GAS GATE	TP _____ TEST PIT
GIP _____ GALVANIZED IRON PIPE	TYP _____ TYPICAL
GRAV _____ GRAVEL	UNK _____ UNKNOWN
GS _____ GAS SERVICE	UP _____ UTILITY POLE
HOR _____ HORIZONTAL	VC _____ VITRIFIED CLAY
HSE _____ HOUSE	VERT _____ VERTICAL
HYD _____ HYDRANT	W/ _____ WITH
HW _____ HEADWALL	WG _____ WATER GATE
INV _____ INVERT	WMH _____ WATER MANHOLE
LP _____ LIGHT POLE	WSO _____ WATER SHUTOFF

**EXISTING LEGEND**

	EX. CATCH BASIN OR DRAIN INLET
	EX. DRAIN MANHOLE
	EX. DRAIN OUTFALL
	EX. SEWER MANHOLE
	EX. HYDRANT
	EX. WATER GATE VALVE
	EX. WATER REDUCER
	EX. GAS GATE VALVE
	EX. UTILITY POLE
	EX. SIGN
	BUILDING (APPROX. LOCATION)
	EXISTING TREE
	APPROX. LOT LINE
	EXISTING 10' CONTOURS
	EXISTING 2' CONTOURS
	EX. DRAIN LINE
	EX. SEWER LINE
	EX. WATER LINE
	EX. OVERHEAD WIRE
	EX. GAS LINE

**PROPOSED LEGEND**

	PROP. WATER HYDRANT
	PROP. WATER GATE VALVE
	PROP. WATER REDUCER
	PROP. CAP UTILITY LINE
	PROP. TEMP. HYDRANT
	PROP. WATER MAIN
	PROP. TEMP. WATER BYPASS
	PROP. SEWER SERVICE
	PROP. WATER SERVICE
	PROP. SEWER MANHOLE
	PROP. SEWER MAIN
	PROP. SEWER SERVICE

**GENERAL NOTES:**

- PLAN AND TOPOGRAPHIC INFORMATION ARE PREPARED FROM AN ON-THE GROUND INSTRUMENT SURVEY PERFORMED BY GCG ASSOCIATES, INC. IN MAY AND JUNE 2017 ALONG WITH CITY OF WALTHAM'S GIS INFORMATION.
- BUILDING LOCATIONS, AS SHOWN, ARE APPROXIMATE AND FOR REFERENCE PURPOSES ONLY.
- PRIOR TO THE PROPOSED CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE ENGINEER AND CITY WITH A CONSTRUCTION SCHEDULE DELINEATING THE SEQUENCE OF WORK AND ESTIMATED TIME OF COMPLETION FOR EACH SEGMENT OF WORK.
- THE CONTRACTOR SHALL SUBMIT A TRAFFIC MANAGEMENT PLAN TO THE CITY FOR REVIEW AND APPROVAL. THE PLAN SHALL BE IN COMPLIANCE WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT) AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- THE CONTRACTOR SHALL MAINTAIN CONTINUOUS TRAFFIC FLOW DURING CONSTRUCTION SATISFACTORILY TO THE THE ENGINEER AND THE CITY OF WALTHAM.
- ALL CONSTRUCTION SIGNING SHALL CONFORM TO THE REQUIREMENTS OF MASSDOT AND MUTCD.
- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES, AND FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH ALL WORK INCLUDED UNDER THIS CONTRACT. THE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL SAFETY BARRIERS, WARNING FLASHERS, ETC., AS REQUIRED BY THE CONDUCT OF THE WORK FOR THE PROTECTION OF WORKERS AND NON-WORKERS ALIKE. THE CONTRACTORS ATTENTION IS DIRECTED TO OSHA REQUIREMENTS.
- ALL CONSTRUCTION MATERIAL, DEBRIS, ASPHALT, SOIL, ETC. REMOVED FROM THE SITE SHALL BECOME PROPERTY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR TRANSPORTING AND DISPOSING ALL EXCESS MATERIALS IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITE RESTORATION AND CLEAN UP UPON COMPLETION OF THE PROJECT. DURING THE COURSE OF CONSTRUCTION, ANY DAMAGE BY THE CONTRACTOR TO FENCES, GUARDRAILS, PATHS, STAIRS, PAVEMENT, LANDSCAPING OR VEGETATION SHALL BE REPAIRED OR REPLACED AND RESTORED TO ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE CONTRACT. ANY REPLACEMENT FENCE AND/OR HANDRAILS MUST MATCH EXISTING.
- TRENCH DEWATERING COSTS THROUGHOUT THE DURATION OF THE PROPOSED PROJECT SHALL BE INCLUDED IN THE APPLICABLE BID. A TRENCH DEWATERING PLAN SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.
- ALL CASTINGS, GATE BOXES, HYDRANTS, LIGHT POLES, ETC. DAMAGED DURING CONSTRUCTION SHALL BE SUPPLIED AND REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETTling ALL EXISTING PROPERTY MONUMENTATION THAT IS DISTURBED BY CONSTRUCTION OPERATIONS AT NO EXPENSE TO THE OWNER. THIS WORK IS TO BE DONE BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS. PROPERTY BOUNDS FOUND ARE SHOWN ON LAYOUT PLANS, THIS MAY NOT BE INCLUSIVE OF ALL BOUNDS THAT EXIST IN THE PROJECT AREA. IF ANY ADDITIONAL BOUNDS ARE FOUND, THE CONTRACTOR SHALL DOCUMENT THE LOCATION AND CONTACT THE ENGINEER.
- THE CONTRACTOR SHALL TAKE SPECIAL CARE NOT TO DAMAGE TREES WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED.
- THE CONTRACTOR IS RESPONSIBLE TO NOTIFY AND COORDINATE SUPPORT WITH OWNERS OF UTILITY POLES WITHIN 10 FEET OF THE PROPOSED UTILITY PIPE CENTERLINE OR AS DIRECTED BY THE ENGINEER.
- POLICE DETAILS SHALL BE COORDINATED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING ANY DEBRIS, SEDIMENT, OR SILTY WATER FROM ENTERING ANY DRAINAGE SYSTEM DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR SHALL INSTALL TEMPORARY CATCH BASIN SILT SACKS AS REQUIRED BY THE ENGINEER.
- CONSTRUCTION HOURS SHALL OCCUR BETWEEN THE HOURS OF 7:00 AM AND 5:00 PM, MONDAY THROUGH FRIDAY. WEEKEND WORK MUST BE APPROVED AT LEAST 48 HOURS IN ADVANCE BY THE CITY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR THE COMPLETION OF THE WORK.

**EROSION & SEDIMENT CONTROL NOTES:**

- THE CONTRACTOR SHALL COMPLY WITH EROSION AND SEDIMENTATION CONTROL DETAILS AND NOTES AS SHOWN IN THESE CONTRACT DRAWINGS.
- STRAW EROSION AND SEDIMENT CONTROL BARRIER (WATTLES) SHALL BE PLACED AT DOWNSTREAM PROJECT LIMITS PRIOR TO THE COMMENCEMENT OF WORK. WATTLES SHALL BE INSPECTED DAILY AND CLEANED OR REPAIRED AS NEEDED DURING THE CONSTRUCTION PERIOD.
- SILT SACKS SHALL BE INSTALLED AT ALL CATCH BASINS WITHIN THE PROJECT AREA PRIOR TO THE COMMENCEMENT OF WORK. SILT SACKS SHALL BE KEPT FREE OF SEDIMENT AND DEBRIS. SILT SACKS SHALL BE INSPECTED ON A DAILY BASIS OR IMMEDIATELY AFTER A RAIN EVENT. THE CONTRACTOR SHALL CLEAN SILT SACKS WITHIN 24 HOURS ONCE DIRECTED BY THE ENGINEER.
- THE CONTRACTOR SHALL REPAIR ALL ERODED AREAS AND ENSURE A GOOD STAND OF TURF IS ESTABLISHED THROUGHOUT. THE CONTRACTOR SHALL REPAIR ALL ERODED OR DISPLACED RIPRAP, AND CLEAN SEDIMENT COVERED STONES.
- THE CONTRACTOR SHALL PERFORM STREET SWEEPING AT THE END OF EACH DAY.

**EXISTING WATER SYSTEM NOTES:**

- ALL EXISTING HYDRANTS, VALVES, VALVE BOXES, FRAMES, AND COVERS REMOVED FROM THE WORK SITE SHALL BE DELIVERED TO THE WALTHAM DPW YARD BY THE CONTRACTOR OR DISPOSED OF BY THE CONTRACTOR, AT NO ADDITIONAL EXPENSE TO THE CITY, AS DETERMINED BY THE ENGINEER IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
- ALL EXISTING WATER PIPE REMOVED SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
- EXISTING WATER SERVICE RECONNECTION SHALL BE DONE AFTER THE PROPOSED MAIN AND SERVICE STUBS HAVE BEEN ACTIVATED (TESTING, DISINFECTION, AND FLUSHING COMPLETED).
- THE CONTRACTOR SHALL NOT OPERATE ANY HYDRANTS, VALVES, CURB STOPS, OR CORPORATIONS NOR SHALL THEY DRAW WATER FROM THE SYSTEM, WITHOUT SPECIFIC APPROVAL OF THE CITY OF WALTHAM WATER & SEWER SUPERINTENDENT OR HIS/HER DESIGNEE.
- THE EXISTING WATER MAINS ON CHRISTOPHER ROAD AND THE UTILITY EASEMENT TO MELODY LANE ARE ASSUMED TO BE CAST IRON OR DUCTILE IRON CONSTRUCTION OR AS NOTED.
- PRIOR TO STARTING ANY WORK THAT WILL AFFECT SERVICE TO CUSTOMERS, THE CONTRACTOR SHALL NOTIFY THE CITY, THE ENGINEER, AND THE CUSTOMERS 72 HOURS PRIOR TO THE SHUTDOWN AND NOTE THAT A TEMPORARY RUSTY WATER CONDITION MAY EXIST.

**PROPOSED WATER SYSTEM NOTES:**

- WATER MAINS SHALL BE CLDI CLASS 56 - DOUBLE CEMENT LINED.
- ALL WATER MAIN FITTINGS AND VALVES SHALL BE DUCTILE IRON MECHANICAL JOINT AND RESTRAINED WITH MJ RESTRAINTS (MEGALUG OR EQUAL).
- ALL WATER SERVICES AND CURB STOPS SHALL BE REPLACED UP TO THE RIGHT OF WAY OR AS DIRECTED BY THE ENGINEER.
- ALL NEW WATER SERVICES, CORPORATIONS AND CURB STOPS SHALL BE SIZED AS SHOWN ON THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- ALL NEW CORPORATIONS AND CURB STOPS SHALL BE LEAD FREE AND BALL TYPE WITH INSERTS AND RESTRAINTS.
- ALL CORPORATIONS ALONG THE PROPOSED MAIN SHALL BE INSTALLED PRIOR TO PRESSURE TESTING.
- ALL HYDRANTS SHALL BE "AMERICAN DARLING B-62", YELLOW BODY WITH BLACK CAPS "WALTHAM COLORS." HYDRANTS SHALL BE FACTORY PAINTED "WALTHAM COLORS"
- REPLACED HYDRANTS SHALL BE LOCATED AT THE EXISTING LOCATION OR AS DIRECTED BY THE ENGINEER.
- HYDRANT MARKERS SHALL BE INSTALLED AT EACH HYDRANT LOCATION AND ARE INCLUDED UNDER THE HYDRANT ITEM.
- SOLID SLEEVE FITTINGS SHALL BE USED AT ALL CONNECTIONS BETWEEN PROPOSED AND EXISTING WATER MAINS. IF EXISTING WATER MAINS ARE FOUND TO BE OVER-SIZED CAST IRON, HI-MAX OR DRESSER COUPLINGS MAY BE SUBSTITUTED FOR A SOLID SLEEVE FITTING UPON SPECIFIC APPROVAL FROM THE CITY OF WALTHAM WATER & SEWER SUPERINTENDENT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERY OF EXISTING OVER-SIZED CAST IRON MAINS.
- LOCATION OF PROPOSED WATER SYSTEM MAY BE ALTERED IN THE FIELD BY THE ENGINEER TO SUIT FIELD CONDITIONS.

**TRENCH PAVING NOTES:**

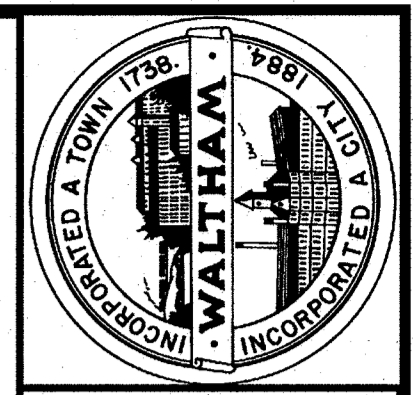
- ALL TRENCHES SHALL BE BROUGHT TO GRADE AT THE END OF EACH WORKDAY. ALL TRENCHES SHALL BE PAVED WITH 3" TEMPORARY BINDER PAVEMENT AT THE END OF EACH WORK WEEK (SEE DETAILS).
- THE CONTRACTOR SHALL LIMIT THE USE OF STEEL PLATES IN THE ROADWAY. STEEL PLATES LEFT WITHIN THE ROADWAY SHALL BE PINNED AND PATCHED AROUND USING BITUMINOUS CONCRETE.
- ALL TEMPORARY AND PERMANENT TRENCHES IN EXISTING PAVEMENT ARE TO BE SAW CUT WHERE THE PROPOSED PAVEMENT SHALL MEET TO ALLOW A SMOOTH TRANSITION AFTER PAVING. NO OTHER METHOD OF CUTTING IS ACCEPTABLE. JOINTS SHALL BE SANDED AND SEALED.
- ALL TRENCHES SHALL BE COMPACTED BY MECHANICAL EQUIPMENT, PUDDLED OR JETTED WITH WATER TO ALLOW FOR PROPER SETTLEMENT. TRENCHES THAT CANNOT BE JETTED WILL BE MECHANICALLY COMPACTED AS DETERMINED BY THE ENGINEER. ALL TRENCHES SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY. THE ENGINEER RESERVES THE RIGHT TO HAVE COMPACTION TESTING DONE AT THE CONTRACTOR'S EXPENSE.
- AFTER COMPACTION IS COMPLETED, THE CONTRACTOR SHALL PLACE TRENCH PAVEMENT AS SHOWN ON THE DETAILS.
- THE CONTRACTOR SHALL REMOVE AND REPLACE ALL PAVEMENT DAMAGED DURING THE INSTALLATION OF THE PROPOSED UTILITY.

**UTILITY NOTES:**

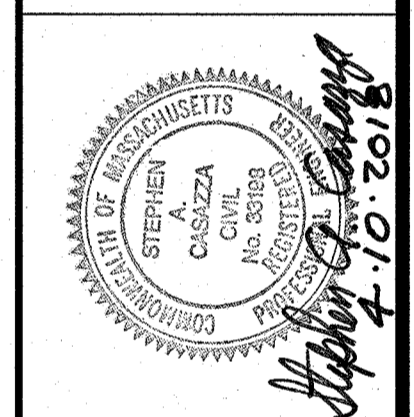
- PRIOR TO CONSTRUCTION, ALL UTILITIES, PUBLIC AND PRIVATE MUST BE NOTIFIED (SEE MASSACHUSETTS GENERAL LAWS, CHAPTER 82 SECTION 40.) ALL "DIG SAFE" - 811, OR CUSTOMER SERVICE - 1 (888) 344-7233.
- THE CITY OF WALTHAM IS NOT A PART OF "DIG SAFE". THE CONTRACTOR MUST SEPARATELY CONTACT THE WATER AND SEWER DEPARTMENT AND WIRES DEPARTMENT FOR APPROPRIATE MARK OUTS.
- SUBSURFACE AND OVERHEAD UTILITY LINES, AS SHOWN HEREON, WERE COMPLIED ACCORDING TO CITY OF WALTHAM GIS INFORMATION. THE LOCATIONS ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD. THE CITY OF WALTHAM ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. THE CONTRACTOR SHALL EXCAVATE TEST PITS TO VERIFY UTILITY LINE LOCATIONS AS NECESSARY.
- UNLESS OTHERWISE INDICATED, WATER MAINS ARE ASSUMED TO BE 5 FEET BELOW THE EXISTING GROUND SURFACE. GAS LINES ARE ASSUMED TO BE 3 FEET BELOW THE EXISTING GROUND SURFACE. TELEPHONE AND ELECTRIC CONDUIT ARE ASSUMED TO BE 2 FEET BELOW THE EXISTING GROUND SURFACE.
- DAMAGE TO ANY UTILITY WILL BE REPAIRED BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, IN A TIMELY MANNER SO THAT DISRUPTION OF SERVICE TO ANY UTILITY WILL NOT BE LONGER THAN PRACTICALLY NECESSARY TO REPAIR THE DAMAGE.
- THE CONTRACTOR SHALL EXCAVATE TEST PITS TO VERIFY UTILITY LINE LOCATIONS AND DETERMINE ACTUAL FIELD CONDITIONS AS NECESSARY OR AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL PLAN AND PERFORM TEST PIT EXCAVATION WELL IN ADVANCE OF COMMENCING CONSTRUCTION IN THE GENERAL AREA TO ALLOW TIME TO REVIEW ACTUAL CONDITIONS ENCOUNTERED. TEST PITS NOT SPECIFICALLY IDENTIFIED SHALL BE EXCAVATED BY THE CONTRACTOR AT THE DIRECTION OF THE ENGINEER. PAYMENT SHALL BE INCLUDED UNDER THE APPLICABLE ITEM.
- EXISTING UTILITIES INTERFERING WITH THE WORK SHALL BE RELOCATED OR BRACED AND SUPPORTED AS DIRECTED IN THE FIELD BY THE ENGINEER, UNLESS OTHERWISE INDICATED OR SPECIFIED.
- UTILITY CONTACTS:  
 THE CITY OF WALTHAM - WATER/SEWER/DRAIN  
 WATER & SEWER FOREMAN (7AM-3PM): 781-314-3826  
 DAYTIME OFFICE: 781-314-3820  
 AFTER HOURS EMERGENCY: 781-893-3700  
 THE CITY OF WALTHAM - WIRES DEPARTMENT  
 TIM KELLY, INSPECTOR OF WIRES: 781-389-6044  
 VERIZON - TELEPHONE  
 FREDERICK WAGNER, AREA PROJECT COORDINATOR: 781-376-5067  
 COMCAST - CABLE  
 MANUEL FURTADO, AREA PROJECT COORDINATOR: 774-644-9104  
 NATIONAL GRID - GAS  
 KEITH WALTERS, AREA PROJECT COORDINATOR: 516-924-4602  
 EVERSOURCE - ELECTRIC  
 N.E. SERVICE NUMBER: 800-592-2000

**STOCKPILED MATERIALS & EQUIPMENT NOTES:**

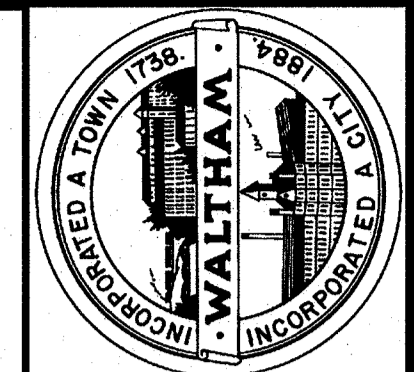
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING A LOCATION FOR STAGING AND STORING STOCKPILED MATERIALS AND EQUIPMENT.
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF LOCATION AND ANY PRIVATE AGREEMENTS AND ALL FEES THAT MAY BE ASSOCIATED WITH THE USE OF AN AREA FOR STORING STOCKPILED MATERIALS AND EQUIPMENT.
- THE CITY OF WALTHAM IS NOT RESPONSIBLE FOR PROVIDING A LOCATION FOR STAGING OR THE STORING OF STOCKPILED MATERIALS AND EQUIPMENT.
- MATERIALS SHALL NOT BE STOCKPILED WITHIN THE ROADWAY OR IN PUBLIC PARKING AREAS.
- NO EQUIPMENT SHALL BE ALLOWED TO BE PARKED WITHIN THE ROADWAY WHILE NOT IN USE.
- ALL SURPLUS EXCAVATED MATERIALS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DISPOSE OF OFFSITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.



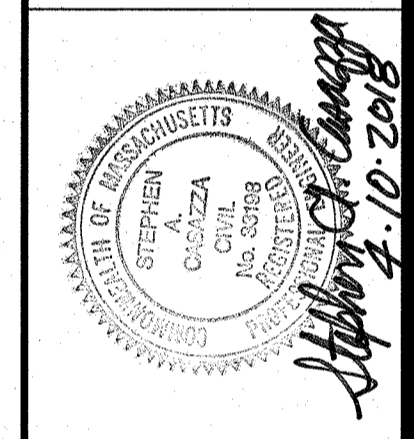
CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT NOTES



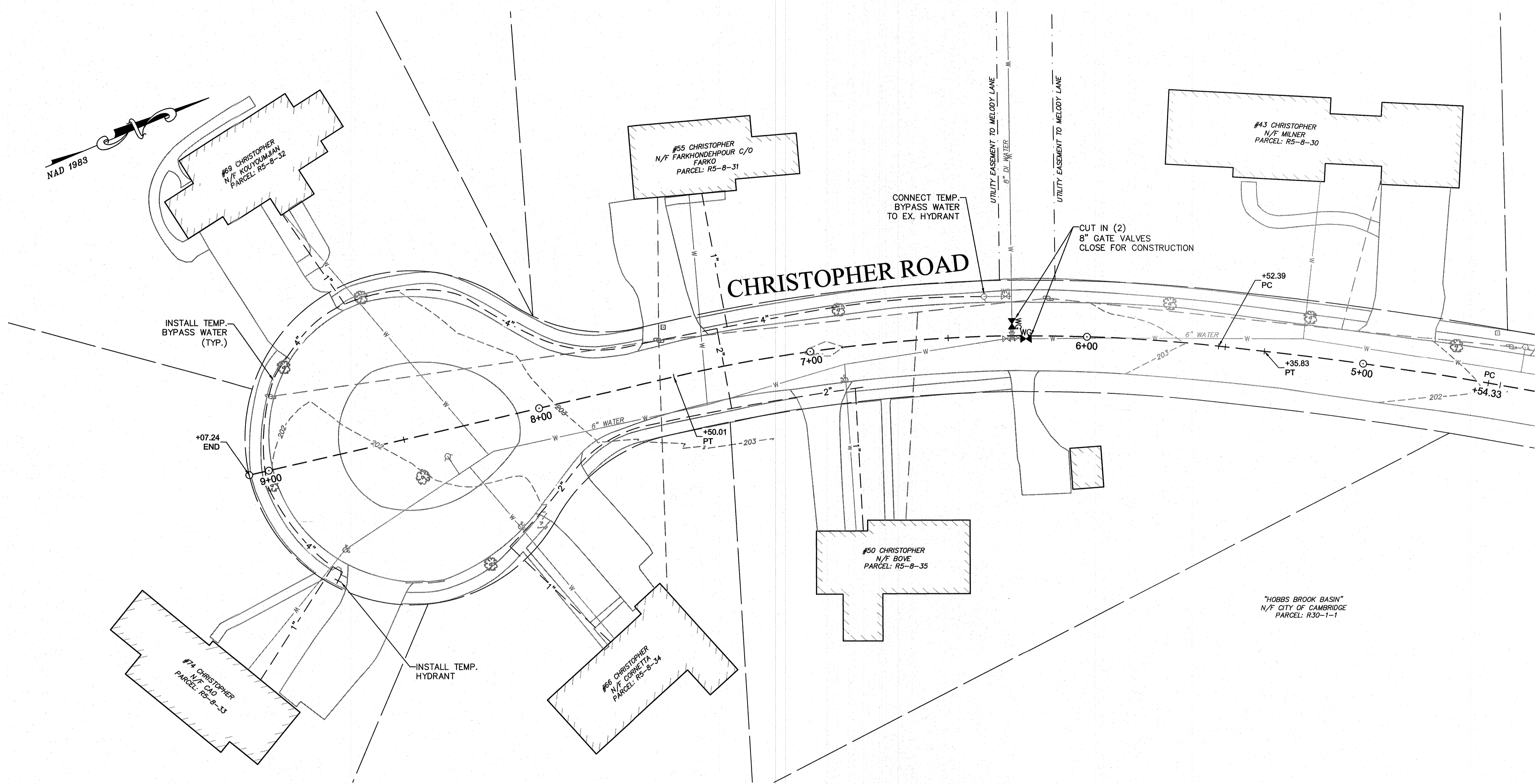
DATE: 04/09/2018	REVISION DATE:
SCALE: N.T.S.	DRAWN BY: JPM
FILE: Christopher2017	DESIGNED BY: SBH
SHEET 2 OF 9	REVIEWED BY: IAM
	APPROVED BY: SAC



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT BYPASS PLAN



DATE: 04/09/2018	REVISION DATE:
SCALE: 1" = 20'	
FILE: Christopher2017	
<b>SHEET 3 OF 9</b>	
DRAWN BY: JPM	DESIGNED BY: SBH
	REVIEWED BY: IAM
	APPROVED BY: SAC



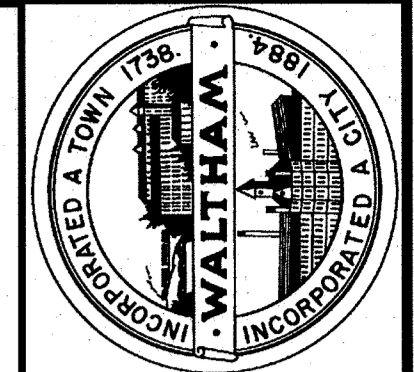
**TEMPORARY BYPASS PIPING NOTES:**

1. PRIOR TO STARTING ANY WORK THAT WILL AFFECT SERVICE TO CUSTOMERS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE CUSTOMERS IN WRITING AT LEAST 72 HOURS PRIOR TO THE SHUTDOWN.
2. TEMPORARY BYPASS PIPING SYSTEM PLAN SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS, EMPLOYED OR CONTRACTED BY THE CONTRACTOR AND SHALL INCLUDE LAYOUT OF THE BYPASS PIPING, TEMPORARY SERVICE LINES TO ALL CUSTOMERS, THE SPECIFIED BYPASS PIPE DIAMETER TO BE USED IN EACH LOCATION, AND THE TYPE AND LOCATION OF TEMPORARY FIRE HYDRANTS. THE BYPASS PIPING, IN MOST CASES, WILL BE LAID ABOVE GROUND AND SHALL BE 4" AND 2" WITH 1" SERVICE CONNECTIONS AS REQUIRED.
3. THREE COPIES OF THE PROPOSED BYPASS DESIGN PLAN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT THE PRE-CONSTRUCTION MEETING. THE ENGINEER SHALL MAKE THE FINAL DECISION AS TO THE ROUTING AND SIZES OF ALL BYPASS LINES BEFORE ANY BYPASS IS INSTALLED.
4. THE TEMPORARY BYPASS PIPING SHALL BE INSTALLED, TESTED, AND APPROVED PRIOR TO THE REMOVAL OF THE EXISTING WATER MAIN AND THE INSTALLATION OF THE PROPOSED WATER MAIN.
5. THE CONTRACTOR SHALL INSTALL THE TEMPORARY BYPASS PIPING BELOW GRADE AT ALL DRIVEWAY CROSSINGS, SEE DETAILS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL AFFECTED WATER CUSTOMERS, IN WRITING, OF DISRUPTION OF SERVICE AT LEAST 72 HOURS PRIOR TO THE SHUTDOWN. NOTICE CARDS WILL BE FURNISHED BY THE CONTRACTOR WHICH WILL INCLUDE THE DATE AND HOURS OF SHUTDOWN AND NOTE THAT A TEMPORARY RUSTY WATER CONDITION MAY EXIST. NOTICE CARDS WILL ALSO HAVE SPACE FOR THE CONTRACTOR TO FILL IN THE SPECIFIC DATES FOR EACH SHUTDOWN. THE WORK SHALL BE SCHEDULED IN SECTIONS, AS APPROVED BY THE ENGINEER, AS IT IS NECESSARY TO ALLOW FOR COMPLETION OF WORK AND RESTORATION OF SERVICE TO THE CUSTOMER WITHIN THE TIMES SPECIFIED BY THE ENGINEER.

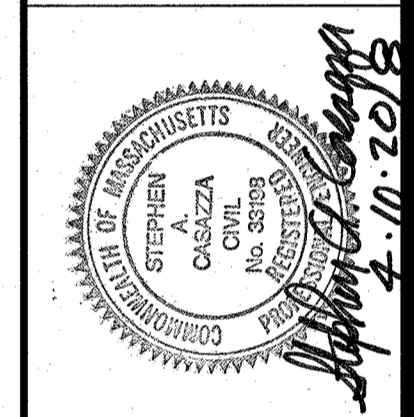
PLAN VIEW  
 SCALE: 1" = 20'

**BYPASS SEQUENCING NOTES:**

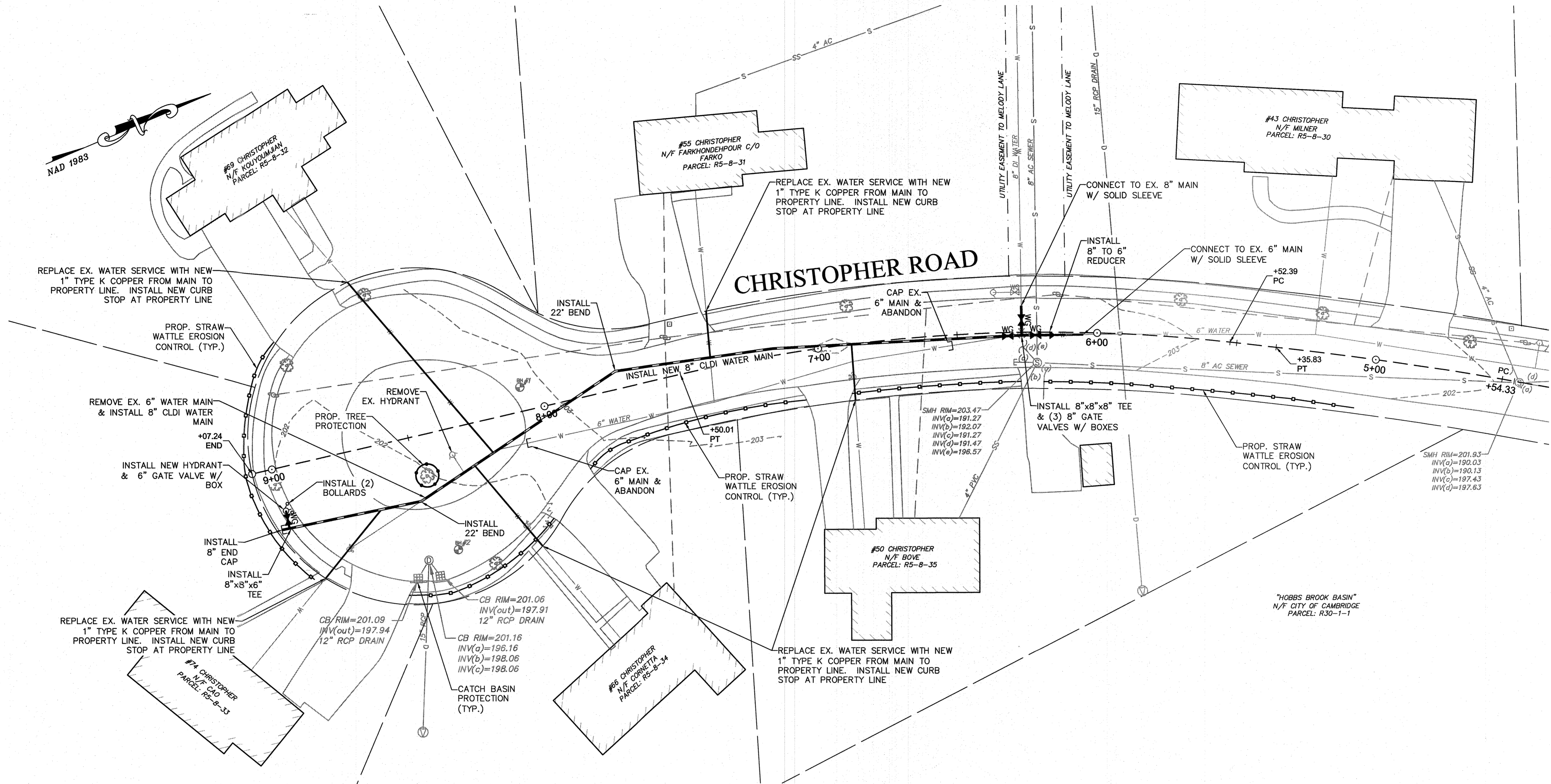
1. CONNECT AND INSTALL TEMPORARY BYPASS WATER TO HYDRANT LOCATED IN UTILITY EASEMENT TO MELODY LANE.
2. INSTALL TEMPORARY BYPASS WATER TO THE END OF CHRISTOPHER ROAD CUL-DE-SAC.
3. CHLORINATE AND TEST TEMPORARY MAIN. UPON PASSING RESULTS, CONNECT HOUSES TO TEMPORARY BYPASS WATER.
4. INSTALL (CUT IN) TWO (2) 8" GATE VALVES ON CHRISTOPHER ROAD NEAR EASEMENT TO MELODY LANE. LEAVE CLOSED FOR CONSTRUCTION.
5. REPLACE / INSTALL PROPOSED WATER SYSTEMS AS SPECIFIED.
6. TEST AND DISINFECT NEW WATER SYSTEMS.
7. CONNECT AND ACTIVATE HOUSE SERVICES.
8. REMOVE TEMPORARY BYPASS WATER.



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT STA. 5+50 - 9+00



DATE: 04/09/2018	REVISION DATE:
SCALE: 1" = 20'	DRAWN BY: JPM
FILE: Christopher2017	DESIGNED BY: SBH
SHEET 4 OF 9	REVIEWED BY: IAM
	APPROVED BY: SAC



PLAN VIEW  
 SCALE: 1" = 20'

**BORING LOG INFORMATION:**

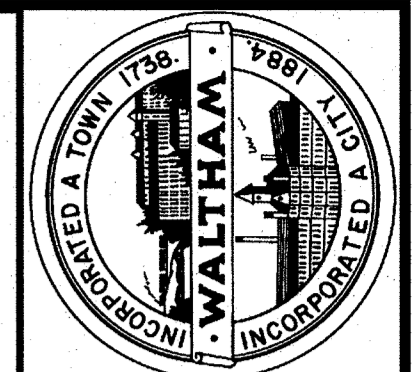
**BORING HOLE 1 - CHRISTOPHER ROAD APPROX. STA. 8+07, RT. 8'**

PERFORMED BY: SOIL EXPLORATION CORP. ON JUNE 16, 2017  
 LOG DATA:  
 0 TO 2" ASPHALT  
 2 TO 3'-6" FINE TO COARSE SAND, FINE TO COARSE GRAVEL, COBBLES, INORGANIC SILT, BOULDERS, ROAD BASE FILL  
 3'-6 TO 12' FINE TO COARSE GRAVEL, FINE TO COARSE SAND, COBBLES, BOULDERS, SANDY GRAVEL GLACIAL TILL  
 12' END OF BORING 12', NO WATER ENCOUNTERED UPON COMPLETION

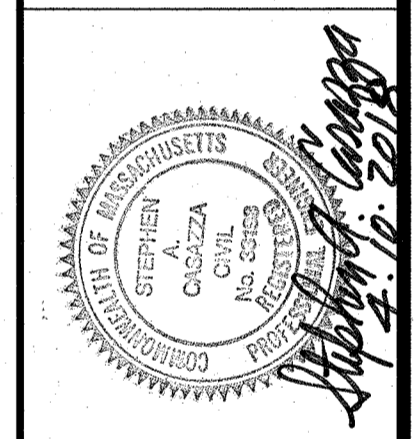
**BORING HOLE 2 - CHRISTOPHER ROAD APPROX. STA. 8+41, LT. 43'**

PERFORMED BY: SOIL EXPLORATION CORP. ON JUNE 16, 2017  
 LOG DATA:  
 0 TO 2" ASPHALT  
 2" TO 3'-6" FINE TO COARSE SAND, FINE TO COARSE GRAVEL, COBBLES, INORGANIC SILT, ROAD BASE FILL  
 3'-6" TO 12' FINE TO COARSE GRAVEL, FINE TO COARSE SAND, INORGANIC SILT, COBBLES, BOULDERS, GLACIAL TILL  
 12' END OF BORING 12', NO WATER ENCOUNTERED UPON COMPLETION

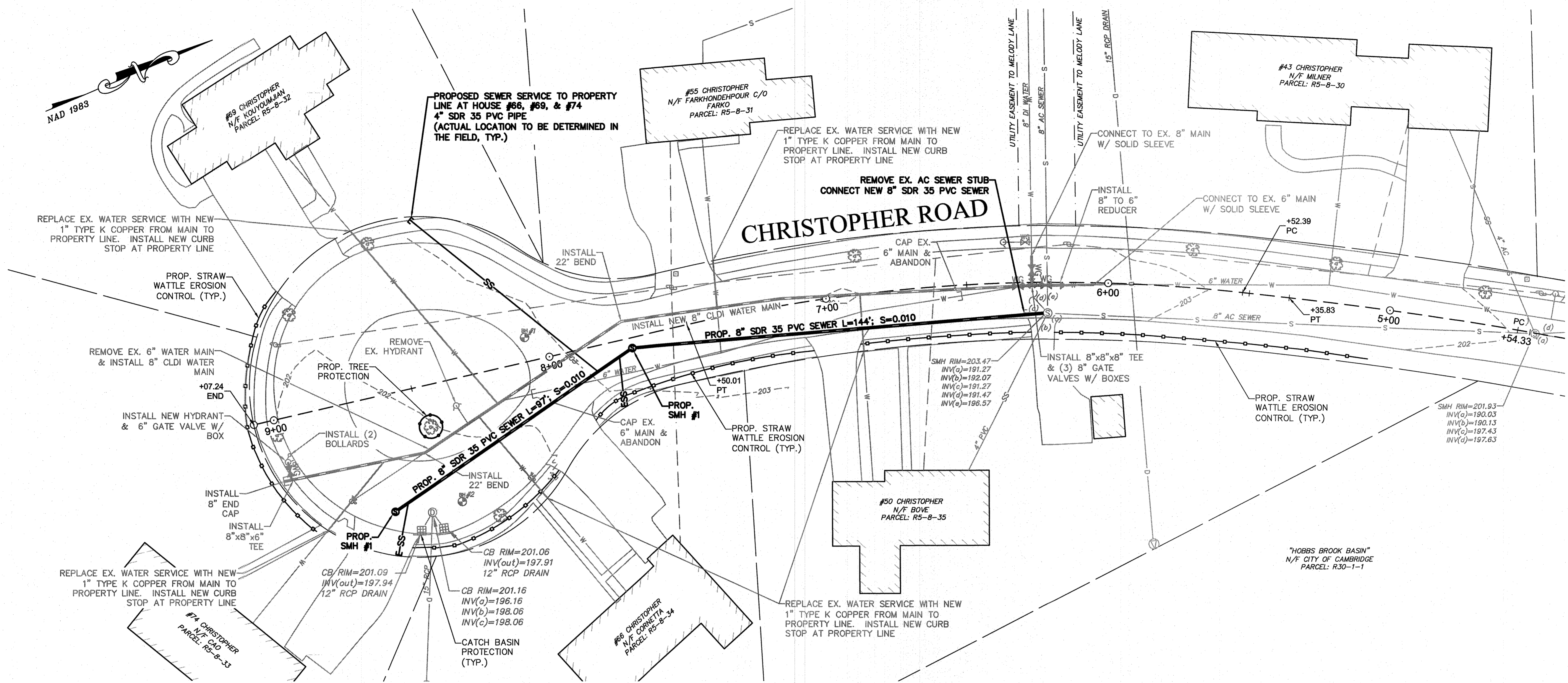




CITY OF WALTHAM ENGINEERING DEPARTMENT  
**CHRISTOPHER ROAD**  
**SEWER MAIN EXTENSION ADD ALT. 1**



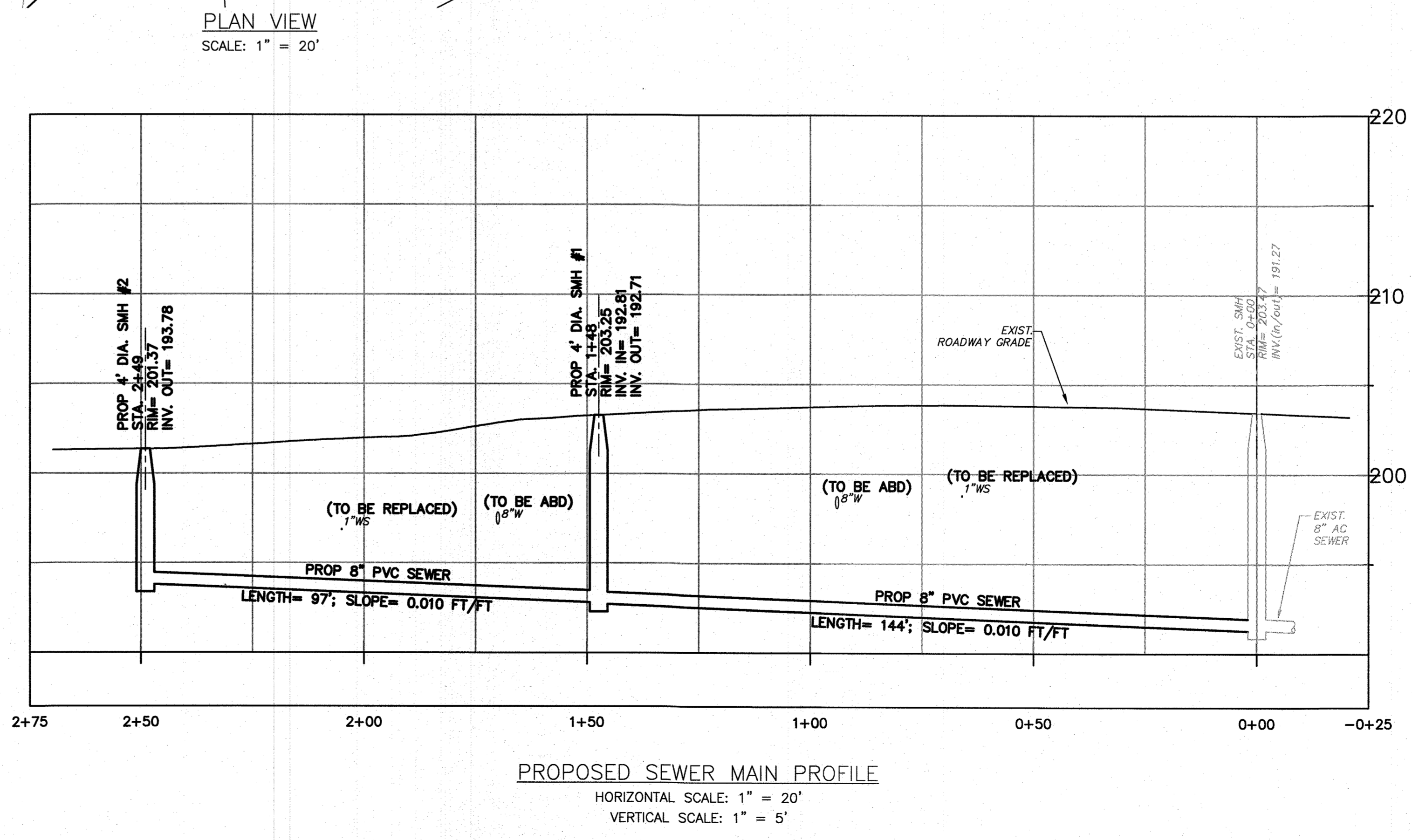
DATE: 04/09/2018	REVISION DATE:
SCALE: AS NOTED	DRAWN BY: JPM
FILE: Christopher2017	DESIGNED BY: SBH
SHEET 5 OF 9	REVIEWED BY: IAM
	APPROVED BY: SAC



**BORING LOG INFORMATION:**

**BORING HOLE 1 - CHRISTOPHER ROAD APPROX. STA. 8+07. RT. 8'**  
 PERFORMED BY: SOIL EXPLORATION CORP. ON JUNE 16, 2017  
 LOG DATA:  
 0 TO 2" ASPHALT  
 2 TO 3'-6" FINE TO COARSE SAND, FINE TO COARSE GRAVEL, COBBLES, INORGANIC SILT, BOULDERS. ROAD BASE FILL.  
 3'-6 TO 12' FINE TO COARSE GRAVEL, FINE TO COARSE SAND, COBBLES, BOULDERS, SANDY GRAVEL GLACIAL TILL.  
 12' END OF BORING 12', NO WATER ENCOUNTERED UPON COMPLETION

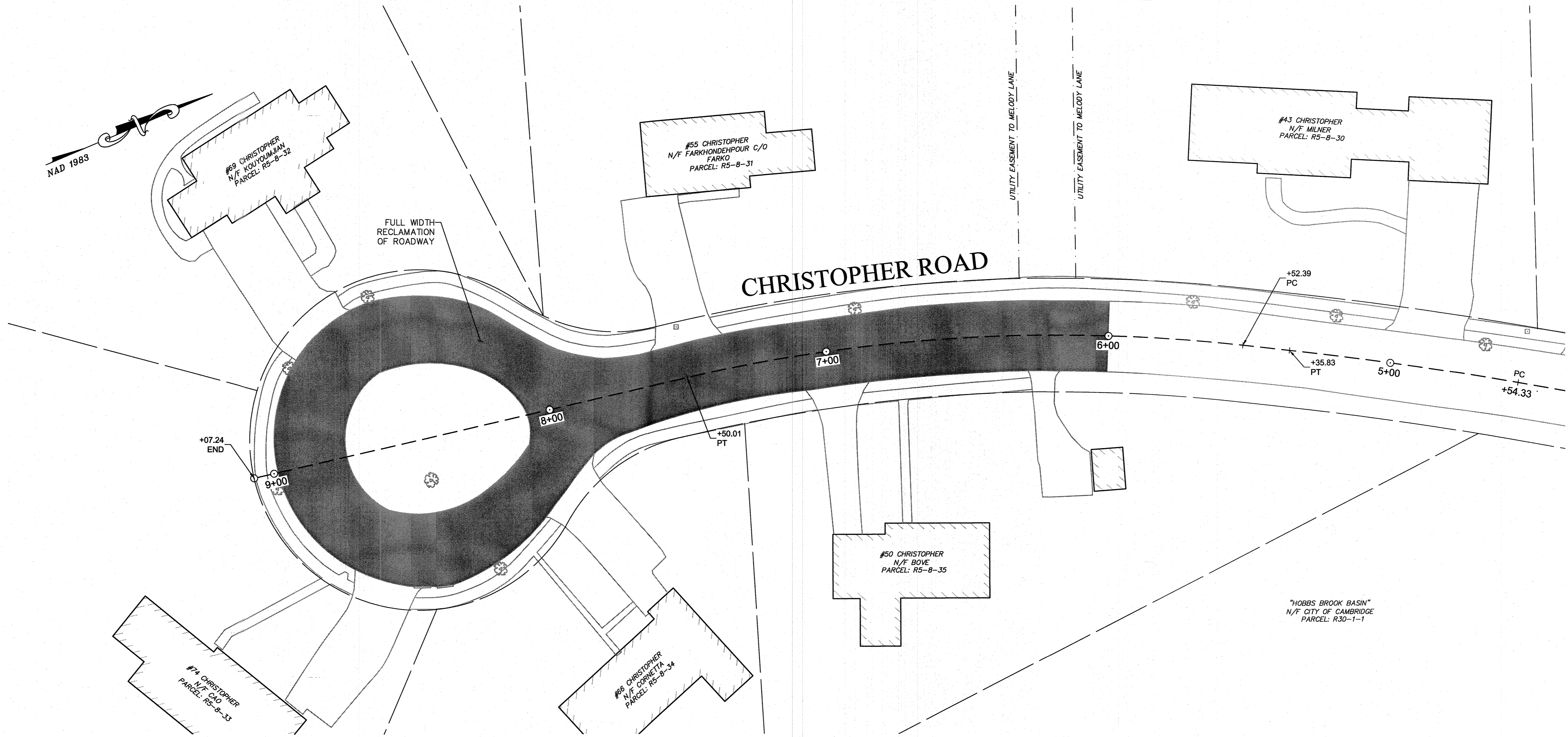
**BORING HOLE 2 - CHRISTOPHER ROAD APPROX. STA. 8+41. LT. 4.3'**  
 PERFORMED BY: SOIL EXPLORATION CORP. ON JUNE 16, 2017  
 LOG DATA:  
 0 TO 2" ASPHALT  
 2" TO 3'-6" FINE TO COARSE SAND, FINE TO COARSE GRAVEL, COBBLES, INORGANIC SILT. ROAD BASE FILL.  
 3'-6" TO 12' FINE TO COARSE GRAVEL, FINE TO COARSE SAND, INORGANIC SILT, COBBLES, BOULDERS, GLACIAL TILL.  
 12' END OF BORING 12', NO WATER ENCOUNTERED UPON COMPLETION





CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT RECLAMATION

STEPHEN O'NEILL  
 CIVIL  
 No. 8198  
 State of Massachusetts  
 4-10-2018



PLAN VIEW  
 SCALE: 1" = 20'

ROADWAY RECLAMATION NOTES:

1. PRIOR TO RECLAIMING, THE CONTRACTOR SHALL COMPLETE ALL EXCAVATING AND PREPARING SUBGRADE REQUIRED TO PULVERIZE THE PAVEMENT AND SHALL LOWER ALL CASTINGS AS SPECIFIED IN SECTION 02220 OF THE CONTRACT SPECIFICATIONS.
2. RECLAMATION OF THE ROADWAY WILL NOT TAKE PLACE UNTIL AFTER 90 DAY SETTLEMENT PERIOD HAS BEEN OBSERVED.
3. ALL DRAINAGE AND UTILITY CASTINGS SHALL BE LOWERED OR REMOVED AND PLATED PRIOR TO RECLAIMING THE ROADWAY. ALL STRUCTURES MUST BE LOWERED TO A DEPTH OF 6 INCHES BELOW THE BOTTOM OF THE PROPOSED RECLAIMED BASE COURSE.
4. ALL STRUCTURES SHALL BE LOWERED PRIOR TO RECLAIMING AND THEN RAISED TO FINISHED GRADE ONCE BINDER COURSE PAVEMENT IS PLACED.
5. THE ENTIRE ROADWAY SHALL BE RECLAIMED TO A MINIMUM DEPTH OF 16" WITHIN THE LIMITS DEFINED ON THE CONTRACT DRAWINGS. THE EXISTING PAVEMENT SHALL BE PULVERIZED TO THE POINT WHERE NO MATERIAL IS GREATER THAN 3".
6. AFTER PULVERIZING THE ROADWAY ASPHALT AND UNDERLYING MATERIALS, THE CONTRACTOR SHALL REMOVE AND STOCKPILE (WINROW) THE RECLAIMED MATERIAL. THE CONTRACTOR SHALL THEN EXCAVATE AND REMOVE THE NECESSARY SUBGRADE MATERIAL IN ORDER TO MEET THE FINAL GRADES OF THE ROADWAY. THE CONTRACTOR SHALL THEN PLACE, GRADE, AND COMPACT THE EXISTING RECLAIMED BASE COURSE TO A 12" DEPTH AS SHOWN ON THE TYPICAL ROADWAY CROSS SECTION. THE SUBBASE SHALL THEN BE FINE GRADED AND COMPACTED TO ALLOW FOR THE PLACEMENT OF A 3" INTERMEDIATE COURSE DENSE BINDER (M3.11.03 - TABLE "A") AND 1.5" HMA STANDARD TOP COURSE (M3.11.03 - TABLE "A").

7. THE CONTRACTOR SHALL GRADE THE EXISTING RECLAIMED SUBBASE MATERIAL OR BORROW MATERIAL TO ALLOW THE FINAL PAVEMENT SURFACE TO MATCH THE EXISTING EDGE OF PAVEMENT GRADE UNLESS OTHERWISE NOTED. ANY GRADING MODIFICATIONS SHALL DIRECT DRAINAGE TOWARDS THE APPROPRIATE AREAS.
8. PRIOR TO COMPLETING FINAL GRADING OF THE RECLAIMED BASE COURSE, THE ENGINEER SHALL REVIEW GRADES TO DETERMINE THAT SUFFICIENT CORSS SLOPES AND POSITIVE DRAINAGE FLOWS HAVE BEEN MAINTAINED. IF GRADES NEED TO BE ADJUSTED, THE CONTRACTOR SHALL REGRADE AS DIRECTED.
9. CONTRACTOR SHALL CONTROL DUST DURING CONSTRUCTION USING CALCIUM CHLORIDE.
10. ALL CASTINGS SHALL BE ADJUSTED OR REMODELED AS REQUIRED TO MEET FINAL PROPOSED GRADE.
11. ALL WORK REQUIRED TO GRADE THE RECLAIMED MATERIAL TO A 12" DEPTH SHALL BE INCLUDED FOR PAYMENT UNDER THE RECLAIM ITEM.
12. THE COSTS ASSOCIATED WITH THE EXCAVATION, PLACEMENT, AND DISPOSAL OF SURPLUS SUBBASE MATERIAL SHALL BE INCLUDED IN THE RECLAIM ITEM.
13. THE CONTRACTOR SHALL STOCKPILE AND RETAIN SUFFICIENT SURPLUS SUBBASE MATERIAL AND RECLAIMED PAVEMENT SUBBASE MATERIALS TO USE AS NEEDED IN THE ENTIRE PROJECT AREA. SURPLUS SUBBASE AND RECLAIMED PAVEMENT SUBBASE MATERIAL SHALL BE USED ONSITE PRIOR TO ADDITIONAL GRAVEL BORROW MATERIAL.
14. ANY EXCESS RECLAIMED MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED AND DISPOSAL OF IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS. THE COST FOR THE REMOVAL AND DISPOSAL OF EXCESS MATERIAL SHALL BE INCLUDED IN THE RECLAIM ITEM.

FINE GRADING AND COMPACTING NOTES:

1. THE CONTRACTOR SHALL FINE GRADE AND COMPACT ALL AREAS IN PREPARATION FOR PAVEMENT, INCLUDING, BUT NOT LIMITED TO THE ROADWAY AND TRANSITION DRIVEWAY AREAS. THE CONTRACTOR SHALL ALSO STRAIGHT CUT ALL EXISTING JOINTS AND EDGES IN PREPARATION FOR FINAL PAVEMENT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPACTION TESTING. TESTING SHALL BE PERFORMED AT INTERVALS OF 100 FEET ALONG THE ROADWAY.
3. FINE GRADING SHALL BE INSPECTED BY THE ENGINEER AND ADJUSTMENTS MADE AT THE ENGINEER'S REQUEST. ROADWAY GRADE SHALL MEET EXISTING DRIVEWAY CURB CUTS.
4. PAYMENT FOR FINE GRADING AND COMPACTING THE RECONSTRUCTED ROADWAY AND DRIVEWAY APRONS SHALL BE INCLUDED FOR PAYMENT UNDER THE FINE GRADING AND COMPACTING ITEM.
5. THE CONTRACTOR SHALL FINE GRADE AND COMPACT THE EXISTING RECLAIMED BASE COURSE MATERIAL NO MORE THAN 24 HOURS PRIOR TO THE PLACEMENT OF THE 3" BINDER COURSE PAVEMENT.

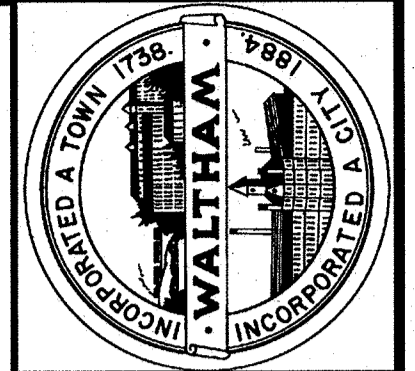
GENERAL PAVING NOTES:

1. THE CONTRACTOR SHALL SAW CUT ALL JOINTS IN THE EXISTING PAVEMENT AREAS WHERE THE PROPOSED PAVEMENT WILL MEET EXISTING PAVEMENT TO REMAIN. ALL JOINTS SHALL PROVIDE A SMOOTH TRANSITION BETWEEN NEW AND OLD PAVEMENTS. IMMEDIATELY AFTER PAVING, ALL NEW JOINTS SHALL BE SANDED AND SEALED. THE COST FOR THIS WORK SHALL BE CONSIDERED INCLUDED IN THE CONTRACT PRICE.
2. THE CONTRACTOR SHALL RESET ALL WATER, SEWER, DRAIN, GAS, ELECTRIC, AND TELEPHONE FRAMES AND COVERS/GRATES AND ANY OTHER STRUCTURES, SIGNS, ETC. NECESSARY TO INSTALL THE PROPOSED PAVEMENT TO THE PROPOSED FINISH GRADE ELEVATION. THIS WORK SHALL BE CONSIDERED INCLUDED IN THE CONTRACT PRICE.
3. THE CONTRACTOR SHALL MILL THE EXISTING ROADWAY TO A DEPTH OF 1.5 INCHES. CONTRACTOR SHALL PLACE TOP COURSE PAVEMENT TO A DEPTH OF 1.5 INCHES COMPACTED TO RESTORE THE ROADWAY TO ITS ORIGINAL GRADE.
4. FINAL MILL AND OVERLAY SHALL BE CONDUCTED AFTER A MINIMUM 90 DAY SETTLEMENT PERIOD OF THE TEMPORARY TRENCH PATCH.
5. ALL CASTINGS, GATE BOXES, ETC. DAMAGED DURING CONSTRUCTION SHALL BE SUPPLIED AND REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.

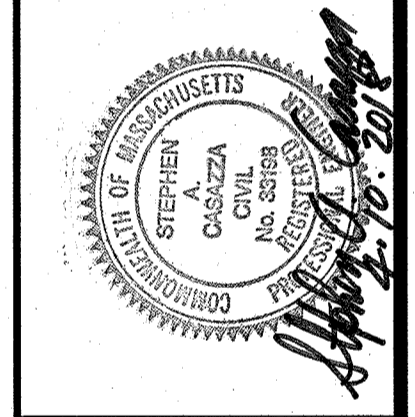
PAVING LEGEND:

FULL WIDTH RECLAMATION - [shaded box]

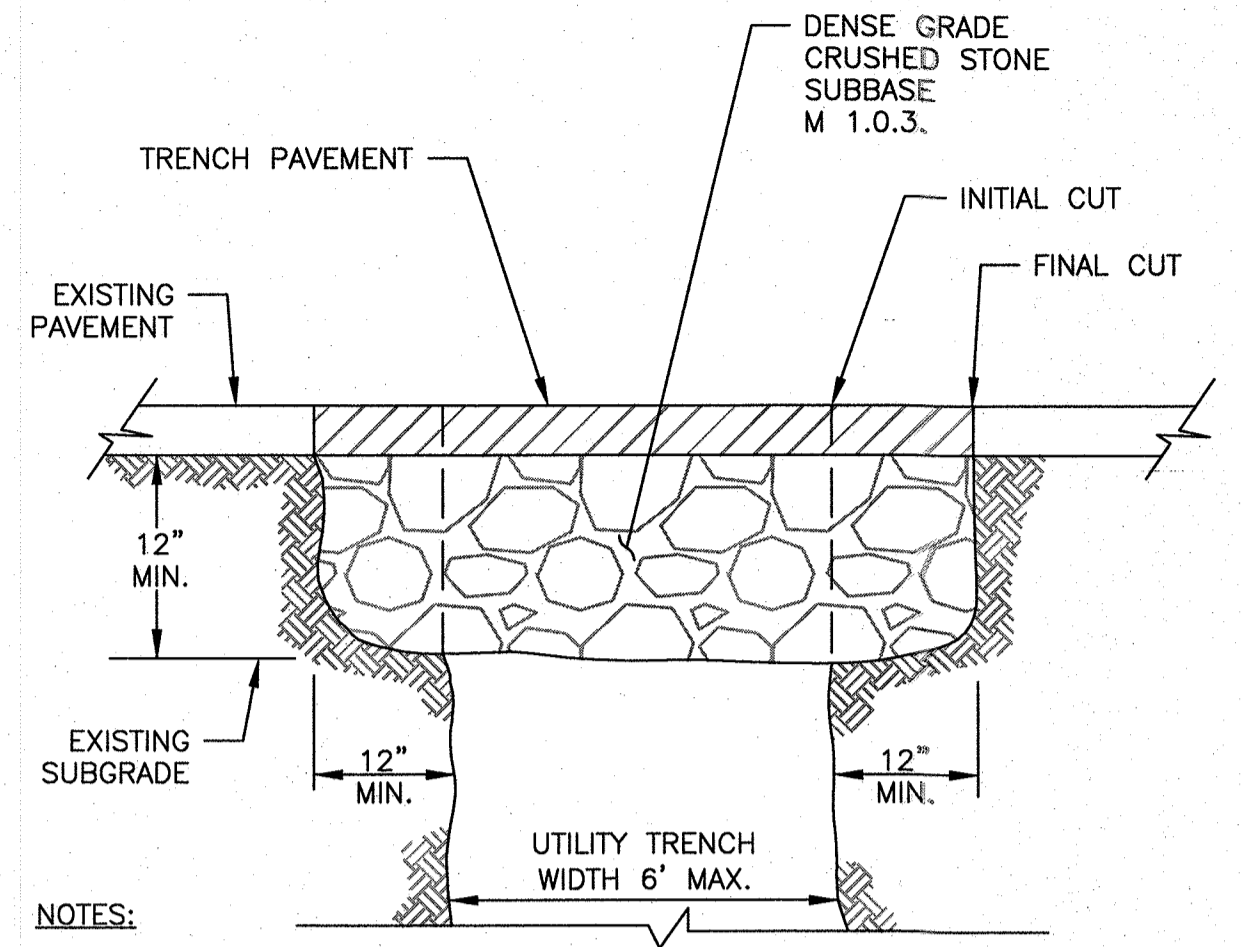
DATE: 04/09/2018	REVISION DATE:
SCALE: 1" = 20'	DRAWN BY: JPM
FILE: Christopher2017	DESIGNED BY: SBH
SHEET 6 OF 9	REVIEWED BY: IAM
	APPROVED BY: SAC



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT DETAILS I

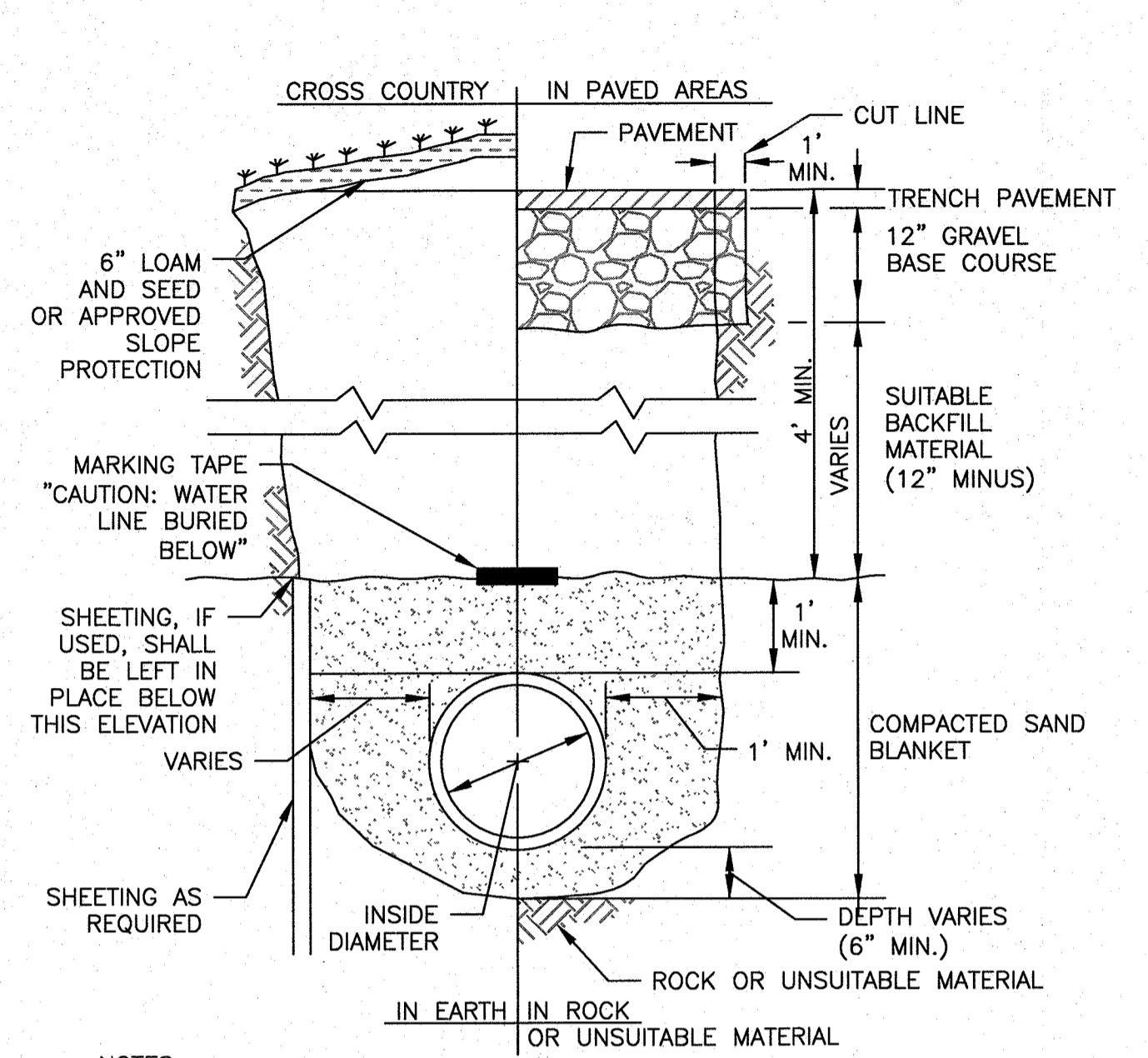


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FILE: Christopher2017					
SHEET 7 OF 9					



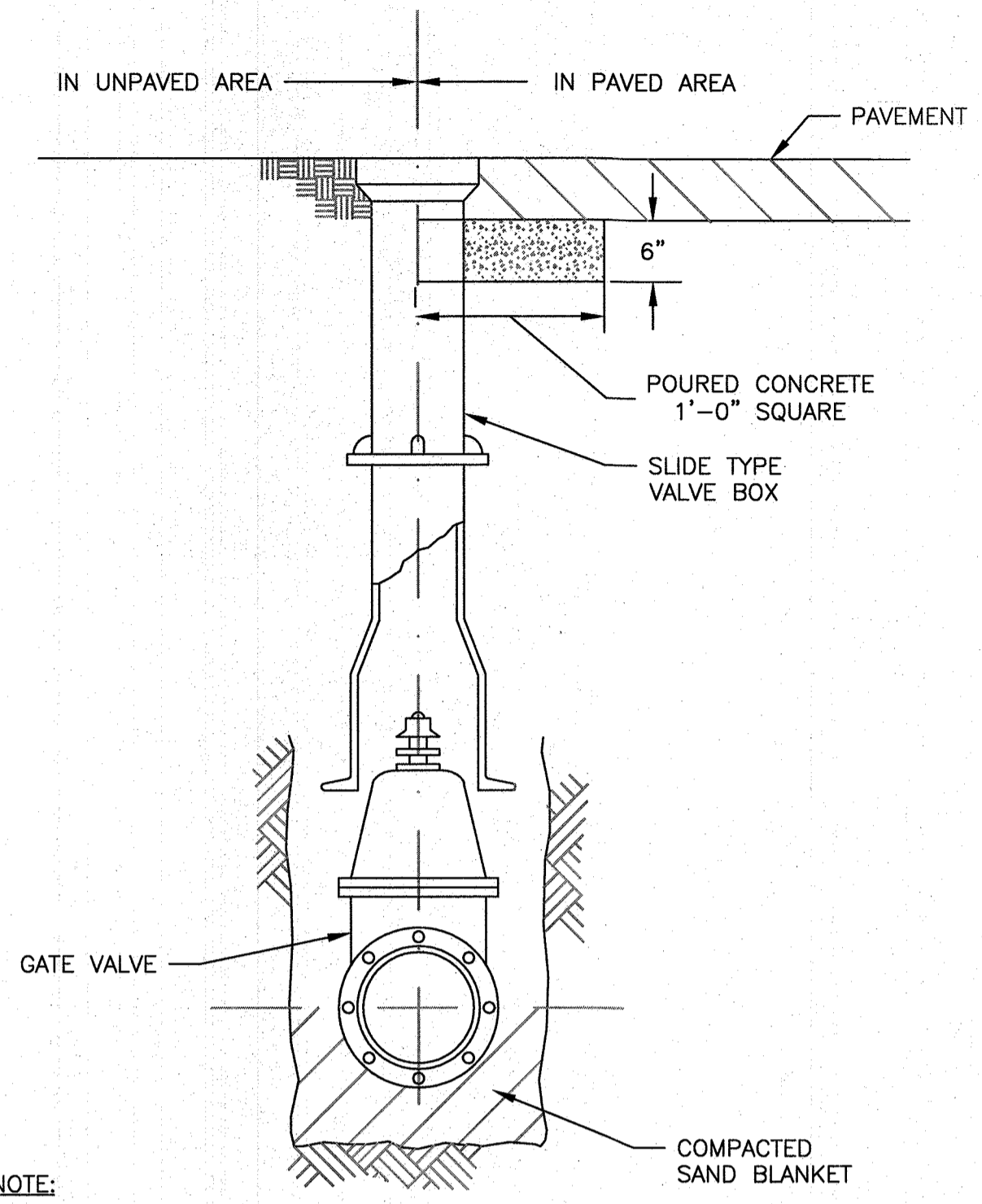
- NOTES:
1. TEMPORARY TRENCH PAVEMENT: 3" OF BINDER COURSE PAVEMENT. THE CONTRACTOR SHALL MAINTAIN THE TEMPORARY TRENCH PAVEMENT THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITY AT NO ADDITIONAL COST TO THE CONTRACT.
  2. 3" BINDER COURSE OF PAVEMENT SHALL BE PLACED AT THE END OF EACH WORK WEEK.
  3. ALL TRENCHES SHALL BE SAW CUT ONLY. NO OTHER METHOD OF CUTTING THE EXISTING PAVEMENT SHALL BE ACCEPTABLE. THIS WORK SHALL BE INCLUDED IN THE ASSOCIATED TRENCH ITEM.

TRENCH PAVEMENT DETAIL  
N.T.S.



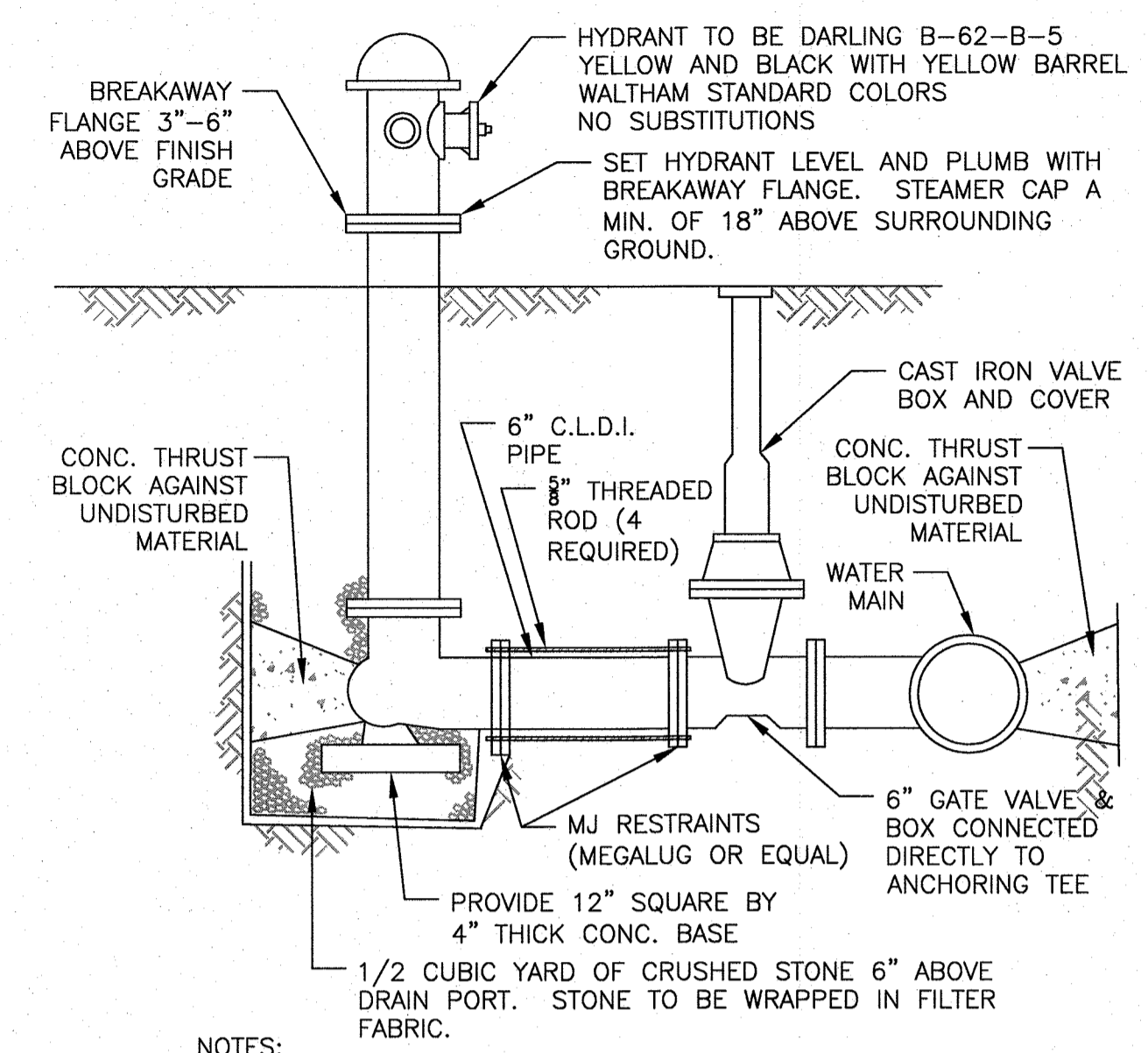
- NOTES:
1. WATER PIPE SHALL BE CLASS 56 C.L.D.I. PIPE - DOUBLE CEMENT LINED.
  2. ALL TRENCHES SHALL BE SAW CUT. NO OTHER METHOD OF CUTTING THE EXISTING PAVEMENT SHALL BE ACCEPTABLE.
  3. WATER MARKING TAPE SHALL BE PLACED A MINIMUM OF 1' ABOVE INSTALLED WATER PIPE.

TYPICAL WATER MAIN TRENCH  
N.T.S.



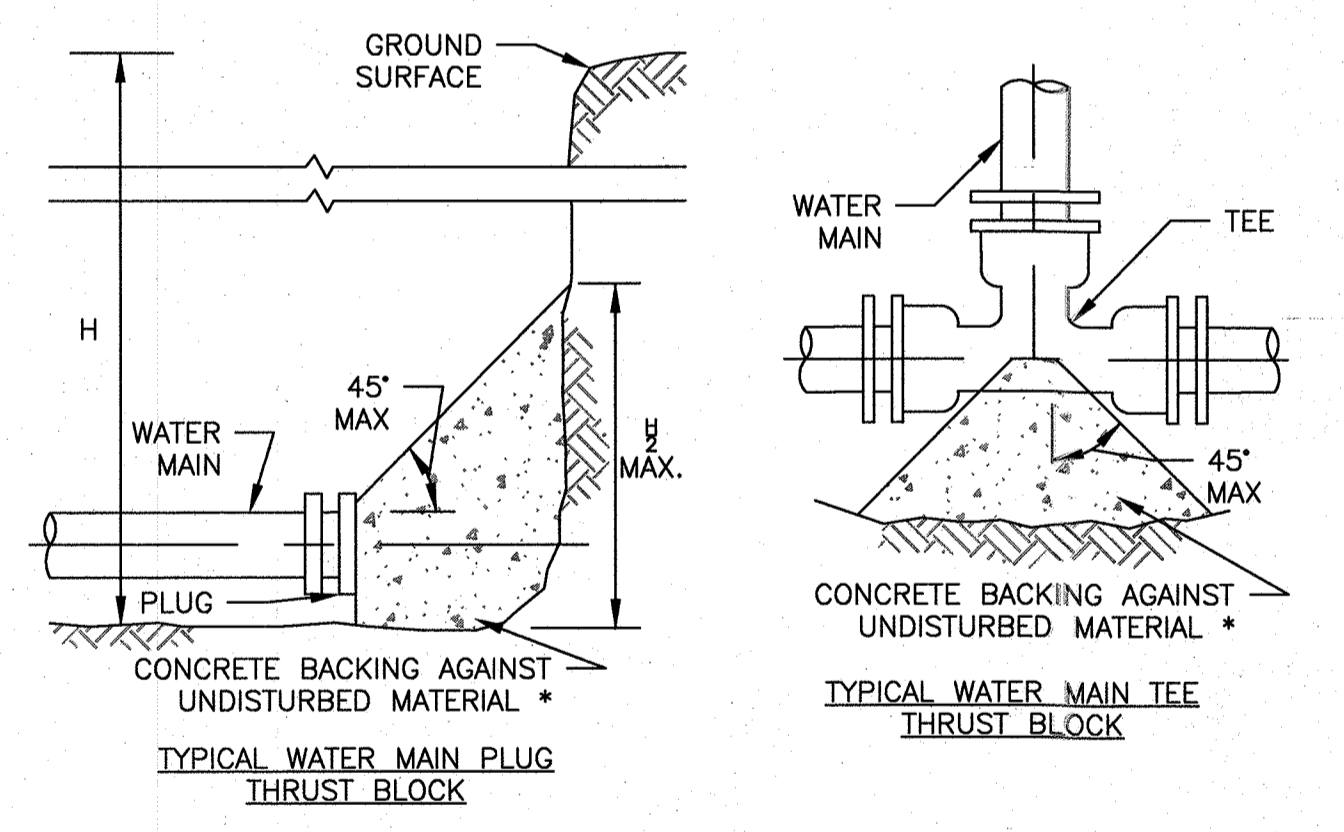
- NOTE:
1. ALL VALVES MUST OPEN RIGHT
  2. ALL VALVES TO BE MANUFACTURED BY MUELLER CO.

TYPICAL GATE VALVE DETAIL  
N.T.S.



- NOTES:
1. HYDRANT VALVE AND TEE SHALL BE RODDED TOGETHER.
  2. ALL VALVES OPEN RIGHT
  3. ALL HYDRANTS SHALL BE PLACED AT BACK OF SIDEWALK WHERE POSSIBLE WITH HYDRANT MARKER.

TYPICAL FIRE HYDRANT DETAIL  
N.T.S.



THRUST BLOCK BEARING AREAS FOR WATER PIPE

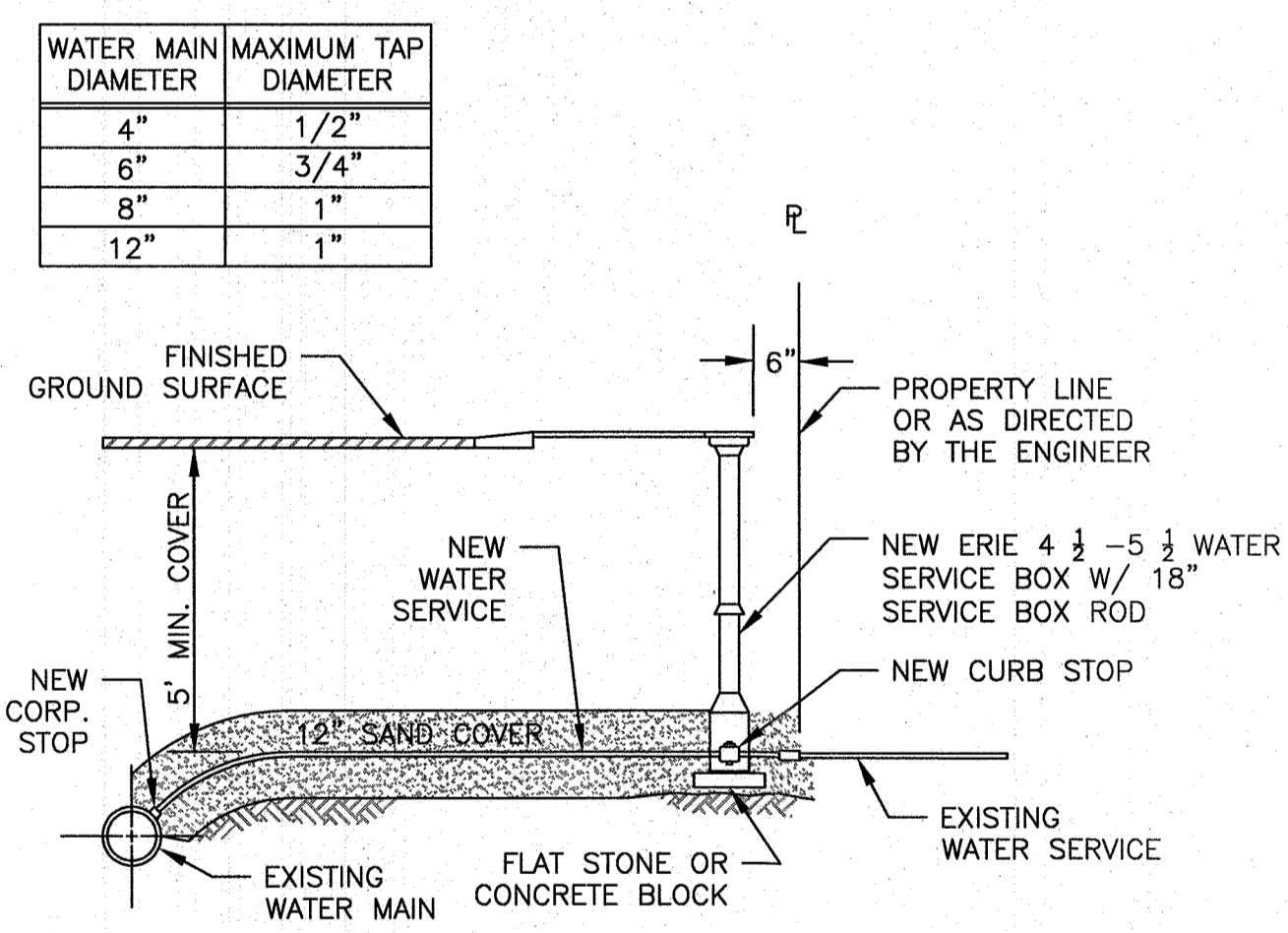
TABLE OF BEARING AREAS IN SQUARE FEET (SQ. FT.) AGAINST UNDISTURBED MATERIAL FOR WATER MAIN FITTINGS \*

SIZE OF MAIN (IN.)	90° BEND	TEES AND PLUGS	45° BEND
6	4	2.5	2
8	6	4	3
12	12	9	7
16	21	16	12

\* TYPE OF SOIL IS MEDIUM CLAYEY, 6 OR MORE BLOWS PER FOOT, OR LOOSE GRANULAR, 9 OR MORE BLOWS PER FOOT. SOIL CONDITIONS OTHER THAN THOSE GIVEN WILL REQUIRE LARGER BEARING AREAS.

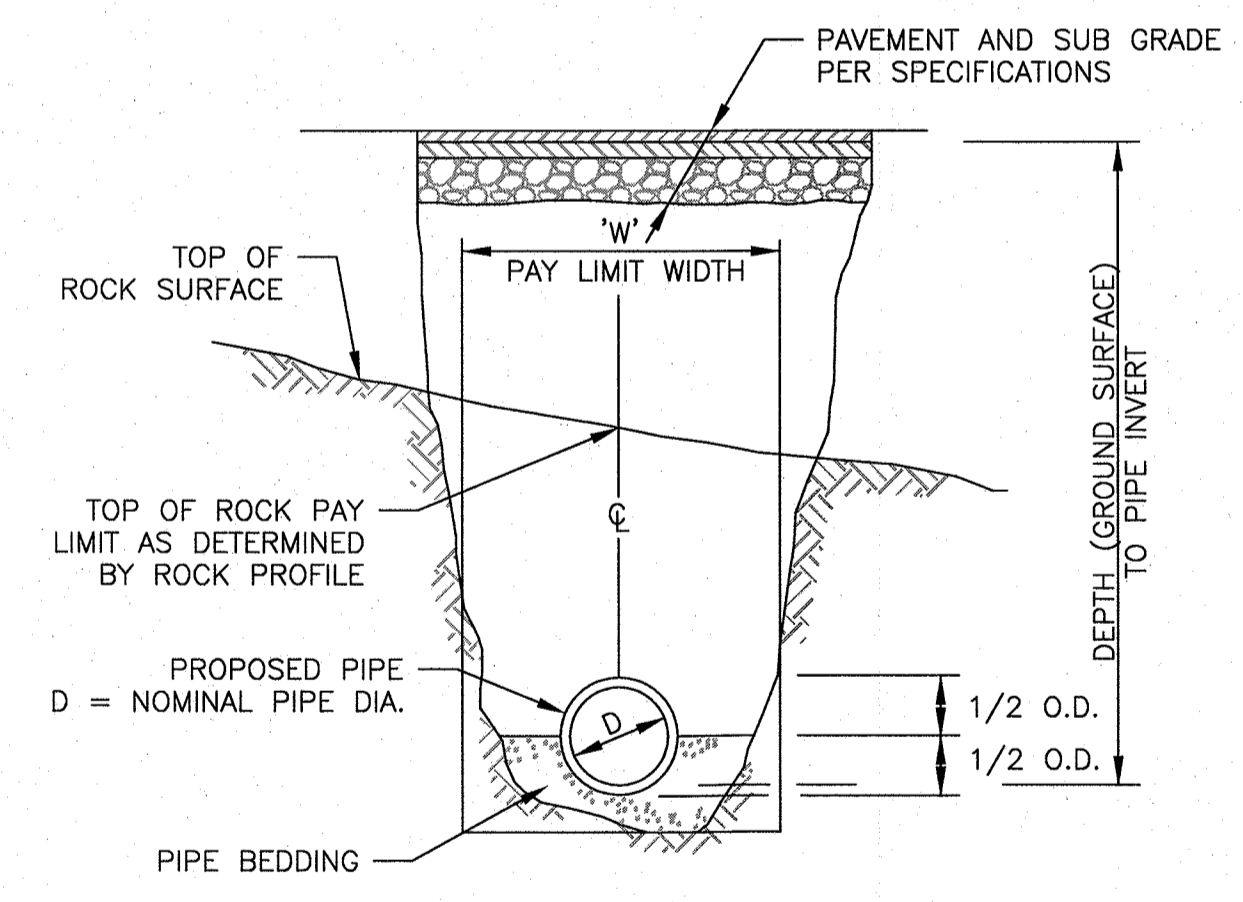
- NOTES:
1. FOR FITTINGS WITH LESS THAN 45° DEFLECTION, USE BEARING AREAS FOR 45° BEND.
  2. BEARING AREAS BASED ON HORIZONTAL PASSIVE SOIL PRESSURE OF 2000 POUNDS PER SQUARE FOOT (PSF) AND INTERNAL WATER PRESSURE OF 150 POUNDS PER SQUARE INCH GAUGE (PSIG). JOINTS SHALL NOT BE ENCASED IN CONCRETE. BEARING AREAS MAY BE DISREGARDED FOR TRENCHES IN ROCK WHERE THE TOP OF THE ROCK FACE IS AT OR ABOVE THE CROWN OF THE PIPE. HOWEVER, CONCRETE BACKING SHALL BE PLACED BETWEEN THE PIPE AND THE ROCK FACE.
  3. ALL FITTINGS AND VALVES SHALL BE DUCTILE IRON MECHANICAL JOINT AND RESTRAINED WITH MJ RESTRAINTS (MEGALUG OR EQUAL).
  4. WATER MAINS SHALL BE C.L.D.I. CLASS 52 - DOUBLE CEMENT LINED.

TYPICAL THRUST BLOCK DETAIL  
N.T.S.



- 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 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.
  3. WHERE GATE BOX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO OPERATE VALVE WITH WRENCH.
  4. REMOVE AND DISPOSE OF EXISTING PIPE AND GATE BOX.

TYPICAL WATER SERVICE  
N.T.S.

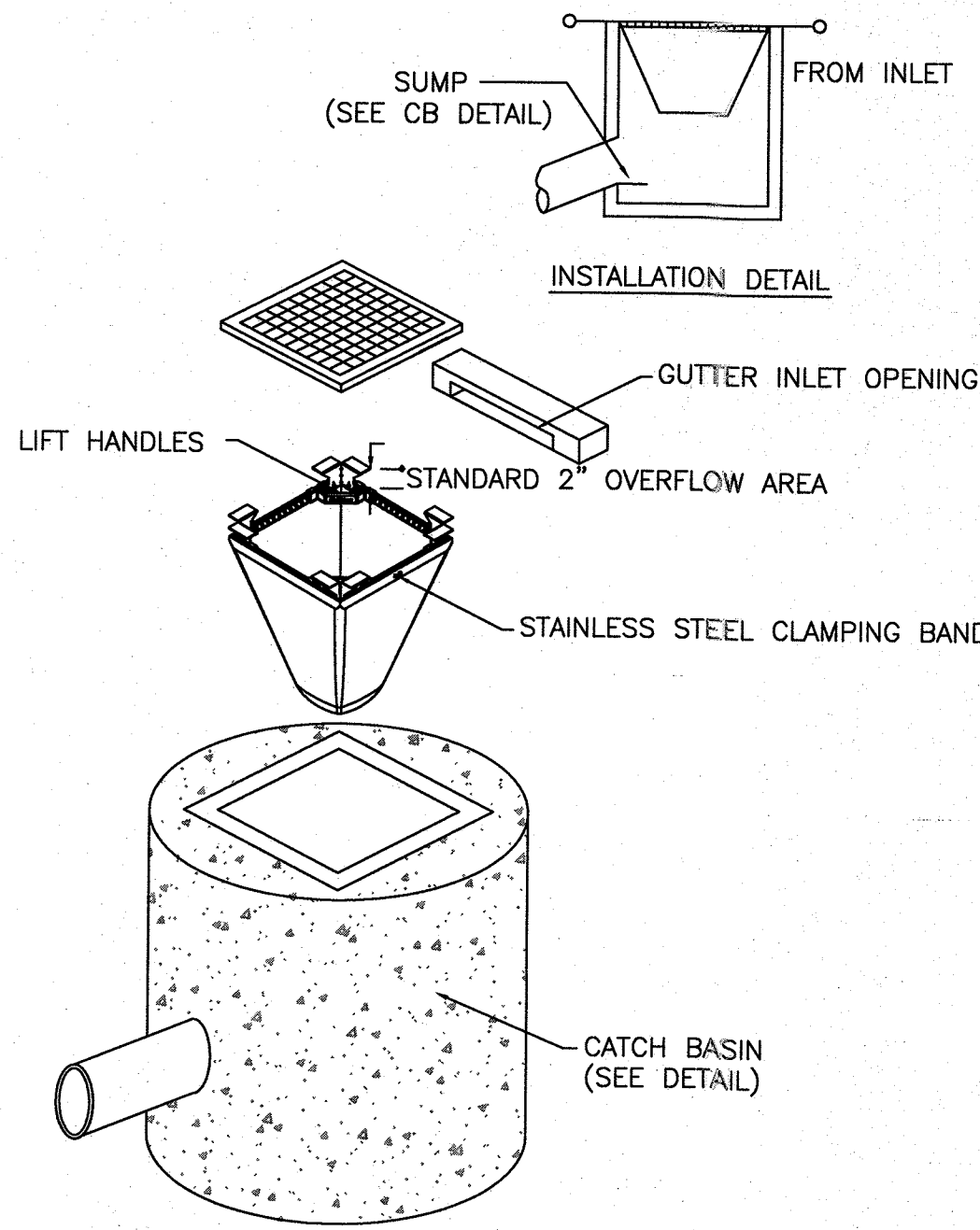


MAXIMUM PAYMENT FOR ROCK EXCAVATION CHART

DEPTH FROM GROUND SURFACE TO INVERT OF PIPE	PAY WIDTH "W" NOMINAL PIPE DIA. "D"	
	D < 24"	D > 24"
DEPTH ≤ 12'	5'-0"	D+3'-0"
12' < DEPTH ≤ 20'	7'-0"	D+5'-0"
DEPTH > 20'	9'-0"	D+7'-0"

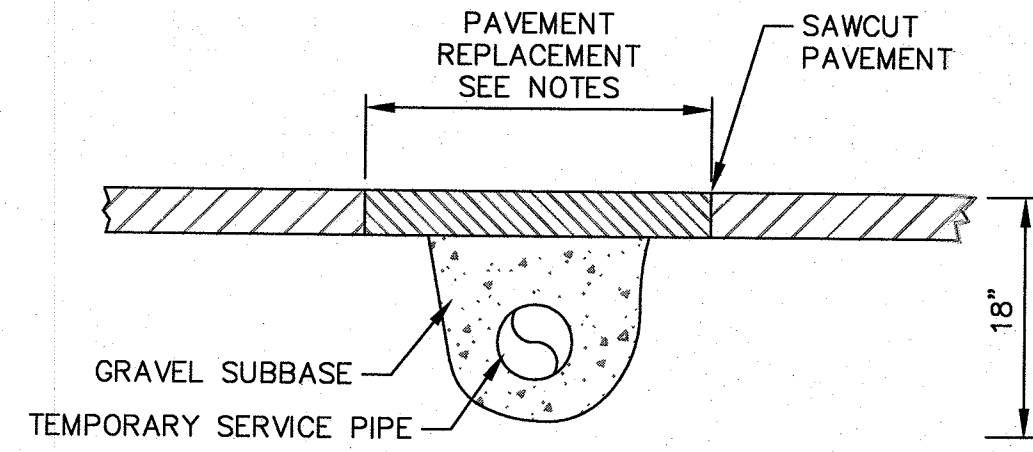
- NOTE:
1. THE MAXIMUM PAY LIMIT FOR ROCK REMOVAL OUTSIDE OF UTILITY STRUCTURES SHALL BE WITHIN A VERTICAL LINE OFFSET OF ONE FOOT (1') OUTSIDE THE WIDEST DIMENSION OF THE STRUCTURE OR SHALL BE THE MAXIMUM CONNECTING TRENCH WIDTH, WHICHEVER IS GREATER.

TYPICAL PAY LIMITS FOR ROCK EXCAVATION DETAIL  
N.T.S.



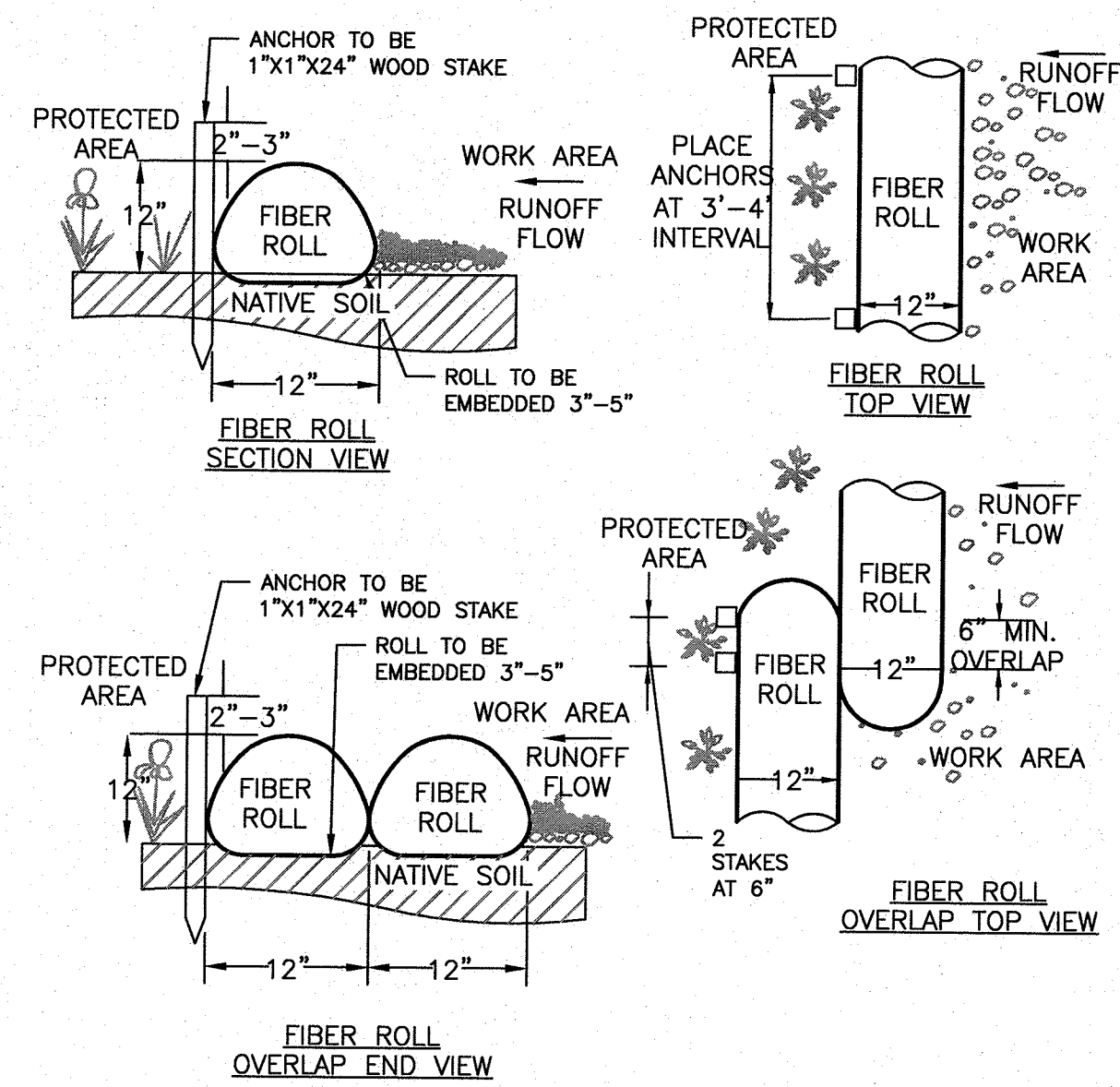
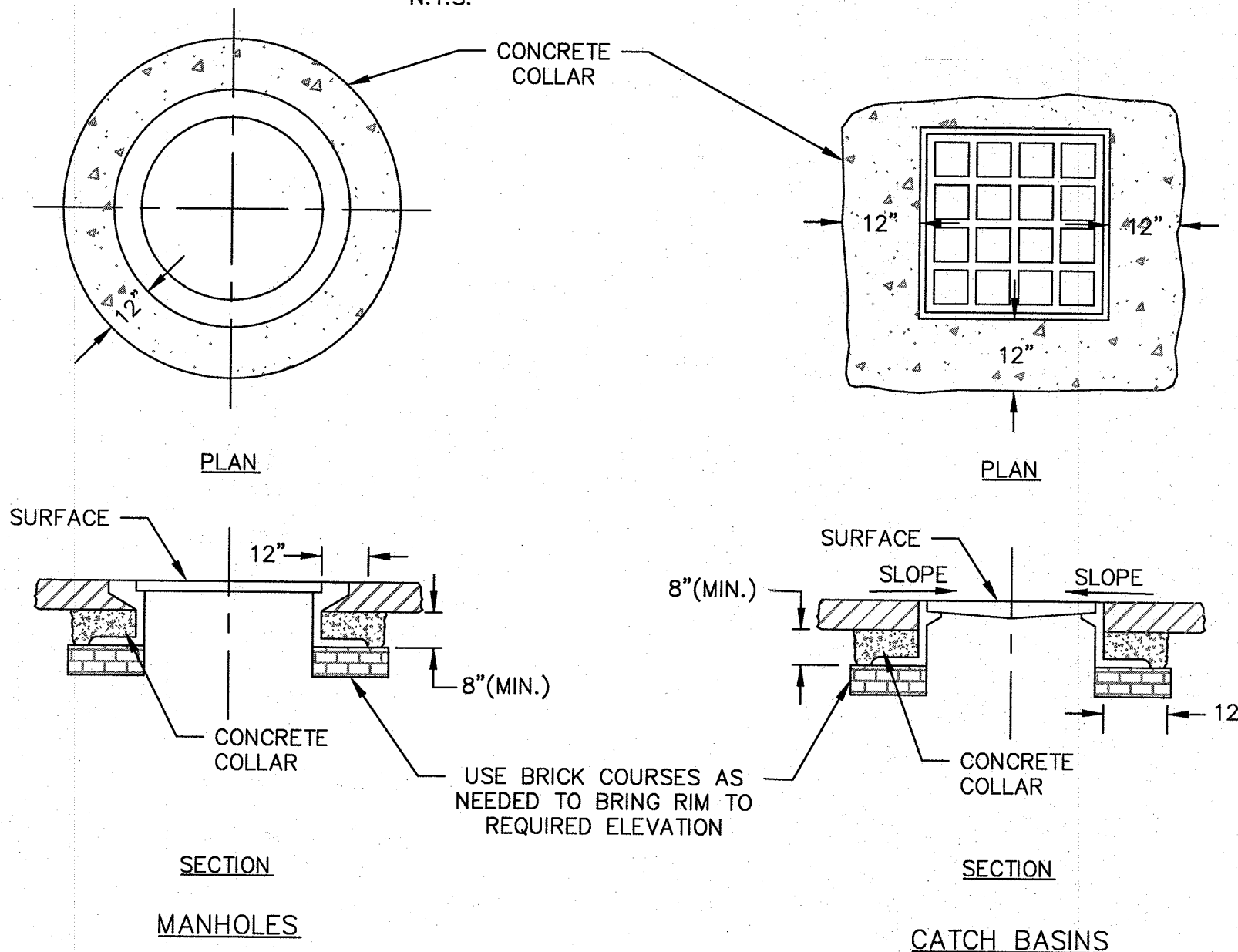
NOTE:  
 1. SILTSACKS SHALL BE FLEXSTORM CATCH-IT OR APPROVED EQUAL.  
 2. SILTSACKS SHALL BE INSTALLED IN ALL CATCH BASIN UNTIL DRAINAGE AREA HAS BEEN FULLY STABILIZED.

CATCH BASIN SILT SACK DETAIL  
 N.T.S.

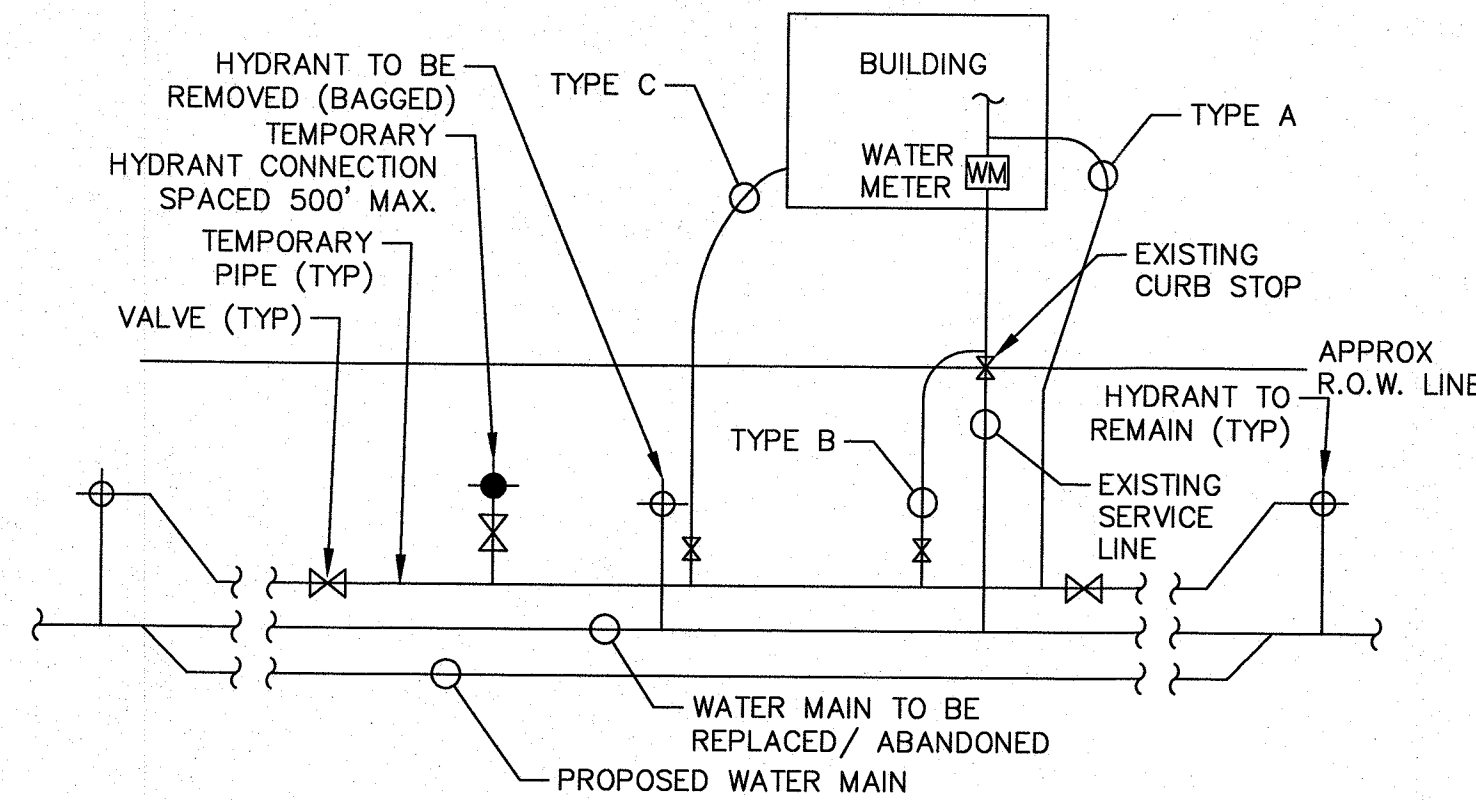


NOTES:  
 1. TEMPORARY PAVEMENT 2" THICK. PERMANENT PAVEMENT 4" PLACED IN TWO (2) LIFTS - 2" BASE, 2" TOP.  
 2. COLD PATCH MAY BE USED FOR TEMPORARY TRENCH PAVING AT THE DISCRETION OF THE ENGINEER.  
 3. ALL TRENCHES SHALL BE SAW CUT, SANDED AND SEALED.

TEMPORARY SERVICE PIPE CROSSING DETAIL IN ROADWAY  
 N.T.S.

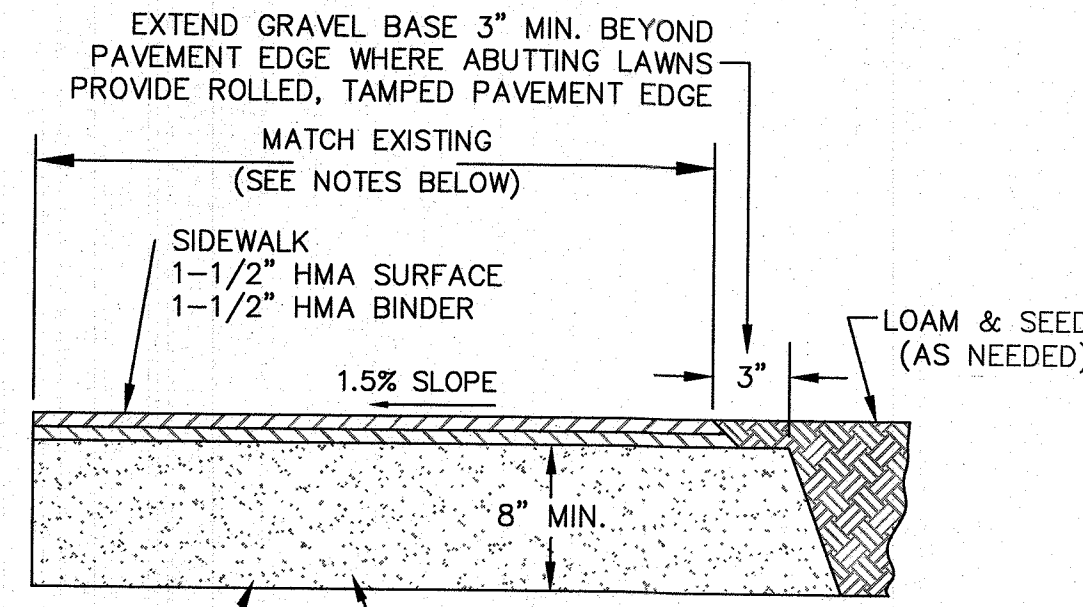


EROSION CONTROL FIBER ROLL  
 N.T.S.



CONNECTION TYPE A - TEMPORARY SERVICE WITH METER REMOVED  
 CONNECTION TYPE B - TEMPORARY SERVICE AT EXISTING CURB STOP  
 CONNECTION TYPE C - TEMPORARY SERVICE AT OTHER SUITABLE LOCATION

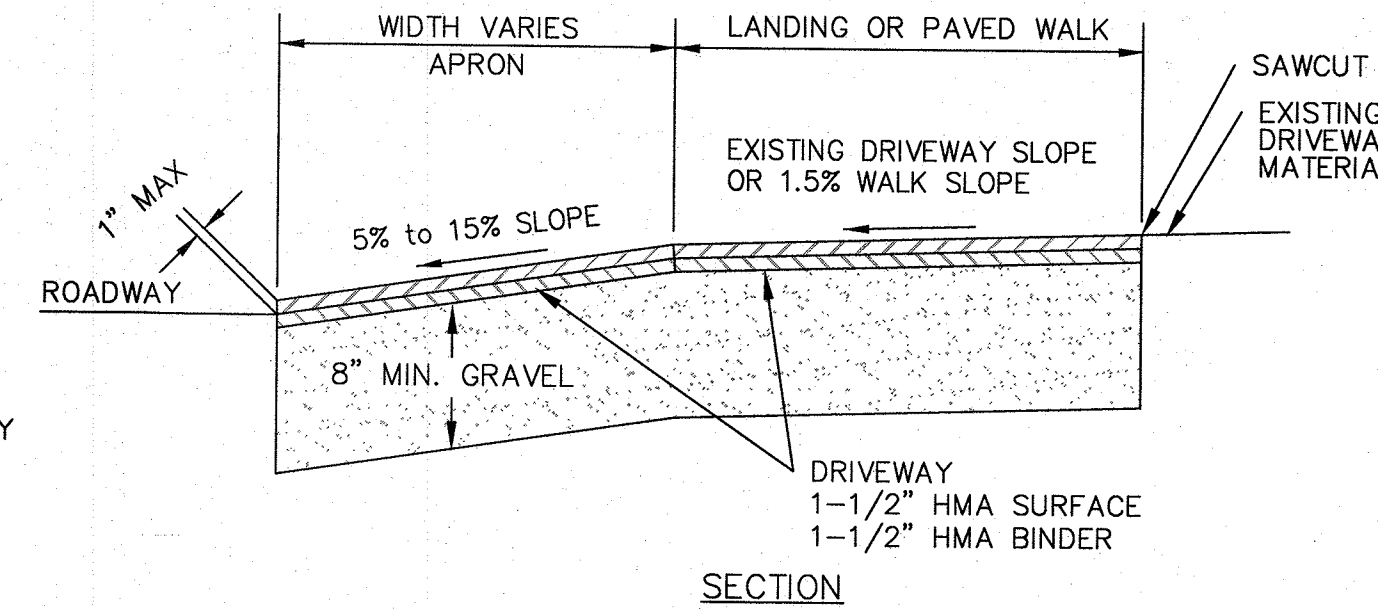
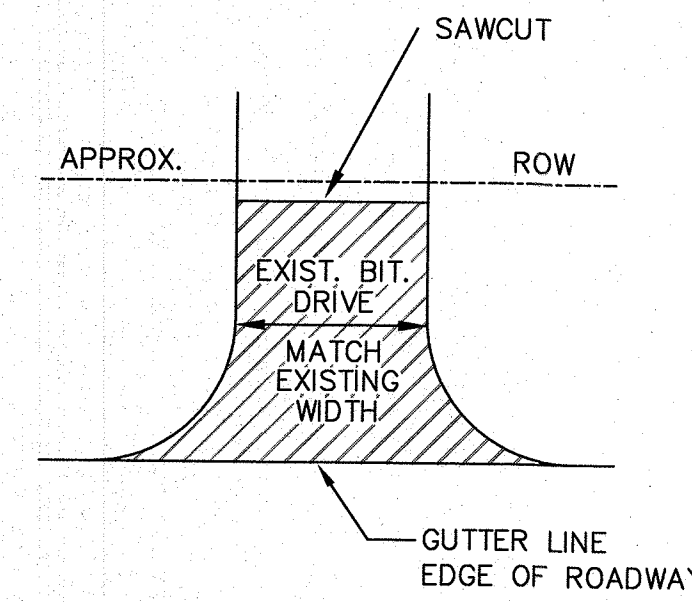
DETAILS FOR RAISING CASTINGS AND VALVE BOXES  
 N.T.S.



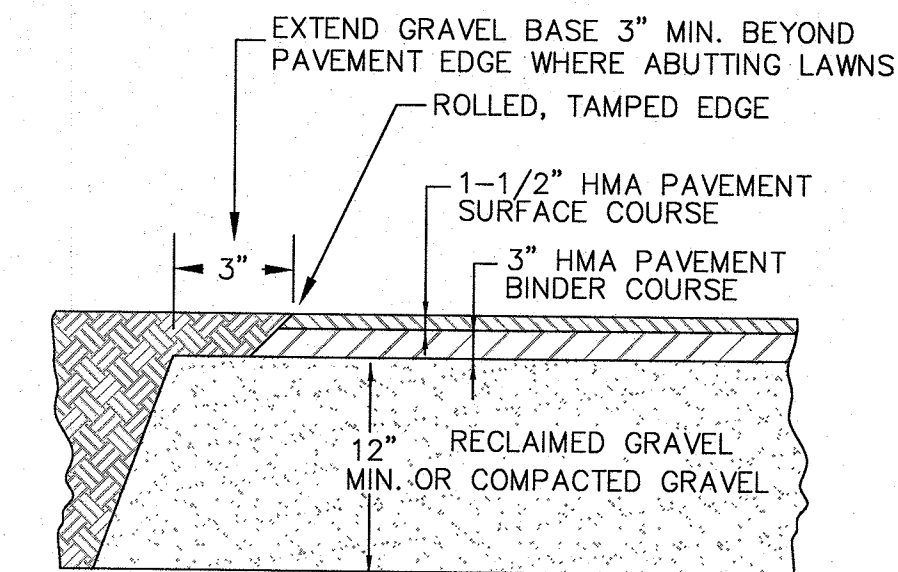
REMOVE EXIST. SUB-BASE IF UNSUITABLE AND REPLACE W/GRAVEL OR RECLAIMED MATERIAL AS DETERMINED IN THE FIELD.

SIDWALK DETAIL  
 N.T.S.

NOTES:  
 1. GRAVEL IN AREAS OF EXISTING SIDEWALKS WHICH ARE BEING REPAIRED OR REPLACED IN THE SAME LOCATION SHALL BE REGRADED AND SUPPLEMENTAL GRAVEL ADDED. ADDITIONAL GRAVEL REQUIRED SHALL BE INCLUDED IN THE CONTRACT.  
 2. PROVIDE JOINT SEALANT WHERE PAVING ABUTS CURBING, WALLS, STEPS, CASTINGS, ETC.

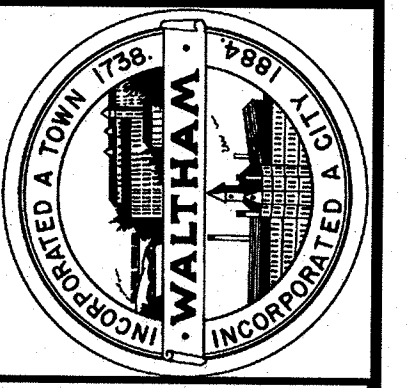


TYPICAL DRIVEWAY  
 N.T.S.

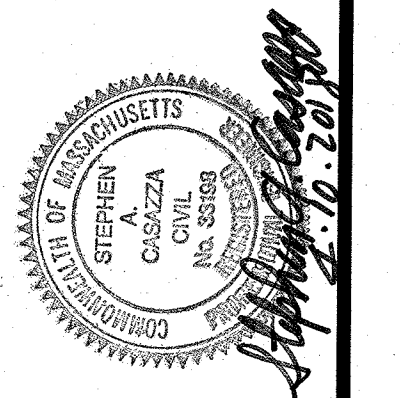


NOTES:  
 1. PRIOR TO COMPLETING FINAL GRADING OF THE RECLAIMED BASE COURSE THE ENGINEER SHALL REVIEW GRADES TO DETERMINE THAT SUFFICIENT DRAINAGE PATTERNS AND CURB REVEAL ARE MAINTAINED. IF GRADES NEED TO BE ADJUSTED, THE CONTRACTOR SHALL REGRADE AS DIRECTED. THE COST TO PERFORM THIS WORK SHALL BE INCLUDED IN THE CONTRACT PRICE.  
 2. PROVIDE JOINT SEALANT WHERE PAVING ABUTS CURBING, WALLS, STEPS, CASTINGS, ETC.

TYPICAL PAVEMENT SECTION  
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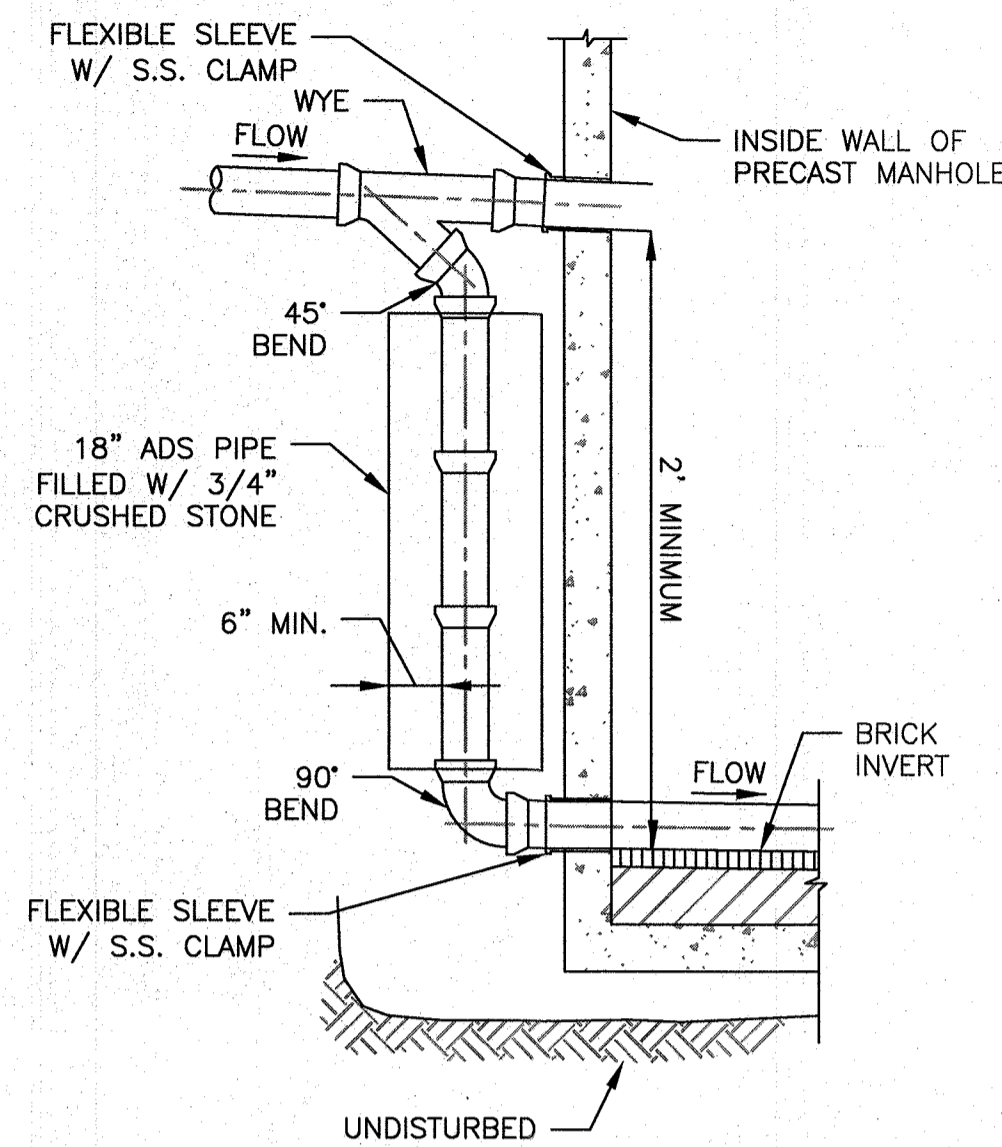
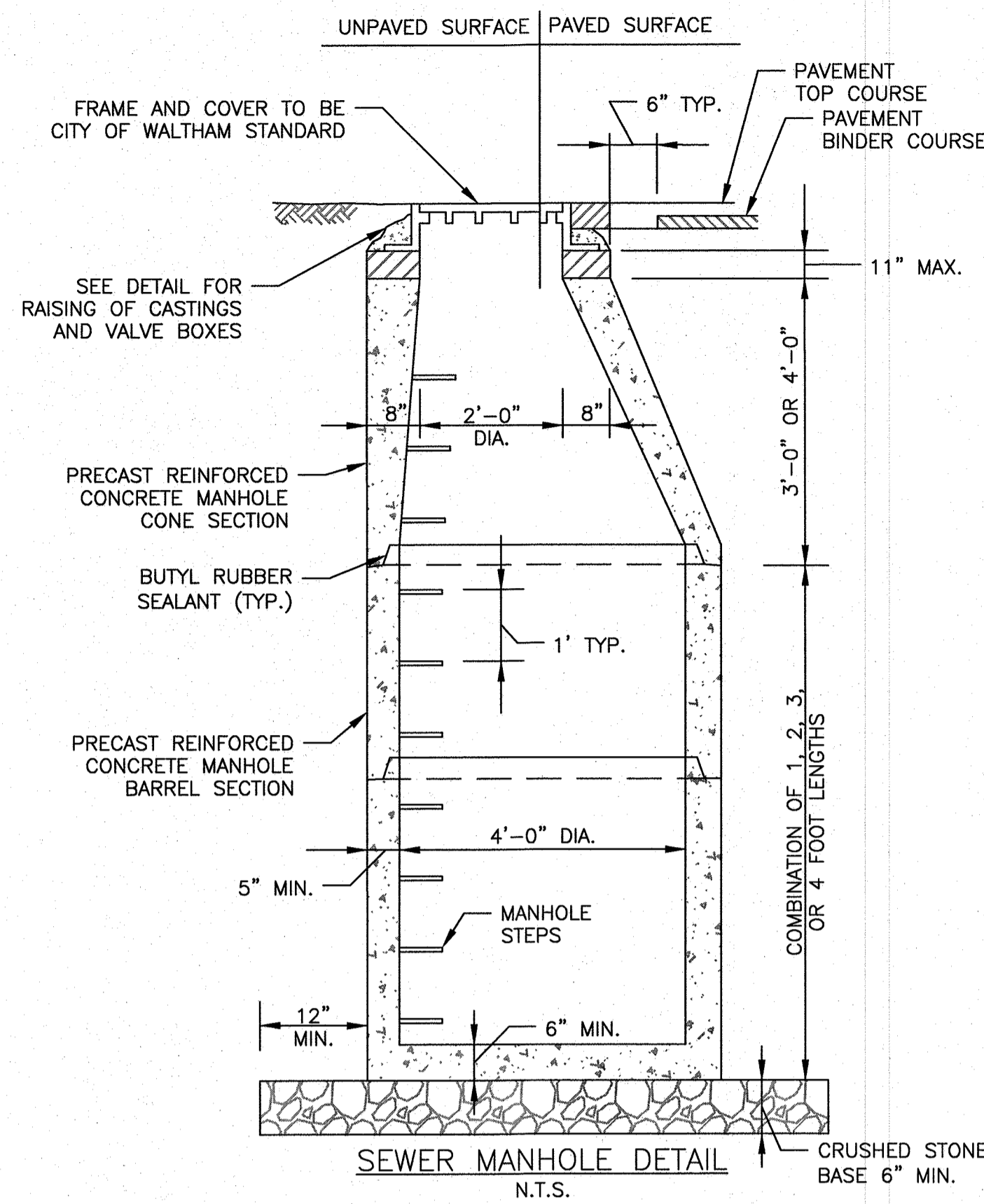
CITY OF WALTHAM ENGINEERING DEPARTMENT  
 CHRISTOPHER ROAD  
 WATER MAIN REPLACEMENT DETAILS II



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FILE: Christopher2017	DESIGNED BY: SBH
SHEET 8 OF 9	REVIEWED BY: IAM
	APPROVED BY: SAC

**PROPOSED SEWER SYSTEM NOTES:**

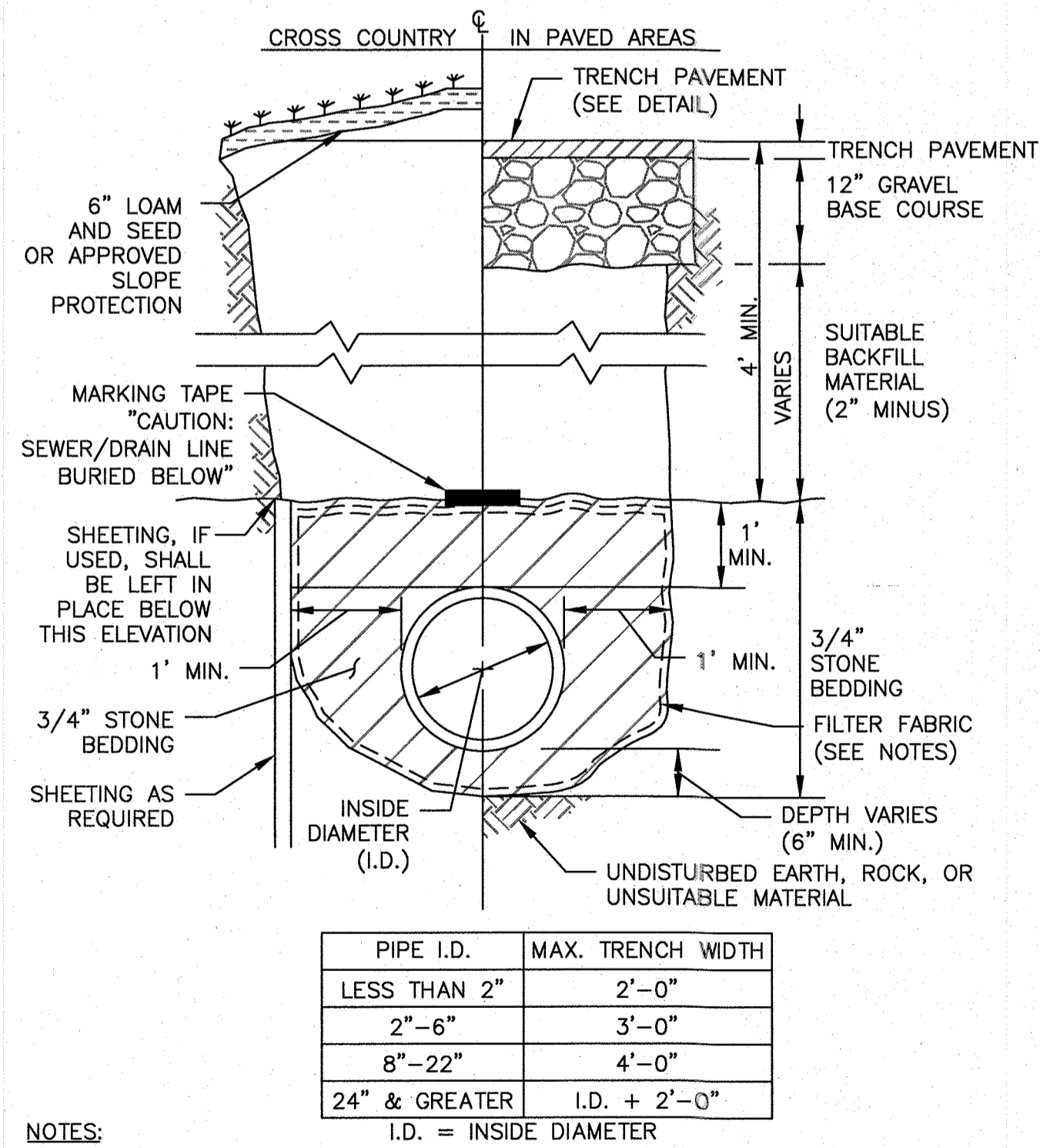
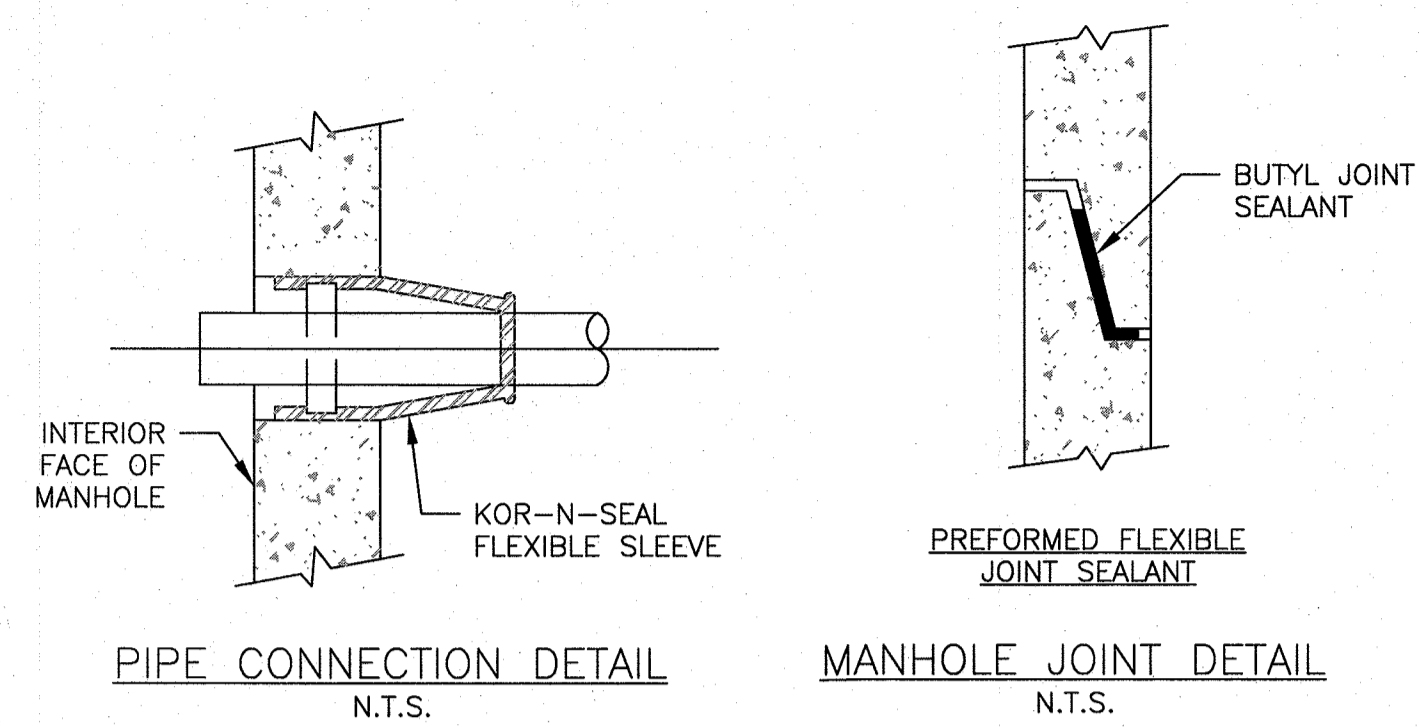
- ALL NEW GRAVITY SANITARY SEWER PIPE AND FITTINGS SHALL BE PVC PIPE, SDR-35 IN CONFORMANCE WITH A.S.T.M. D-3034.
- ALL FITTINGS, ADAPTERS, COUPLINGS, CAPS, ETC. ASSOCIATED WITH THE PROPOSED SEWER SYSTEM SHALL BE INCLUDED FOR PAYMENT IN THE ASSOCIATED PIPE ITEM.
- ALL PRECAST MANHOLES SHALL CONFORM TO THE LATEST A.S.T.M. C478 SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE SECTIONS. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I. REINFORCING STEEL SHALL CONFORM TO THE LATEST A.S.T.M. A185 SPECIFICATIONS. ALL STRUCTURES SHALL BE CAPABLE OF SUPPORTING H-20 LOADING.
- MANHOLES SHALL HAVE A BRICK PAVED SHELF AND INVERT CONSTRUCTED TO CONFORM TO THE SIZE OF PIPE AND FLOW AT CHANGES OF DIRECTION. THE INVERT SHALL BE LAID OUT IN CURVES OF THE LONGEST RADIUS POSSIBLE TANGENT TO THE CENTERLINE OF THE SEWER PIPES. SHELVES SHALL BE CONSTRUCTED TO THE ELEVATION OF THE HIGHEST PIPE CROWN AND SLOPED TOWARD THE FLOWING TROUGH CHANNEL. UNDERLAY OF INVERT AND SHELF SHALL CONSIST OF 3,000 P.S.I. CONCRETE FILL AND BRICK MASONRY. BRICK INVERT SHALL BE SLOPED TO PROVIDE SMOOTH TRANSITION FROM INLET TO OUTLET.
- WHEN THE DIFFERENCE IN ELEVATION BETWEEN INLET AND OUTLET PIPES IS GREATER THAN 2 FEET AT MANHOLES, INSIDE OR OUTSIDE DROPS ARE REQUIRED.
- WHEN A MANHOLE DEPTH IS LESS THAN 6 FEET, A REINFORCED CONCRETE SLAB COVER MAY BE USED IN LIEU OF CONE SECTION. REINFORCED CONCRETE SLAB SHALL HAVE AN ECCENTRIC ENTRANCE OPENING AND CAPABLE OF SUPPORTING H-20 LOADING.
- CONCRETE COLLARS TO BE CLASS 3,000 P.S.I. CEMENT CONCRETE MASONRY.
- ALL MANHOLES SHALL BE DAMPPROOFED WITH BITUMASTIC COATING.
- PROPOSED PIPE AND MANHOLE LOCATIONS ARE APPROXIMATE AND MAY BE ALTERED IN THE FIELD TO BEST SUIT FIELD CONDITIONS AT THE DISCRETION OF THE ENGINEER.
- WHEN THE HORIZONTAL SEPARATION BETWEEN THE NEW SEWER AND/OR THE EXISTING, NEW, OR RELOCATED WATER MAIN IS LESS THAN 10 FEET AND WHEN THE VERTICAL SEPARATION IS LESS THAN 18 INCHES, BOTH PIPES SHALL BE ENCASED IN CONCRETE FOR A MINIMUM OF 10 FEET. THE PROPOSED PIPE SHALL BE LAID IN SUCH A MANNER AS TO KEEP THE PIPE JOINTS AT A MAXIMUM DISTANCE FROM THE WATER MAIN.
- TERMINUS MANHOLES SHALL BE LOCATED NO MORE THAN 5 FEET UPSTREAM OF THE LAST SERVICE CONNECTION ON THE LINE.
- NEW SEWER SERVICE CONNECTIONS SHALL BE INSTALLED SUCH THAT THEY ARE BENEATH THE WATER MAIN AND WATER SERVICE CONNECTIONS WHILE MAINTAINING 5 FEET MINIMUM DEPTH OF COVER.
- COMMONWEALTH OF MASSACHUSETTS DEP STANDARDS REQUIRE 10 FEET HORIZONTAL SEPARATION BETWEEN SEWER AND WATER MAINS, HOWEVER, SHOULD CONSTRUCTION OPERATIONS REVEAL OR EXPOSE A WATER MAIN RUNNING APPROXIMATELY PARALLEL AND LESS THAN 10 FEET HORIZONTALLY FROM THE PROPOSED SEWER INSTALLATION AND WHERE IT IS NOT PRACTICABLE TO RELOCATE THE SEWER THE FOLLOWING METHODS OF PROTECTION MUST BE EMPLOYED. THE SEWER SHALL BE LAID IN A SEPARATE TRENCH AND THE ELEVATION OF THE TOP (CROWN) OF THE SEWER SHALL BE AT LEAST 18 INCHES BELOW THE INVERT (BOTTOM) OF THE WATER MAIN. IF THIS SEPARATION CANNOT BE ACHIEVED, THE WATER MAIN SHALL BE ENCASED IN CONCRETE.



**NOTES:**

- EXTERIOR DROP MANHOLE INSIDE DIAMETER IS TO BE 4 FEET UNLESS OTHERWISE NOTED.
- DIMENSIONS AND CONSTRUCTION OF EXTERIOR DROP MANHOLE TO MATCH TYPICAL PRECAST MANHOLE EXCEPT FOR VARIATIONS AS SHOWN.
- TRENCH BACKFILL TO BE PLACED AND COMPACTED CONCURRENTLY TO SAME ELEVATION ON EACH SIDE OF DROP CONNECTION.

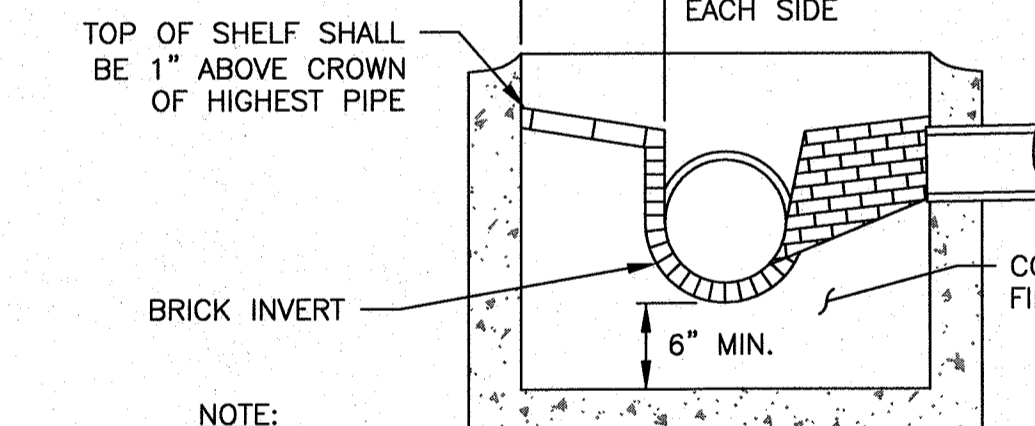
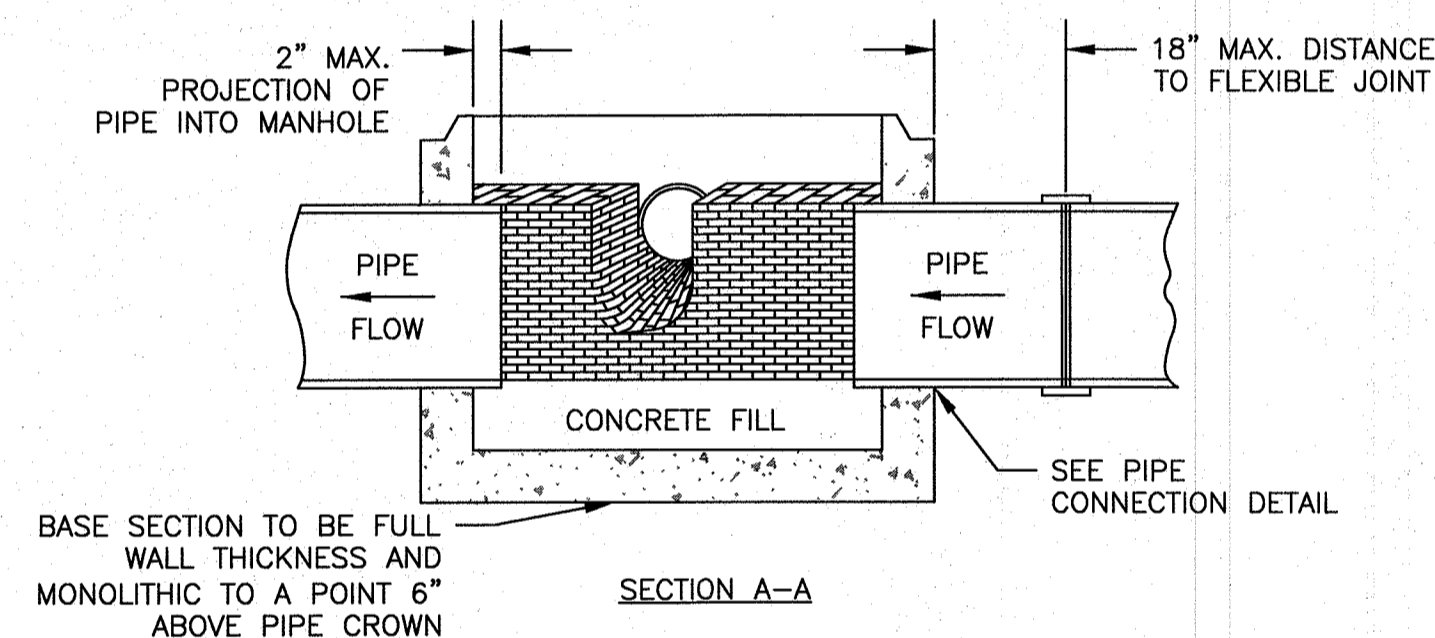
**EXTERIOR DROP MANHOLE CONNECTION DETAIL**  
N.T.S.



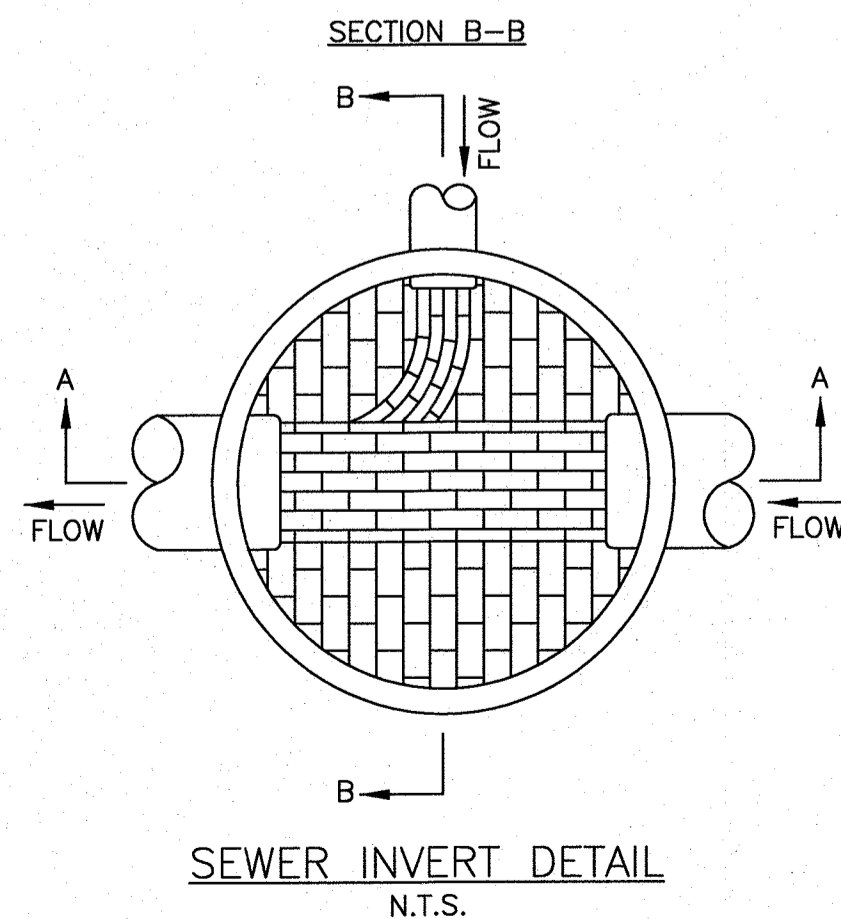
PIPE I.D.	MAX. TRENCH WIDTH
LESS THAN 2"	2'-0"
2"-6"	3'-0"
8"-22"	4'-0"
24" & GREATER	I.D. + 2'-0"

- NOTES:**
- REFER TO TABLE FOR PAYMENT OF ALL ITEMS IN WHICH PAY TRENCH WIDTH IS A VARIABLE FOR CALCULATIONS OF QUANTITIES EXCEPT FOR TRENCH PAVEMENT.
  - REFER TO TRENCH PAVEMENT DETAIL FOR PAVEMENT PAYMENT WIDTHS.
  - 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.

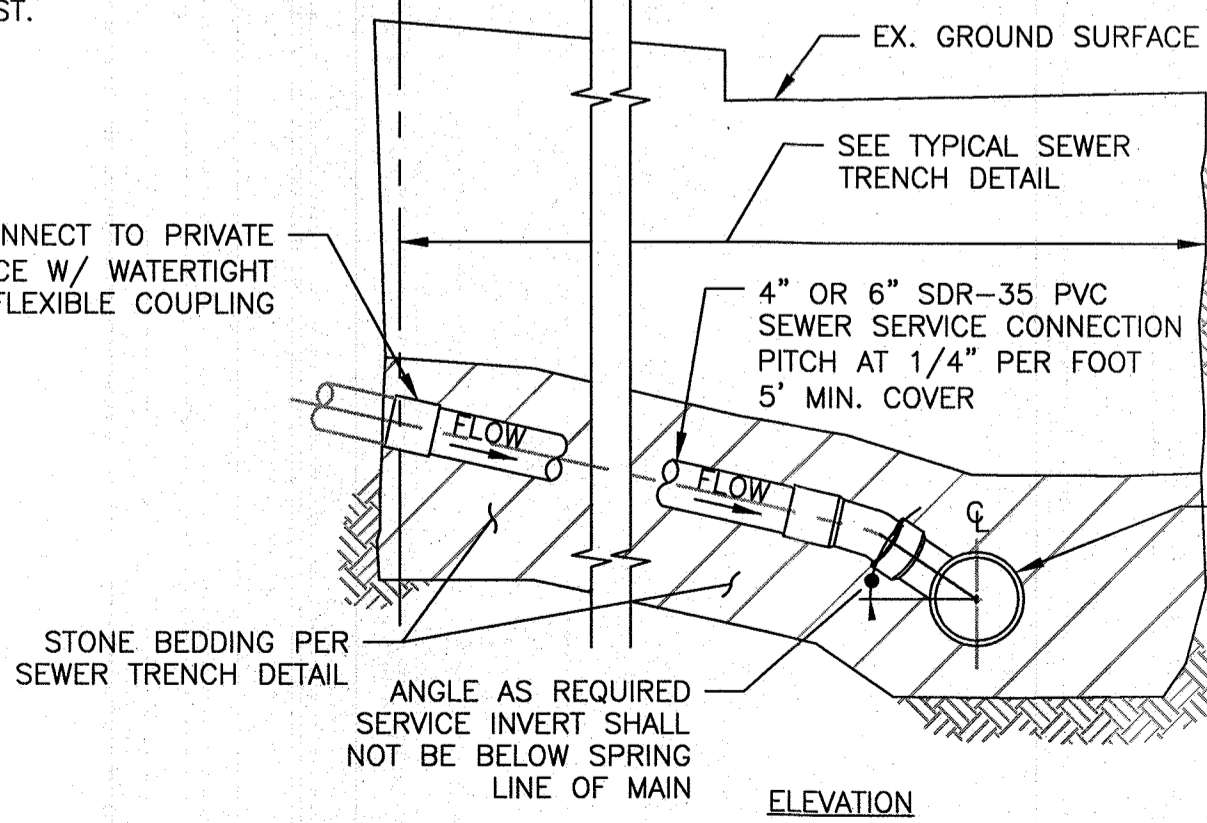
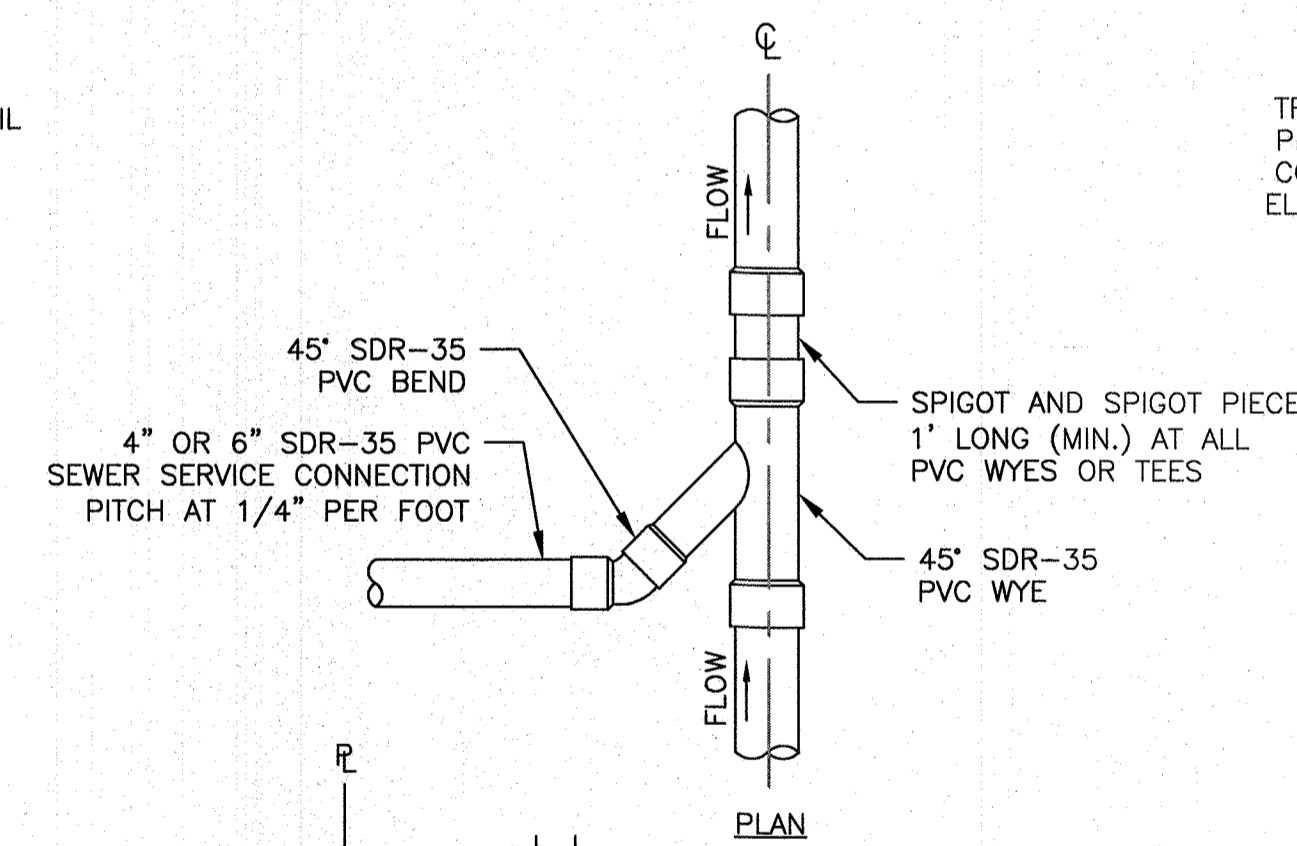
**TYPICAL SEWER / DRAIN TRENCH**  
N.T.S.



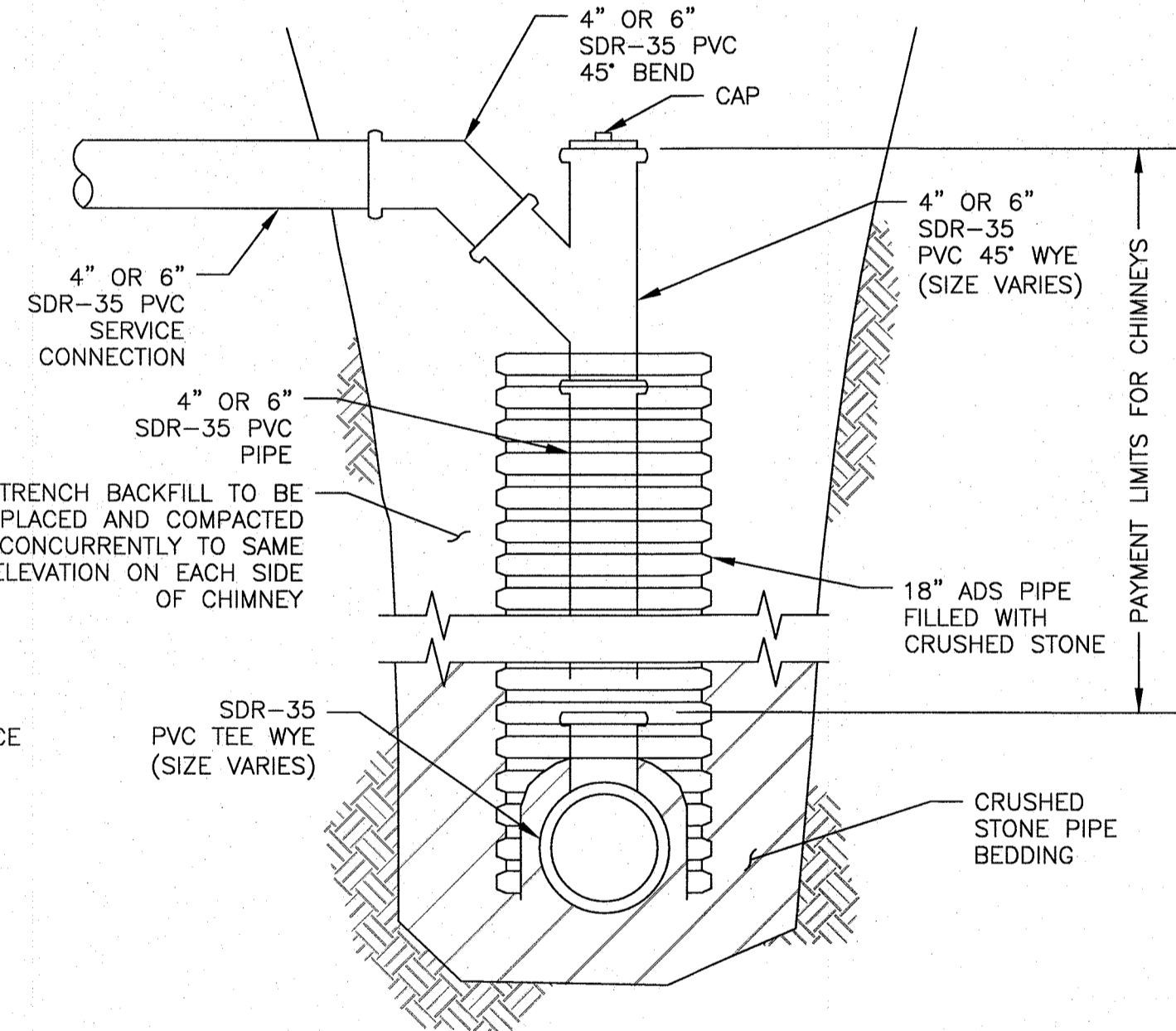
- NOTE:**
- CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT. INVERT BRICKS SHALL BE LAID ON EDGE.
  - INVERT AND SHELF TO BE PLACED AFTER SUCCESSFUL VACUUM TEST.



**SEWER INVERT DETAIL**  
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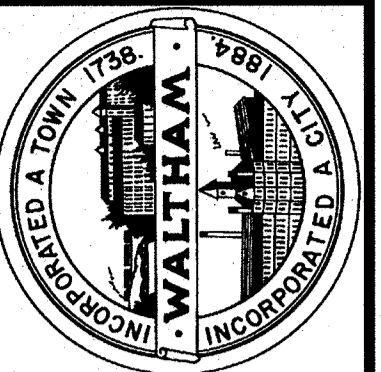


**SEWER SERVICE DETAIL**  
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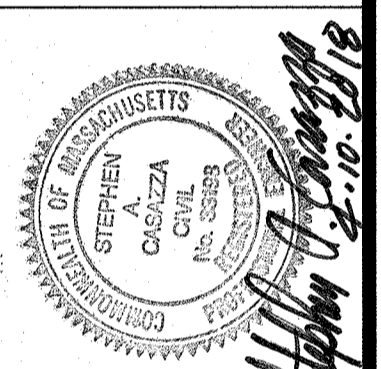


- NOTES:**
- CHIMNEYS TO BE PAID FOR AT THE PRICE PER VERTICAL PIPE UNDER THE CORRESPONDING PIPE ITEM.

**SEWER SERVICE CHIMNEY CONNECTION DETAIL**  
N.T.S.



**CITY OF WALTHAM ENGINEERING DEPARTMENT**  
**CHRISTOPHER ROAD**  
**WATER MAIN REPLACEMENT DETAILS III**



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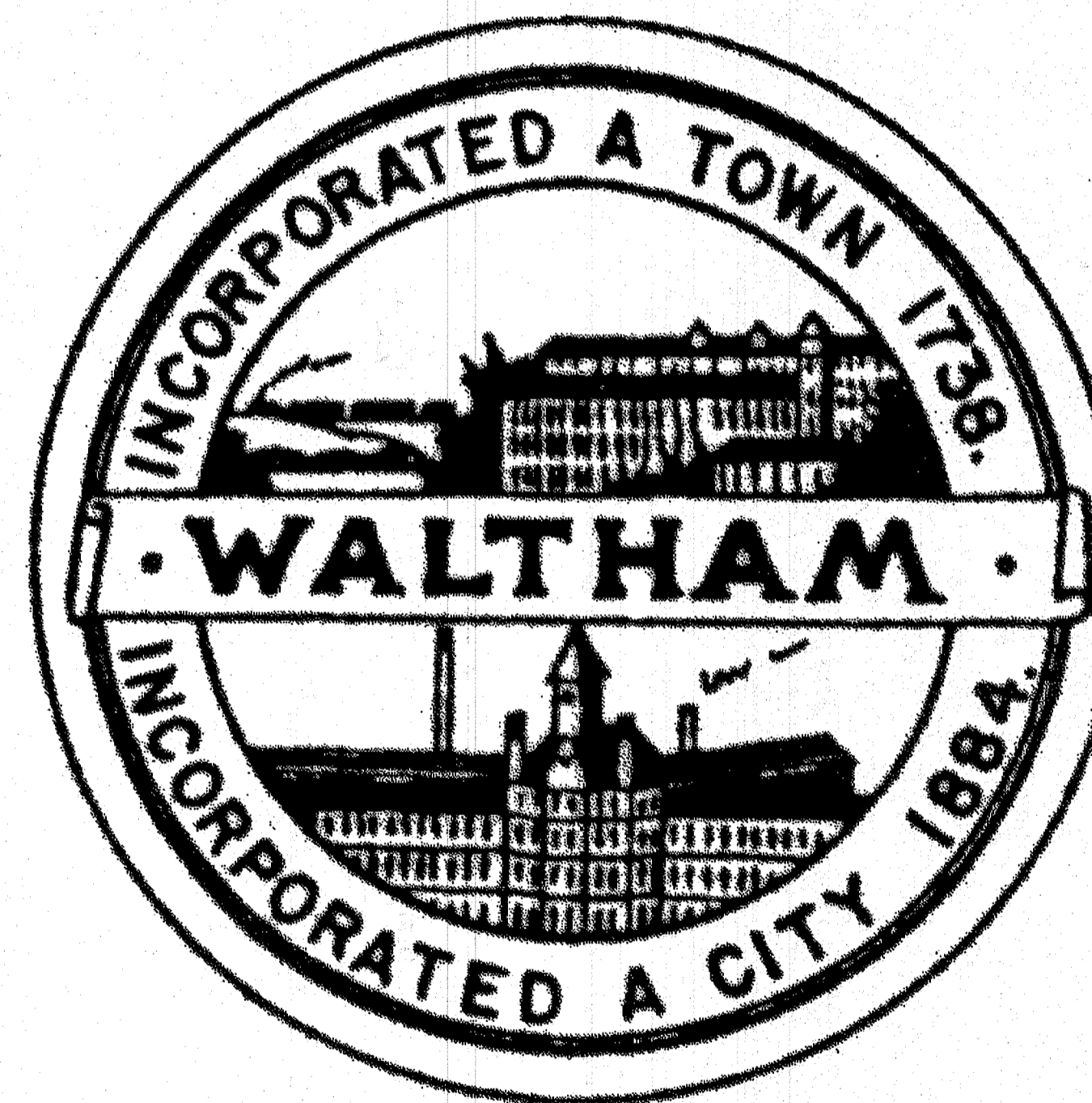
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SCALE: N.T.S.  
FILE: Christopher2017  
SHEET 9 OF 9

# PLANS SHOWING MONTCLAIR AVENUE WATER MAIN REPLACEMENT CITY OF WALTHAM, MASSACHUSETTS

APRIL 2018

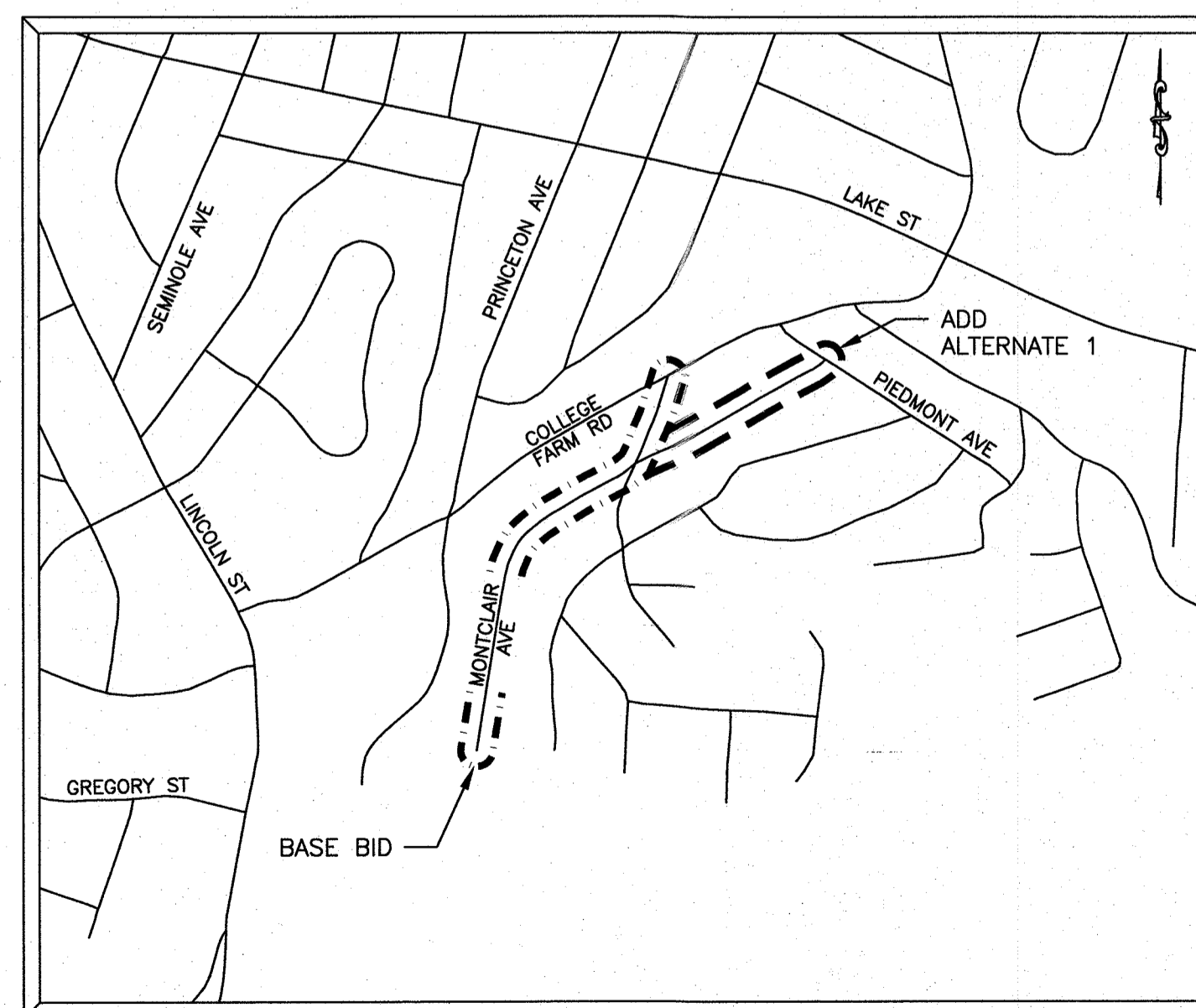
PREPARED BY  
CITY OF WALTHAM  
ENGINEERING DEPARTMENT  
119 SCHOOL STREET  
WALTHAM, MA 02451

CITY ENGINEER  
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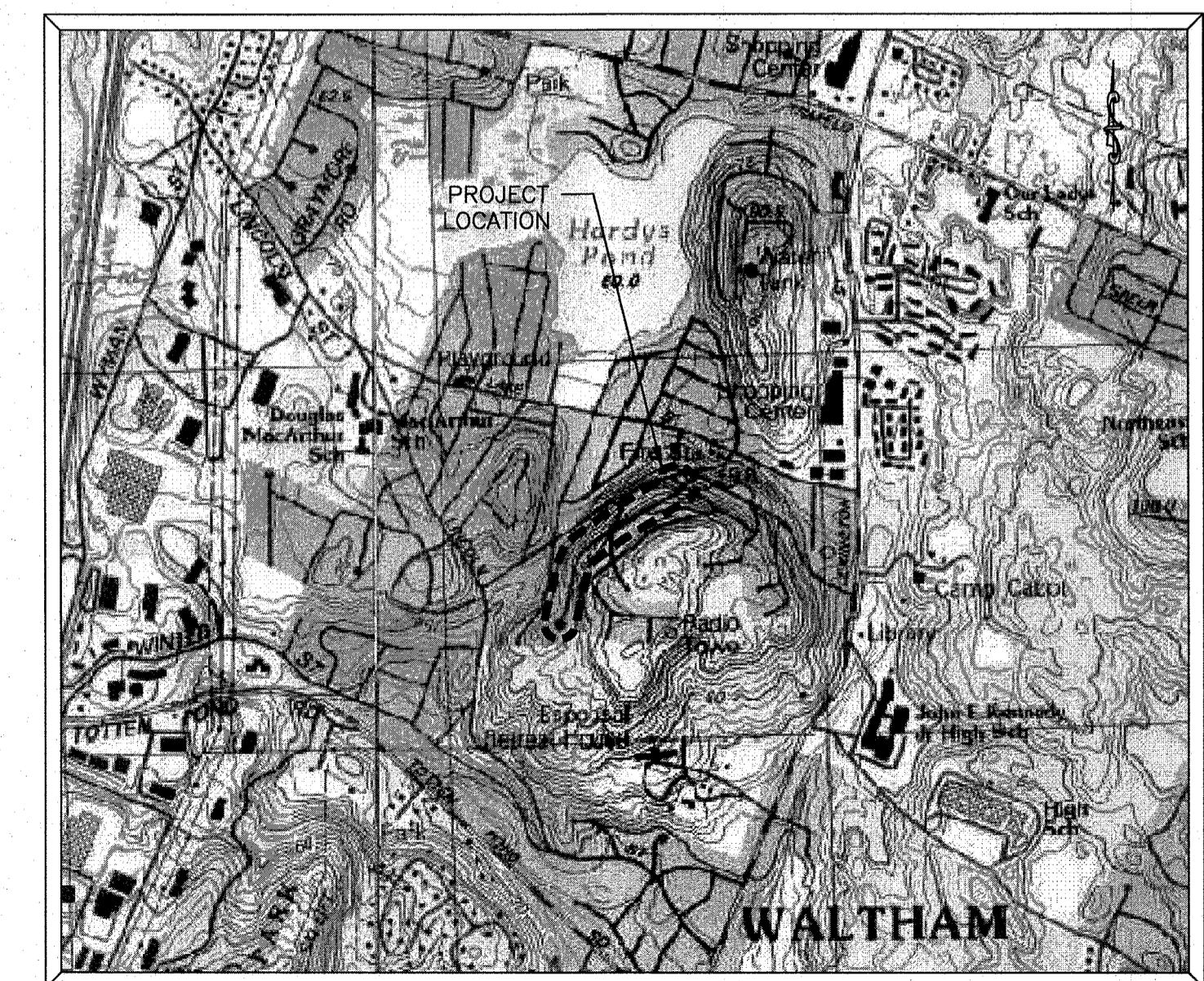


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PHASING PLAN  
N.T.S.



LOCUS MAP  
N.T.S.

### ABBREVIATIONS:

AC	ASBESTOS CONCRETE	MB	MAIL BOX
ALT	ALTERNATE	MH	MANHOLE
APPROX	APPROXIMATE	MIN	MINIMUM
BIT	BITUMINOUS CONCRETE	N/F	NOW OR FORMERLY
BM	BENCHMARK	NTS	NOT TO SCALE
BLDG	BUILDING	OHW	OVERHEAD WIRE
BOL	BOLLARD	PC	POINT OF CURVATURE
BND	BOUND	PROP	PROPOSED OR PROPERTY
BRK	BRICK	PT	POINT OF TANGENCY
CL	CENTERLINE	PVC	POLYVINYL CHLORIDE
CB	CATCH BASIN	R	RIM OR RADIUS
CI	CAST IRON	RCP	REINFORCED
CLDI	CEMENT LINED	CONCRETE PIPE	CONCRETE PIPE
	DUCTILE IRON	REC	RECORD
CLF	CHAIN LINK FENCE	RET WALL	RETAINING WALL
CMP	CORRUGATED METAL PIPE	ROW	RIGHT OF WAY
CONC	CONCRETE	SB	STONE BOUND
DH	DRILL HOLE	SMH	SEWER MANHOLE
DI	DUCTILE IRON	SN	SIGN
DMH	DRAIN MANHOLE	STA	STATION
DRV	DRIVEWAY	SW	SIDEWALK
EMH	ELECTRIC MANHOLE	TBM	TEMPORARY BENCHMARK
EX	EXISTING	TEMP	TEMPORARY
FNC	FENCE	TMH	TELEPHONE MANHOLE
FND	FOUND	TOC	TOP OF CURB
EOP	EDGE OF PAVEMENT	TP	TEST PIT
GG	GAS GATE	TYP	TYPICAL
GIP	GALVANIZED IRON PIPE	UNK	UNKNOWN
GRAV	GRAVEL	UP	UTILITY POLE
GS	GAS SERVICE	VC	VITRIFIED CLAY
HOR	HORIZONTAL	VERT	VERTICAL
HSE	HOUSE	W/	WITH
HYD	HYDRANT	WG	WATER GATE
HW	HEADWALL	WMH	WATER MANHOLE
INV	INVERT	WSO	WATER SHUTOFF
LP	LIGHT POLE		

### EXISTING LEGEND

[Symbol]	EX. CATCH BASIN OR DRAIN INLET
[Symbol]	EX. DRAIN MANHOLE
[Symbol]	EX. SEWER MANHOLE
[Symbol]	EX. HYDRANT
[Symbol]	EX. WATER GATE VALVE
[Symbol]	EX. WATER REDUCER
[Symbol]	EX. GAS GATE VALVE
[Symbol]	EX. UTILITY POLE
[Symbol]	BUILDING (APPROX. LOCATION)
[Symbol]	APPROX. LOT LINE
---195---	EXISTING 10' CONTOURS
---195---	EXISTING 2' CONTOURS
—d—	EX. DRAIN LINE
—s—	EX. SEWER LINE
—w—	EX. WATER LINE
—OHW—	EX. OVERHEAD WIRE
—G—	EX. GAS LINE

### PROPOSED LEGEND

[Symbol]	PROP. WATER HYDRANT
[Symbol]	PROP. WATER GATE VALVE
[Symbol]	PROP. WATER REDUCER
[Symbol]	PROP. CAP UTILITY LINE
[Symbol]	PROP. TEMP. HYDRANT
[Symbol]	PROP. WATER LINE
[Symbol]	PROP. TEMP. WATER BYPASS
[Symbol]	PROP. SEWER SERVICE
[Symbol]	PROP. WATER SERVICE

### GENERAL NOTES:

1. PLAN INFORMATION IS BASED UPON INFORMATION OBTAINED FROM THE CITY OF WALTHAM'S GIS DATA AND IS APPROXIMATE ONLY.
2. BUILDING LOCATIONS, AS SHOWN, ARE APPROXIMATE AND FOR REFERENCE PURPOSES ONLY.
3. DISTANCES SHALL NOT BE SCALED OFF OF THESE PLANS.
4. PRIOR TO THE PROPOSED CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE ENGINEER AND CITY WITH A CONSTRUCTION SCHEDULE DELINEATING THE SEQUENCE OF WORK AND ESTIMATED TIME OF COMPLETION FOR EACH SEGMENT OF WORK.
5. THE CONTRACTOR SHALL SUBMIT A TRAFFIC MANAGEMENT PLAN TO THE CITY FOR REVIEW AND APPROVAL. THE PLAN SHALL BE IN COMPLIANCE WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT) AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
6. THE CONTRACTOR SHALL MAINTAIN CONTINUOUS TRAFFIC FLOW DURING CONSTRUCTION SATISFACTORILY TO THE THE ENGINEER AND THE CITY OF WALTHAM.
7. ALL CONSTRUCTION SIGNING SHALL CONFORM TO THE REQUIREMENTS OF MASSDOT AND MUTCD.
8. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES, AND FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH ALL WORK INCLUDED UNDER THIS CONTRACT. THE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL SAFETY BARRIERS, WARNING FLASHERS, ETC., AS REQUIRED BY THE CONDUCT OF THE WORK FOR THE PROTECTION OF WORKERS AND NON-WORKERS ALIKE. THE CONTRACTORS ATTENTION IS DIRECTED TO OSHA REQUIREMENTS.
9. ALL CONSTRUCTION MATERIAL, DEBRIS, ASPHALT, SOIL, ETC. REMOVED FROM THE SITE SHALL BECOME PROPERTY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR TRANSPORTING AND DISPOSING ALL EXCESS MATERIALS IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITE RESTORATION AND CLEAN UP UPON COMPLETION OF THE PROJECT. DURING THE COURSE OF CONSTRUCTION, ANY DAMAGE BY THE CONTRACTOR TO FENCES, GUARDRAILS, PATHS, STAIRS, PAVEMENT, LANDSCAPING OR VEGETATION SHALL BE REPAIRED OR REPLACED AND RESTORED TO ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE CONTRACT. ANY REPLACEMENT FENCE AND/OR HANDRAILS MUST MATCH EXISTING.
11. TRENCH DEWATERING COSTS THROUGHOUT THE DURATION OF THE PROPOSED PROJECT SHALL BE INCLUDED IN THE APPLICABLE BID. A TRENCH DEWATERING PLAN SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.
12. ALL CASTINGS, GATE BOXES, HYDRANTS, LIGHT POLES, ETC. DAMAGED DURING CONSTRUCTION SHALL BE SUPPLIED AND REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETING ALL EXISTING PROPERTY MONUMENTATION THAT IS DISTURBED BY CONSTRUCTION OPERATIONS AT NO EXPENSE TO THE OWNER. THIS WORK IS TO BE DONE BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS. PROPERTY BOUNDS FOUND ARE SHOWN ON LAYOUT PLANS, THIS MAY NOT BE INCLUSIVE OF ALL BOUNDS THAT EXIST IN THE PROJECT AREA. IF ANY ADDITIONAL BOUNDS ARE FOUND, THE CONTRACTOR SHALL DOCUMENT THE LOCATION AND CONTACT THE ENGINEER.
14. THE CONTRACTOR SHALL TAKE SPECIAL CARE NOT TO DAMAGE TREES WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED.
15. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY AND COORDINATE SUPPORT WITH OWNERS OF UTILITY POLES WITHIN 10 FEET OF THE PROPOSED UTILITY PIPE CENTERLINE OR AS DIRECTED BY THE ENGINEER.
16. POLICE DETAILS SHALL BE COORDINATED BY THE CONTRACTOR.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING ANY DEBRIS, SEDIMENT, OR SILTY WATER FROM ENTERING ANY DRAINAGE SYSTEM DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR SHALL INSTALL TEMPORARY CATCH BASIN SILT SACKS AS REQUIRED BY THE ENGINEER.
18. CONSTRUCTION HOURS SHALL OCCUR BETWEEN THE HOURS OF 7:00 AM AND 5:00 PM, MONDAY THROUGH FRIDAY. WEEKEND WORK MUST BE APPROVED AT LEAST 48 HOURS IN ADVANCE BY THE CITY.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR THE COMPLETION OF THE WORK.

### STOCKPILED MATERIALS & EQUIPMENT NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING A LOCATION FOR STAGING AND STORING STOCKPILED MATERIALS AND EQUIPMENT.
2. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF LOCATION AND ANY PRIVATE AGREEMENTS AND ALL FEES THAT MAY BE ASSOCIATED WITH THE USE OF AN AREA FOR STORING STOCKPILED MATERIALS AND EQUIPMENT.
3. THE CITY OF WALTHAM IS NOT RESPONSIBLE FOR PROVIDING A LOCATION FOR STAGING OR THE STORING OF STOCKPILED MATERIALS AND EQUIPMENT.
4. MATERIALS SHALL NOT BE STOCKPILED WITHIN THE ROADWAY OR IN PUBLIC PARKING AREAS.
5. NO EQUIPMENT SHALL BE ALLOWED TO BE PARKED WITHIN THE ROADWAY WHILE NOT IN USE.
6. ALL SURPLUS EXCAVATED MATERIALS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DISPOSE OF OFFSITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

### EXISTING WATER SYSTEM NOTES:

1. ALL EXISTING HYDRANTS, VALVES, VALVE BOXES, FRAMES, AND COVERS REMOVED FROM THE WORK SITE SHALL BE DELIVERED TO THE WALTHAM DPW YARD BY THE CONTRACTOR OR DISPOSED OF BY THE CONTRACTOR, AT NO ADDITIONAL EXPENSE TO THE CITY, AS DETERMINED BY THE ENGINEER IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
2. ALL EXISTING WATER PIPE REMOVED SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
3. EXISTING WATER SERVICE RECONNECTION SHALL BE DONE AFTER THE PROPOSED MAIN AND SERVICE STUBS HAVE BEEN ACTIVATED (TESTING, DISINFECTION, AND FLUSHING COMPLETED).
4. THE CONTRACTOR SHALL NOT OPERATE ANY HYDRANTS, VALVES, CURB STOPS, OR CORPORATIONS NOR SHALL THEY DRAW WATER FROM THE SYSTEM, WITHOUT SPECIFIC APPROVAL OF THE CITY OF WALTHAM WATER & SEWER SUPERINTENDENT OR HIS/HER DESIGNEE.
5. THE EXISTING WATER MAINS ON MONTCLAIR AVENUE, PIEDMONT AVENUE, AND COLLEGE FARM ROAD ARE ASSUMED TO BE CAST IRON OR DUCTILE IRON CONSTRUCTION OR AS NOTED.
6. PRIOR TO STARTING ANY WORK THAT WILL AFFECT SERVICE TO CUSTOMERS, THE CONTRACTOR SHALL NOTIFY THE CITY, THE ENGINEER, AND THE CUSTOMERS 72 HOURS PRIOR TO THE SHUTDOWN AND NOTE THAT A TEMPORARY RUSTY WATER CONDITION MAY EXIST.

### PROPOSED WATER SYSTEM NOTES:

1. WATER MAINS SHALL BE CLDI CLASS 56 - DOUBLE CEMENT LINED.
2. ALL WATER MAIN FITTINGS AND VALVES SHALL BE DUCTILE IRON MECHANICAL JOINT AND RESTRAINED WITH MJ RESTRAINTS (MEGALUG OR EQUAL).
3. ALL WATER SERVICES AND CURB STOPS SHALL BE REPLACED FROM THE MAIN UP TO THE RIGHT OF WAY OR AS DIRECTED BY THE ENGINEER.
4. EXISTING WATER SERVICES NOT CALLED OUT TO BE REPLACED SHALL BE RECONNECTED TO THE PROPOSED WATER MAIN WITHIN THE WATER MAIN TRENCH.
5. ALL EXISTING WATER SERVICES FOUND CONSISTING OF A MATERIAL OTHER THAN TYPE K COPPER TUBING SHALL BE REPLACED UP TO THE PROPERTY LINE.
6. ALL NEW WATER SERVICES, CORPORATIONS AND CURB STOPS SHALL BE SIZED AS SHOWN ON THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. ALL NEW CORPORATIONS AND CURB STOPS SHALL BE LEAD FREE AND BALL TYPE WITH INSERTS AND RESTRAINTS.
8. ALL CORPORATIONS ALONG THE PROPOSED MAIN SHALL BE INSTALLED PRIOR TO PRESSURE TESTING.
9. ALL HYDRANTS SHALL BE "AMERICAN DARLING B-62", YELLOW BODY WITH BLACK CAPS "WALTHAM COLORS." HYDRANTS SHALL BE FACTORY PAINTED "WALTHAM COLORS"
10. REPLACED HYDRANTS SHALL BE LOCATED AT THE EXISTING LOCATION OR AS DIRECTED BY THE ENGINEER.
11. HYDRANT MARKERS SHALL BE INSTALLED AT EACH HYDRANT LOCATION AND ARE INCLUDED UNDER THE HYDRANT ITEM.
12. SOLID SLEEVE FITTINGS SHALL BE USED AT ALL CONNECTIONS BETWEEN PROPOSED AND EXISTING WATER MAINS. IF EXISTING WATER MAINS ARE FOUND TO BE OVER-SIZED CAST IRON, HI-MAX OR DRESSER COUPLINGS MAY BE SUBSTITUTED FOR A SOLID SLEEVE FITTING UPON SPECIFIC APPROVAL FROM THE CITY OF WALTHAM WATER & SEWER SUPERINTENDENT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERY OF EXISTING OVER-SIZED CAST IRON MAINS.
13. LOCATION OF PROPOSED WATER SYSTEM MAY BE ALTERED IN THE FIELD BY THE ENGINEER TO SUIT FIELD CONDITIONS.

### PROPOSED SANITARY SEWER SERVICE NOTES:

1. ALL NEW GRAVITY SANITARY SEWER SERVICES SHALL BE PVC PIPE, SDR-35 IN CONFORMANCE WITH ASTM D-3034.
2. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE LOCATION OF THE EXISTING SEWER SERVICES AT THE PROPERTY LINE FOR CONNECTION TO THE EXISTING MAIN.
3. THE CONTRACTOR SHALL PERFORM TEST PITS, AS DIRECTED BY THE ENGINEER, TO VERIFY IN THE FIELD THE MATERIAL OF EXISTING SEWER SERVICES. SERVICES FOUND TO BE COMPRISED OF AN UNDESIRABLE MATERIAL SHALL BE REPLACED FROM THE MAIN TO THE PROPERTY LINE BY THE CONTRACTOR.
4. ALL FITTINGS, ADAPTERS, COUPLINGS, CAPS, ETC. ASSOCIATED WITH THE PROPOSED SEWER SERVICE REPLACEMENTS SHALL BE CONSIDERED INCLUDED IN THE COMPENSATION UNDER THE ASSOCIATED PIPE ITEM.
5. THE SEWER SERVICE PIPE SHALL MATCH THE EXISTING SERVICE DIAMETER. PAYMENT FOR SEWER SERVICE PIPE DIAMETERS OF 4", 5", AND 6" SHALL ALL BE PAID FOR UNDER THE 6" SEWER PIPE ITEM.

### UTILITY NOTES:

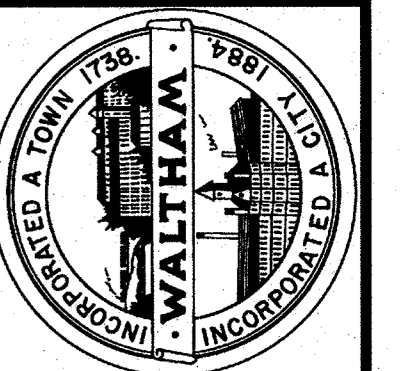
1. PRIOR TO CONSTRUCTION, ALL UTILITIES, PUBLIC AND PRIVATE MUST BE NOTIFIED (SEE MASSACHUSETTS GENERAL LAWS, CHAPTER 82 SECTION 40.) ALL "DIG SAFE" - 811, OR CUSTOMER SERVICE - 1 (888) 344-7233.
2. THE CITY OF WALTHAM IS NOT A PART OF "DIG SAFE". THE CONTRACTOR MUST SEPARATELY CONTACT THE WATER AND SEWER DEPARTMENT AND WIRES DEPARTMENT FOR APPROPRIATE MARK OUTS.
3. SUBSURFACE AND OVERHEAD UTILITY LINES, AS SHOWN HERON, WERE COMPLIED ACCORDING TO CITY OF WALTHAM GIS INFORMATION. THE LOCATIONS ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD. THE CITY OF WALTHAM ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. THE CONTRACTOR SHALL EXCAVATE TEST PITS TO VERIFY UTILITY LINE LOCATIONS AS NECESSARY.
4. UNLESS OTHERWISE INDICATED, WATER MAINS ARE ASSUMED TO BE 5 FEET BELOW THE EXISTING GROUND SURFACE. GAS LINES ARE ASSUMED TO BE TO BE 3 FEET BELOW THE EXISTING GROUND SURFACE. TELEPHONE AND ELECTRIC CONDUIT ARE ASSUMED TO BE 2 FEET BELOW THE EXISTING GROUND SURFACE.
5. DAMAGE TO ANY UTILITY WILL BE REPAIRED BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, IN A TIMELY MANNER SO THAT DISRUPTION OF SERVICE TO ANY UTILITY WILL NOT BE LONGER THAN PRACTICALLY NECESSARY TO REPAIR THE DAMAGE.
6. THE CONTRACTOR SHALL EXCAVATE TEST PITS TO VERIFY UTILITY LINE LOCATIONS AND DETERMINE ACTUAL FIELD CONDITIONS AS NECESSARY OR AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL PLAN AND PERFORM TEST PIT EXCAVATION WELL IN ADVANCE OF COMMENCING CONSTRUCTION IN THE GENERAL AREA TO ALLOW TIME TO REVIEW ACTUAL CONDITIONS ENCOUNTERED. TEST PITS NOT SPECIFICALLY IDENTIFIED SHALL BE EXCAVATED BY THE CONTRACTOR AT THE DIRECTION OF THE ENGINEER. PAYMENT SHALL BE INCLUDED UNDER THE APPLICABLE ITEM.
7. EXISTING UTILITIES INTERFERING WITH THE WORK SHALL BE RELOCATED OR BRACED AND SUPPORTED AS DIRECTED IN THE FIELD BY THE ENGINEER, UNLESS OTHERWISE INDICATED OR SPECIFIED.
8. UTILITY CONTACTS:  
THE CITY OF WALTHAM - WATER/SEWER/DRAIN  
WATER & SEWER FOREMAN (7AM-3PM): 781-314-3826  
DAYTIME OFFICE: 781-314-3820  
AFTER HOURS EMERGENCY: 781-893-3700  
THE CITY OF WALTHAM - WIRES DEPARTMENT  
TIM KELLY, INSPECTOR OF WIRES: 781-389-6044  
VERIZON - TELEPHONE  
FREDERICK WAGNER, AREA PROJECT COORDINATOR: 781-376-5067  
COMCAST - CABLE  
MANUEL FURTADO, AREA PROJECT COORDINATOR: 774-644-9104  
NATIONAL GRID - GAS  
KEITH WALTERS, AREA PROJECT COORDINATOR: 516-924-4602  
EVERSOURCE - ELECTRIC  
N.E. SERVICE NUMBER: 800-592-2000

### TRENCH PAVING NOTES:

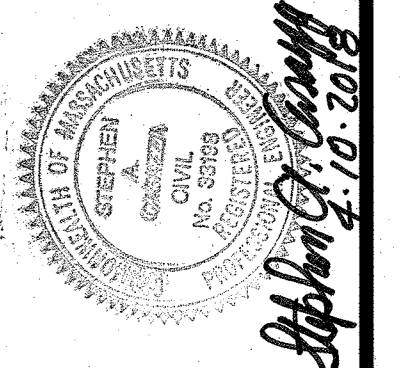
1. ALL TRENCHES SHALL BE BROUGHT TO GRADE AT THE END OF EACH WORKDAY. ALL TRENCHES SHALL BE PAVED WITH 3" TEMPORARY BINDER PAVEMENT AT THE END OF EACH WORK WEEK (SEE DETAILS). AFTER A MINIMUM OF 30 DAY SETTLEMENT PERIOD THE CONTRACTOR SHALL INSTALL THE REMAINING 2" OF TEMPORARY TOP COURSE PAVEMENT ALONG TRENCHES.
2. THE CONTRACTOR SHALL LIMIT THE USE OF STEEL PLATES IN THE ROADWAY. STEEL PLATES LEFT WITHIN THE ROADWAY SHALL BE PINNED AND PATCHED AROUND USING BITUMINOUS CONCRETE.
3. ALL TEMPORARY AND PERMANENT TRENCHES IN EXISTING PAVEMENT ARE TO BE SAW CUT WHERE THE PROPOSED PAVEMENT SHALL MEET TO ALLOW A SMOOTH TRANSITION AFTER PAVING. NO OTHER METHOD OF CUTTING IS ACCEPTABLE. JOINTS SHALL BE SANDED AND SEALED.
4. ALL TRENCHES SHALL BE COMPACTED BY MECHANICAL EQUIPMENT, PUDDLED OR JETTED WITH WATER TO ALLOW FOR PROPER SETTLEMENT. TRENCHES THAT CANNOT BE JETTED WILL BE MECHANICALLY COMPACTED AS DETERMINED BY THE ENGINEER. ALL TRENCHES SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY. THE ENGINEER RESERVES THE RIGHT TO HAVE COMPACTION TESTING DONE AT THE CONTRACTOR'S EXPENSE.
5. AFTER COMPACTION IS COMPLETED, THE CONTRACTOR SHALL PLACE TRENCH PAVEMENT AS SHOWN ON THE DETAILS.
6. THE CONTRACTOR SHALL REMOVE AND REPLACE ALL PAVEMENT DAMAGED DURING THE INSTALLATION OF THE PROPOSED UTILITY.

### EROSION & SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH EROSION AND SEDIMENTATION CONTROL DETAILS AND NOTES AS SHOWN IN THESE CONTRACT DRAWINGS.
2. SILT SACKS SHALL BE INSTALLED AT ALL CATCH BASINS WITHIN THE PROJECT AREA PRIOR TO THE COMMENCEMENT OF WORK. SILT SACKS SHALL BE KEPT FREE OF SEDIMENT AND DEBRIS. SILT SACKS SHALL BE INSPECTED ON A DAILY BASIS OR IMMEDIATELY AFTER A RAIN EVENT. THE CONTRACTOR SHALL CLEAN SILT SACKS WITHIN 24 HOURS ONCE DIRECTED BY THE ENGINEER.
3. THE CONTRACTOR SHALL REPAIR ALL ERODED AREAS AND ENSURE A GOOD STAND OF TURF IS ESTABLISHED THROUGHOUT. THE CONTRACTOR SHALL REPAIR ALL ERODED OR DISPLACED RIPRAP, AND CLEAN SEDIMENT COVERED STONES.
4. THE CONTRACTOR SHALL PERFORM STREET SWEEPING AT THE END OF EACH DAY.



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT NOTES



REVISION DATE:

DRAWN BY: IAM

DESIGNED BY: IAM

REVIEWED BY: IAM

APPROVED BY: SAC

DATE: 04/09/2018

SCALE: N.T.S.

FILE: montclairwater2017

SHEET 2 OF 11

**TEMPORARY BYPASS PIPING NOTES:**

1. PRIOR TO STARTING ANY WORK THAT WILL AFFECT SERVICE TO CUSTOMERS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE CUSTOMERS IN WRITING AT LEAST 72 HOURS PRIOR TO THE SHUTDOWN.
2. TEMPORARY BYPASS PIPING SYSTEM PLAN SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS, EMPLOYED OR CONTRACTED BY THE CONTRACTOR AND SHALL INCLUDE LAYOUT OF THE BYPASS PIPING, TEMPORARY SERVICE LINES TO ALL CUSTOMERS, THE SPECIFIED BYPASS PIPE DIAMETER TO BE USED IN EACH LOCATION, AND THE TYPE AND LOCATION OF TEMPORARY FIRE HYDRANTS. THE BYPASS PIPING, IN MOST CASES, WILL BE LAID ABOVE GROUND AND SHALL BE 4" AND 2" WITH 1" SERVICE CONNECTIONS AS REQUIRED.
3. THREE COPIES OF THE PROPOSED BYPASS DESIGN PLAN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT THE PRE-CONSTRUCTION MEETING. THE ENGINEER SHALL MAKE THE FINAL DECISION AS TO THE ROUTING AND SIZES OF ALL BYPASS LINES BEFORE ANY BYPASS IS INSTALLED.
4. THE TEMPORARY BYPASS SHALL BE INSTALLED, TESTED, AND APPROVED PRIOR TO THE REMOVAL OF THE EXISTING WATER MAIN AND THE INSTALLATION OF THE PROPOSED WATER MAIN.
5. THE CONTRACTOR SHALL INSTALL THE TEMPORARY BYPASS PIPING BELOW GRADE AT ALL ROADWAY / DRIVEWAY CROSSINGS, SEE DETAILS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL AFFECTED WATER CUSTOMERS, IN WRITING, OF DISRUPTION OF SERVICE AT LEAST 72 HOURS PRIOR TO THE SHUTDOWN. NOTICE CARDS WILL BE FURNISHED BY THE CONTRACTOR WHICH WILL INCLUDE THE DATE AND HOURS OF SHUTDOWN AND NOTE THAT A TEMPORARY RUSTY WATER CONDITION MAY EXIST. NOTICE CARDS WILL ALSO HAVE SPACE FOR THE CONTRACTOR TO FILL IN THE SPECIFIC DATES FOR EACH SHUTDOWN. THE WORK SHALL BE SCHEDULED IN SECTIONS, AS APPROVED BY THE ENGINEER, AS IT IS NECESSARY TO ALLOW FOR COMPLETION OF WORK AND RESTORATION OF SERVICE TO THE CUSTOMER WITHIN THE TIMES SPECIFIED BY THE ENGINEER.

**BASE BID - BYPASS SEQUENCING NOTES:**

1. INSTALL (CUT IN) 16" GATE VALVE ON COLLEGE FARM ROAD NEAR INTERSECTION WITH LINCOLN STREET.
2. INSTALL HYDRANT LOCATED NEAR #181 COLLEGE FARM ROAD.
3. CONNECT AND INSTALL TEMPORARY BYPASS WATER TO HYDRANT LOCATED NEAR #199 COLLEGE FARM ROAD.
4. CONNECT AND INSTALL TEMPORARY BYPASS WATER TO HYDRANT LOCATED NEAR INTERSECTION OF MONTCLAIR AVENUE AND TRIMOUNT AVENUE.
5. INSTALL TEMPORARY BYPASS WATER TO THE END OF MONTCLAIR AVENUE.
6. CHLORINATE AND TEST TEMPORARY MAIN. UPON PASSING RESULTS, CONNECT HOUSES TO TEMPORARY BYPASS WATER.
7. INSTALL (CUT IN) 16" AND 12" GATE VALVES ON COLLEGE FARM ROAD. LEAVE VALVES CLOSED FOR CONSTRUCTION.
8. CUT AND CAP EXISTING 8" MAIN AT CONNECTION WITH EXISTING 10" MAIN ON COLLEGE FARM ROAD.
9. INSTALL (CUT IN) 12" VALVE AND 8" VALVE AT INTERSECTION OF MONTCLAIR AVENUE AND TRIMOUNT AVENUE. LEAVE VALVES CLOSED FOR CONSTRUCTION.
10. REPLACE / INSTALL PROPOSED WATER SYSTEMS AS SPECIFIED.
11. TEST AND DISINFECT NEW WATER SYSTEMS.
12. CONNECT AND ACTIVATE HOUSE SERVICES.
13. REMOVE TEMPORARY BYPASS WATER.

**ADD ALTERNATE 1 - BYPASS SEQUENCING NOTES:**

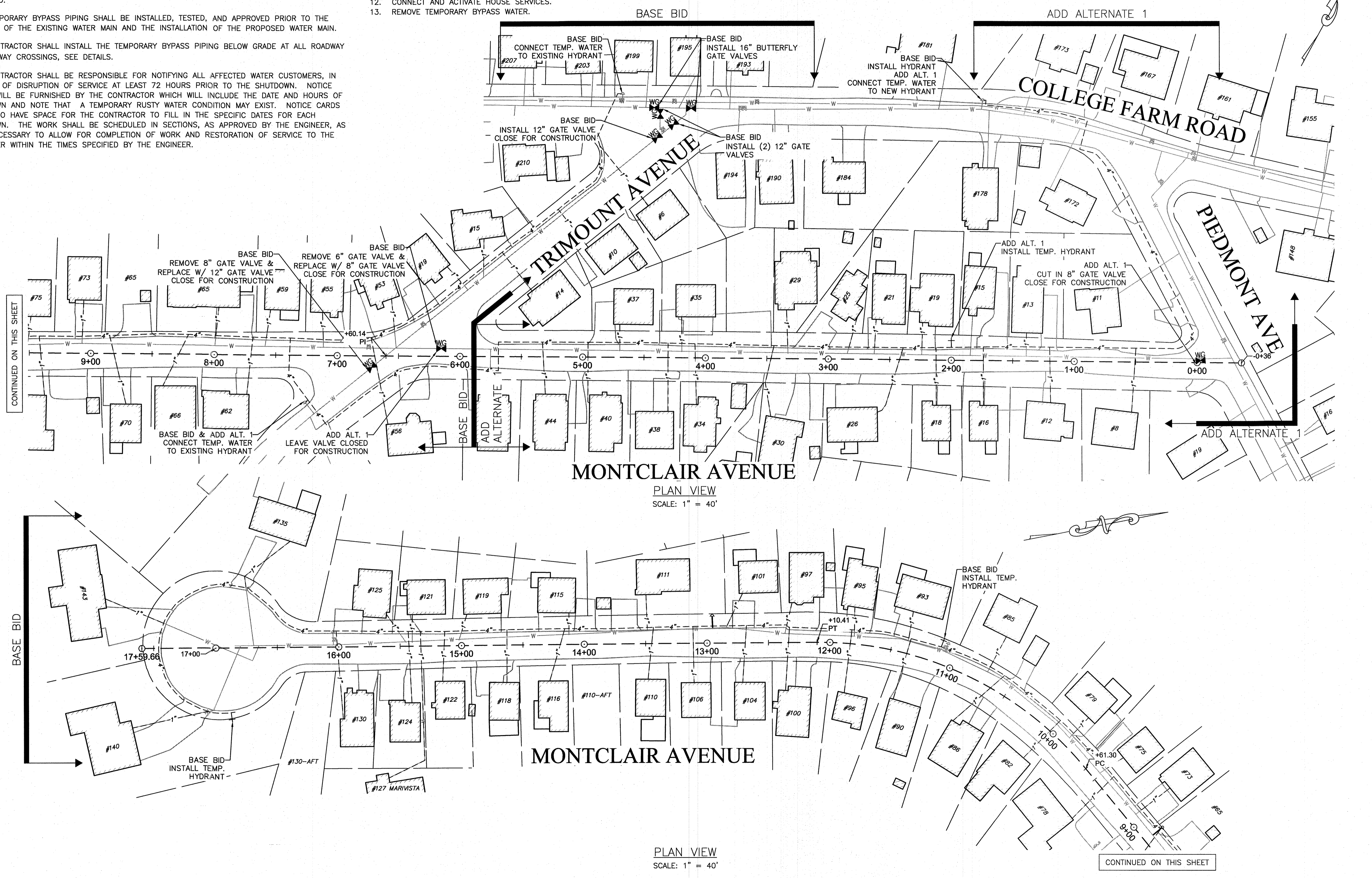
1. CONNECT TEMPORARY BYPASS WATER TO HYDRANT LOCATED NEAR #181 COLLEGE FARM ROAD.
2. CONNECT TEMPORARY BYPASS WATER TO HYDRANT LOCATED NEAR INTERSECTION OF MONTCLAIR AVE AND TRIMOUNT AVE.
3. INSTALL TEMPORARY BYPASS WATER.
4. CHLORINATE AND TEST TEMPORARY MAIN. UPON PASSING RESULTS, CONNECT HOUSES TO TEMPORARY BYPASS WATER.
5. INSTALL (CUT IN) 8" GATE ON MONTCLAIR AVE AT PIEDMONT AVE. LEAVE CLOSED FOR CONSTRUCTION.
6. CLOSE 8" VALVE ON MONTCLAIR AVE AT TRIMOUNT AVE.
7. REPLACE / INSTALL PROPOSED WATER SYSTEMS AS SPECIFIED.
8. TEST AND DISINFECT NEW WATER SYSTEMS.
9. CONNECT AND ACTIVATE HOUSE SERVICES.
10. REMOVE TEMPORARY BYPASS WATER.



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT BYPASS PLAN

STATE OF MASSACHUSETTS  
 REGISTERED PROFESSIONAL ENGINEER  
 JOHN J. CASAZZA  
 No. 10103  
 4-10-2018

DATE: 04/09/2018	REVISION DATE:
SCALE: 1" = 40'	DRAWN BY: IAM
FILE: montclairwater2017	DESIGNED BY: IAM
SHEET 3 OF 11	REVIEWED BY: IAM
	APPROVED BY: SAC



PLAN VIEW  
 SCALE: 1" = 40'

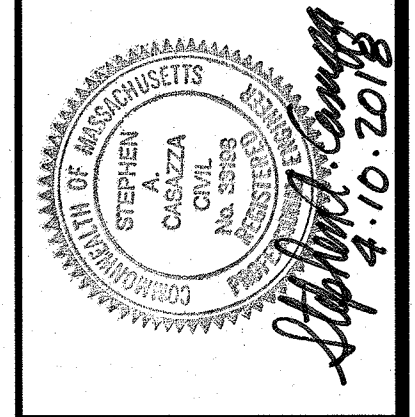
PLAN VIEW  
 SCALE: 1" = 40'

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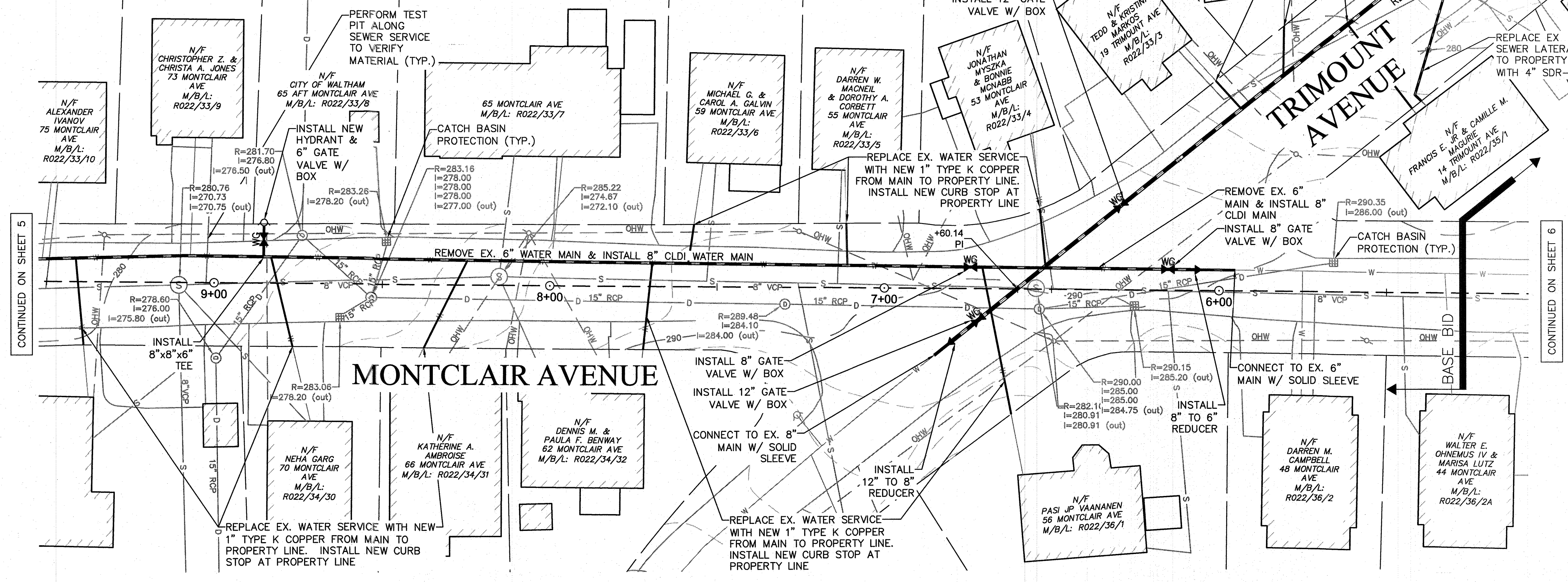
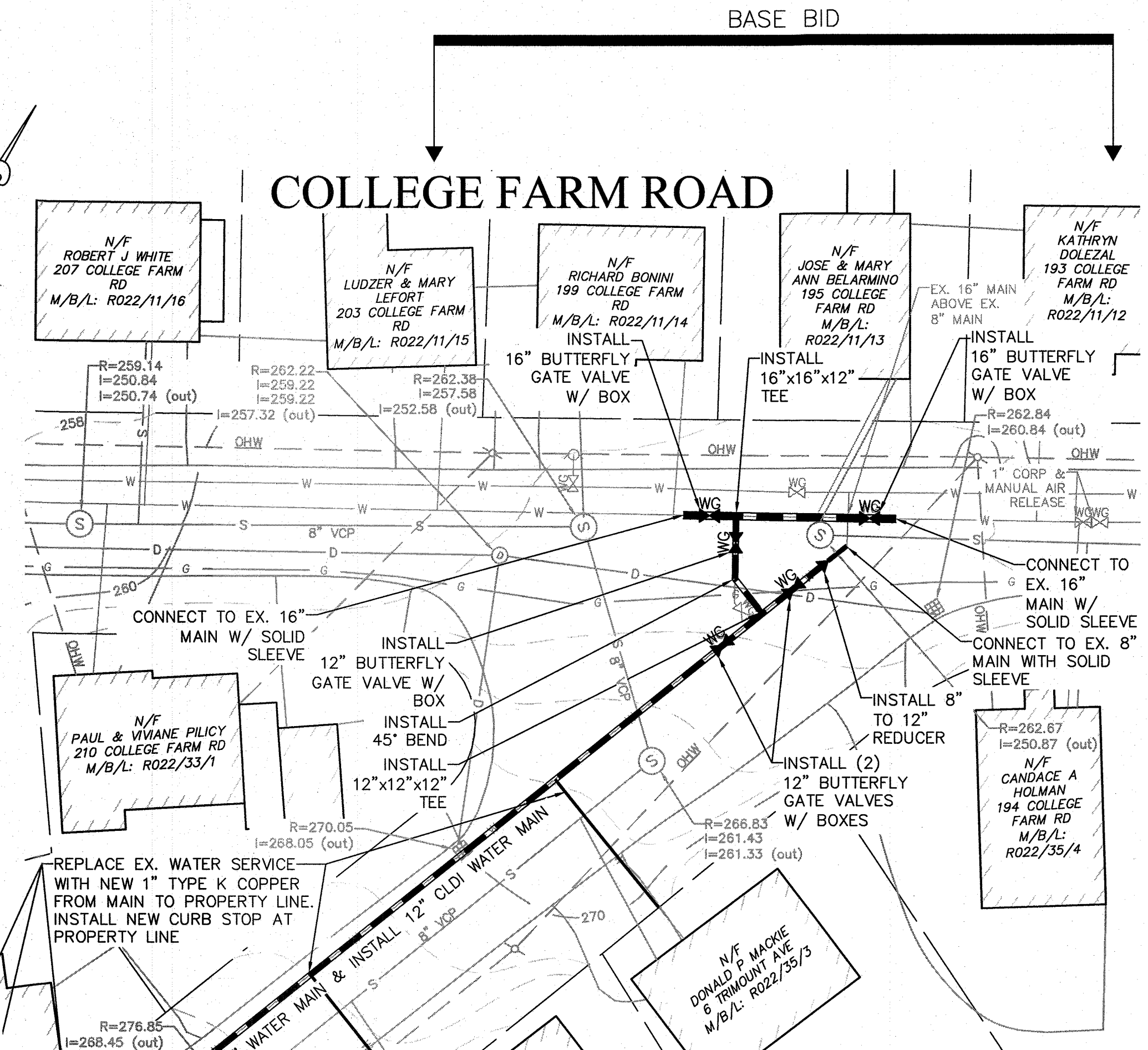
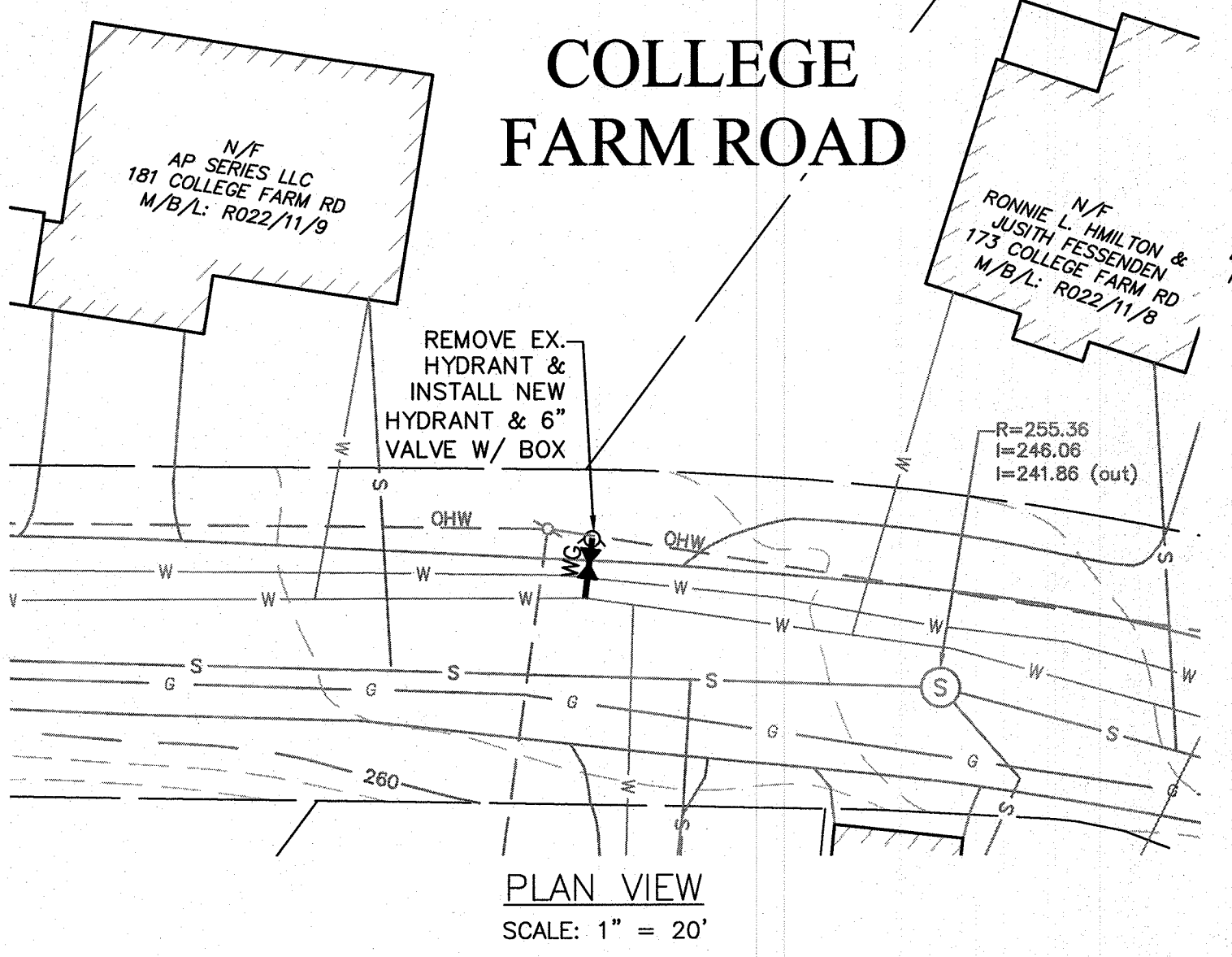
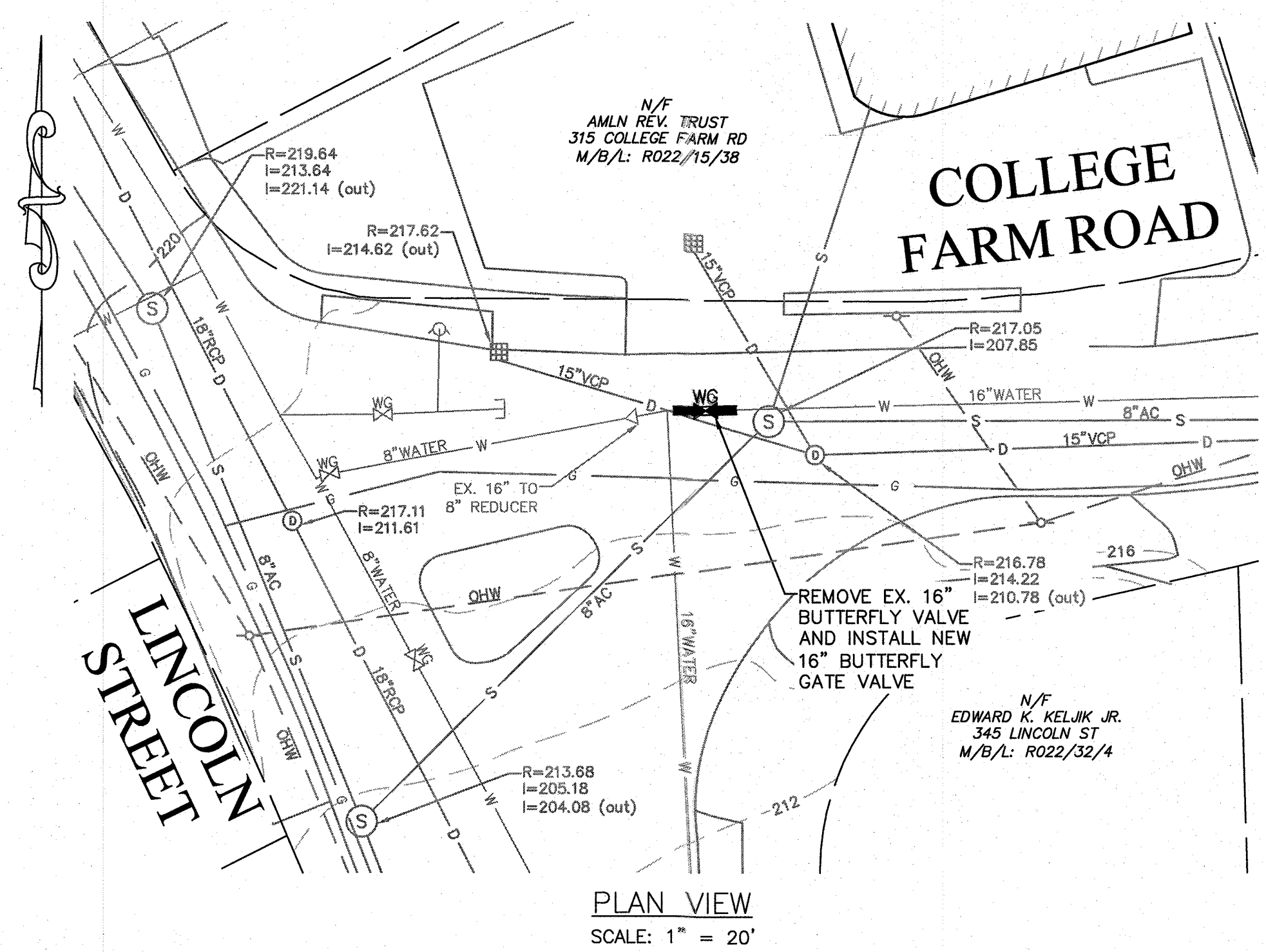




CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE BASE BID  
 WATER MAIN REPLACEMENT STA. 5+50 - 9+50

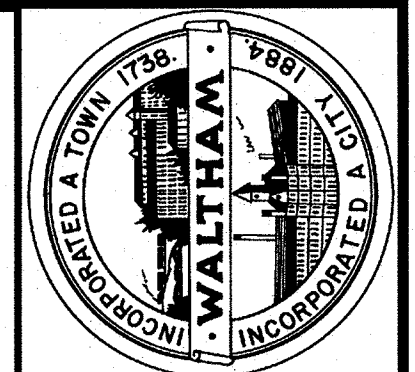


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SHEET 4 OF 11	

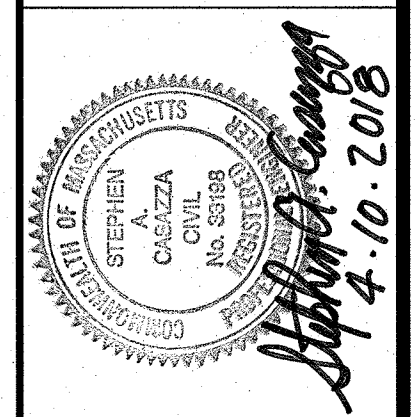


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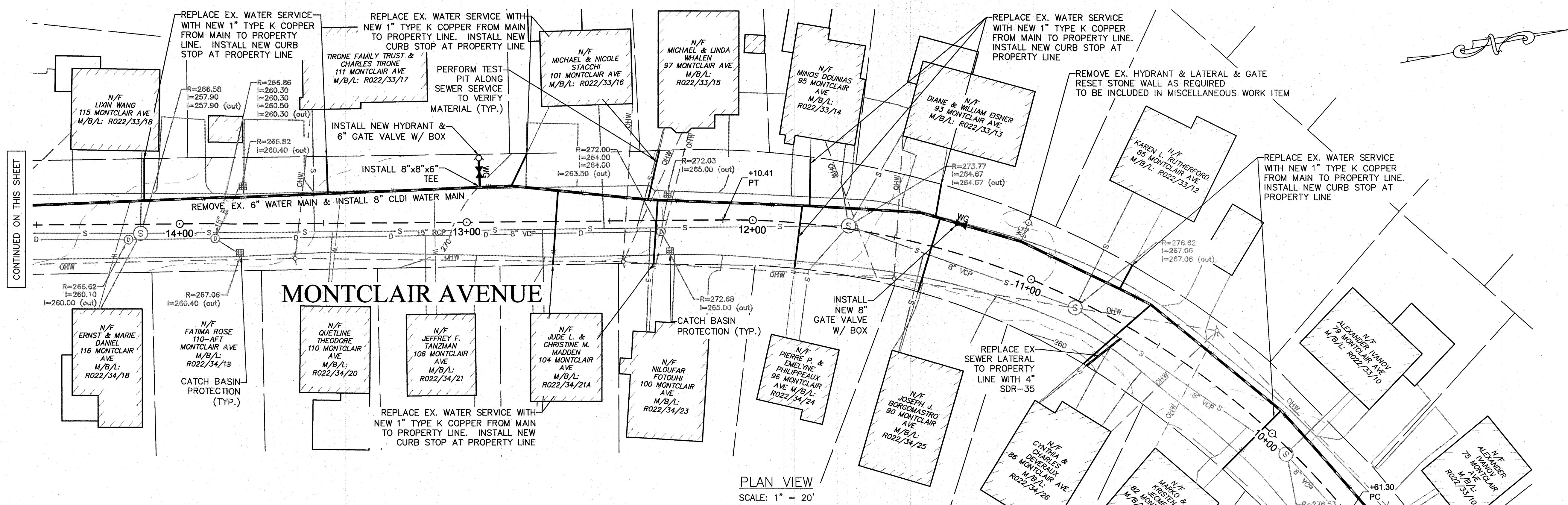
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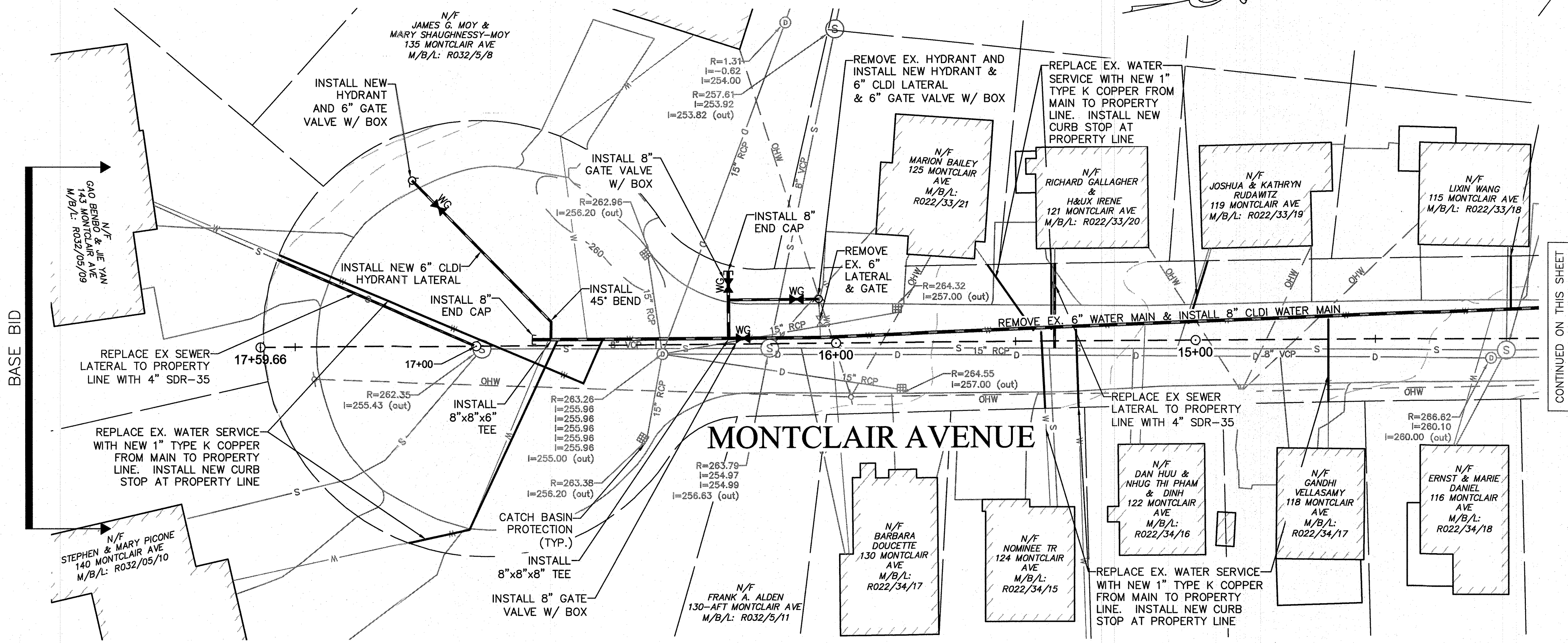
CITY OF WALTHAM ENGINEERING DEPARTMENT  
**MONTCLAIR AVENUE BASE BID**  
**WATER MAIN REPLACEMENT STA. 9+50 - 17+50**



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PLAN VIEW  
 SCALE: 1" = 20'

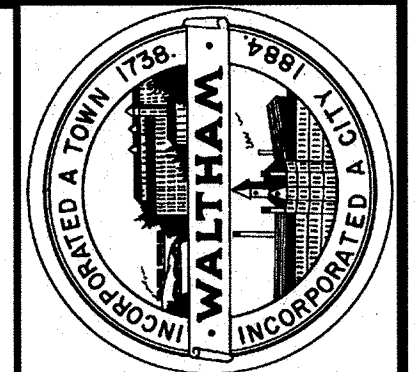
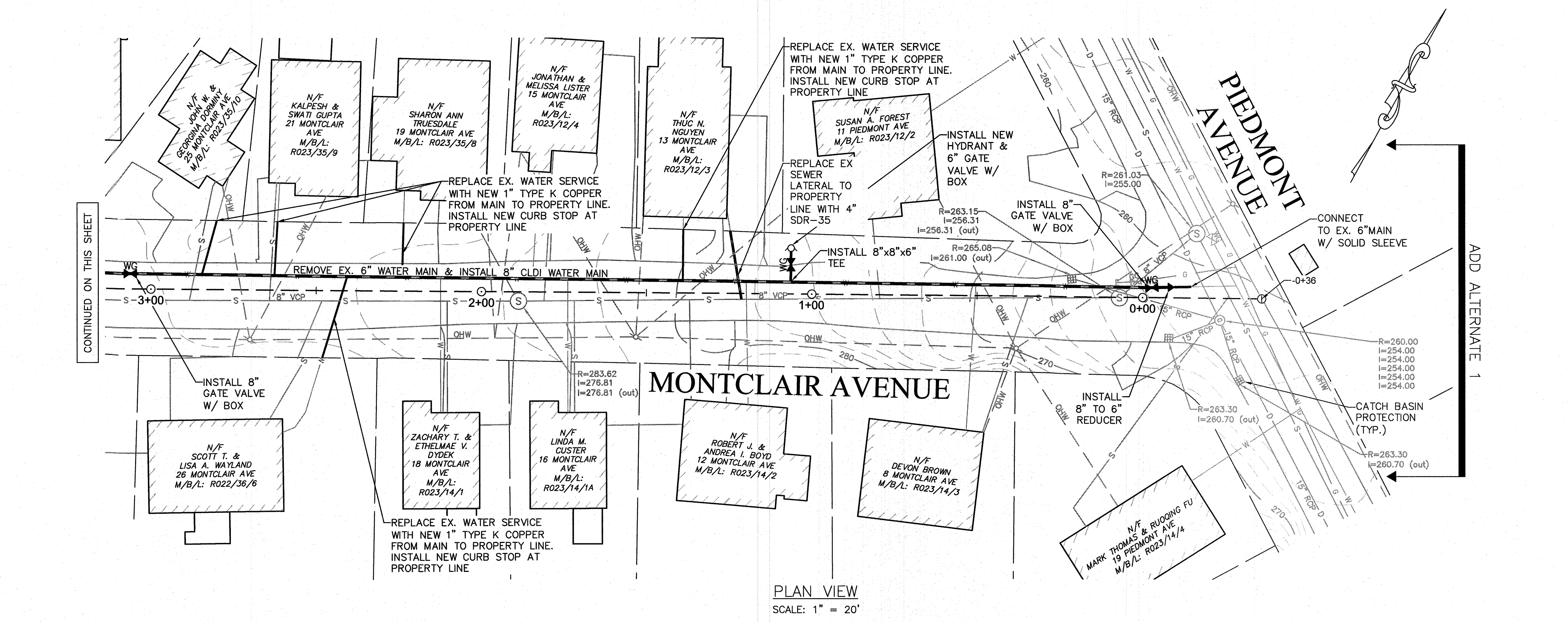
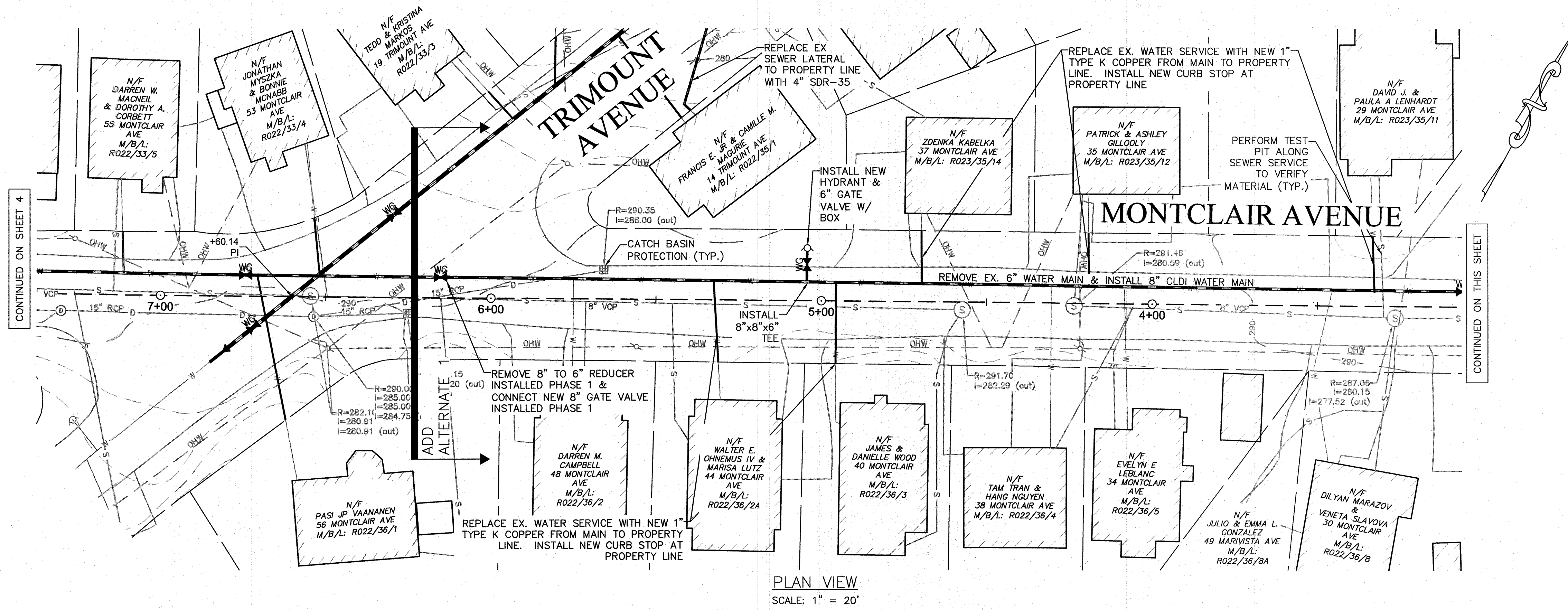


PLAN VIEW  
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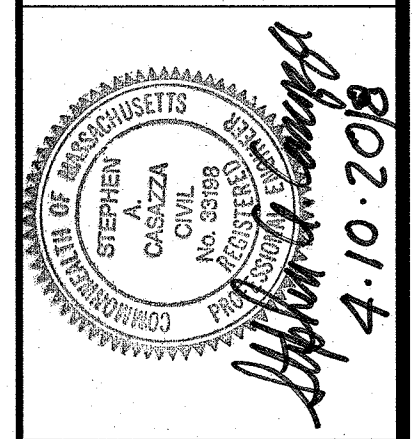
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BASE BID



CITY OF WALTHAM ENGINEERING DEPARTMENT  
**MONTCLAIR AVENUE ADD ALTERNATE 1**  
**WATER MAIN REPLACEMENT STA. 0+00 - 7+00**





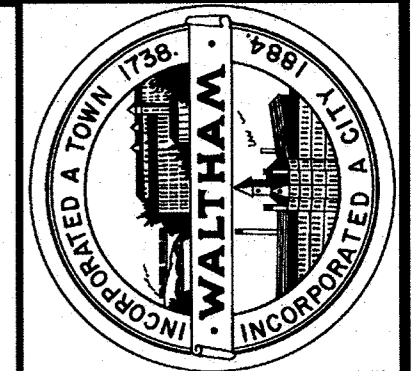
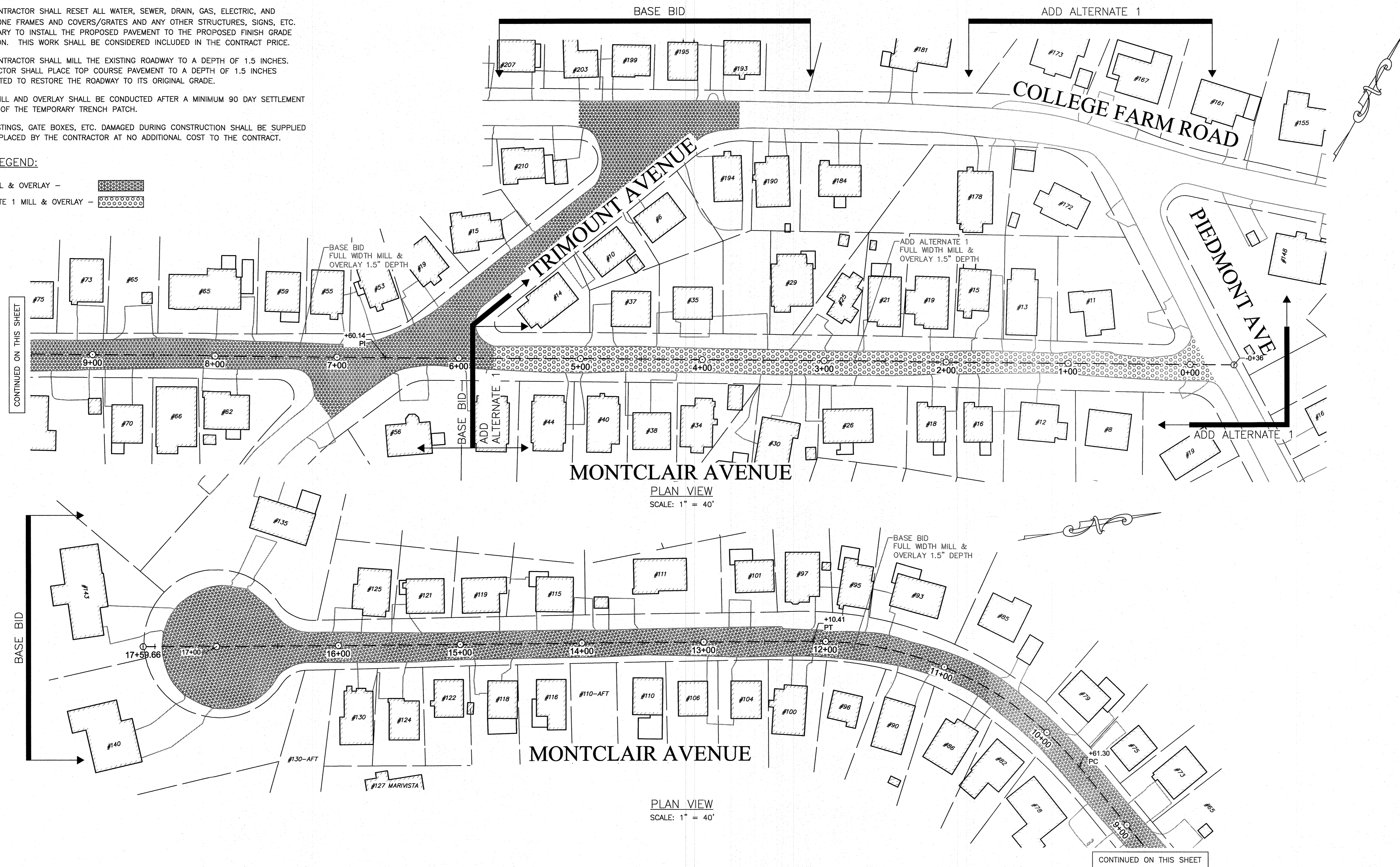
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**GENERAL PAVING NOTES:**

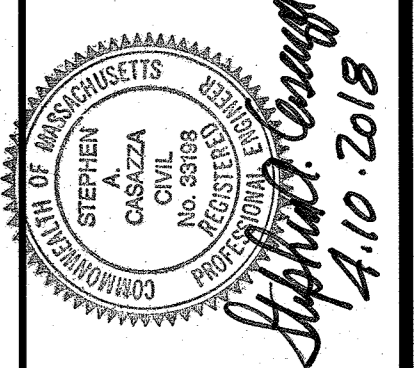
1. THE CONTRACTOR SHALL SAW CUT ALL JOINTS IN THE EXISTING PAVEMENT AREAS WHERE THE PROPOSED PAVEMENT WILL MEET EXISTING PAVEMENT TO REMAIN. ALL JOINTS SHALL PROVIDE A SMOOTH TRANSITION BETWEEN NEW AND OLD PAVEMENTS. IMMEDIATELY AFTER PAVING, ALL NEW JOINTS SHALL BE SANDED AND SEALED. THE COST FOR THIS WORK SHALL BE CONSIDERED INCLUDED IN THE CONTRACT PRICE.
2. THE CONTRACTOR SHALL RESET ALL WATER, SEWER, DRAIN, GAS, ELECTRIC, AND TELEPHONE FRAMES AND COVERS/GRATES AND ANY OTHER STRUCTURES, SIGNS, ETC. NECESSARY TO INSTALL THE PROPOSED PAVEMENT TO THE PROPOSED FINISH GRADE ELEVATION. THIS WORK SHALL BE CONSIDERED INCLUDED IN THE CONTRACT PRICE.
3. THE CONTRACTOR SHALL MILL THE EXISTING ROADWAY TO A DEPTH OF 1.5 INCHES. CONTRACTOR SHALL PLACE TOP COURSE PAVEMENT TO A DEPTH OF 1.5 INCHES COMPACTED TO RESTORE THE ROADWAY TO ITS ORIGINAL GRADE.
4. FINAL MILL AND OVERLAY SHALL BE CONDUCTED AFTER A MINIMUM 90 DAY SETTLEMENT PERIOD OF THE TEMPORARY TRENCH PATCH.
5. ALL CASTINGS, GATE BOXES, ETC. DAMAGED DURING CONSTRUCTION SHALL BE SUPPLIED AND REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.

**PAVING LEGEND:**

BASE BID MILL & OVERLAY -   
 ADD ALTERNATE 1 MILL & OVERLAY - 



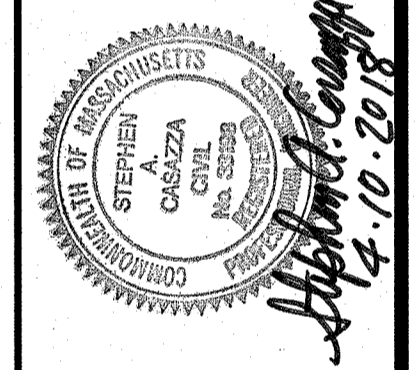
CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT PAVING PLAN



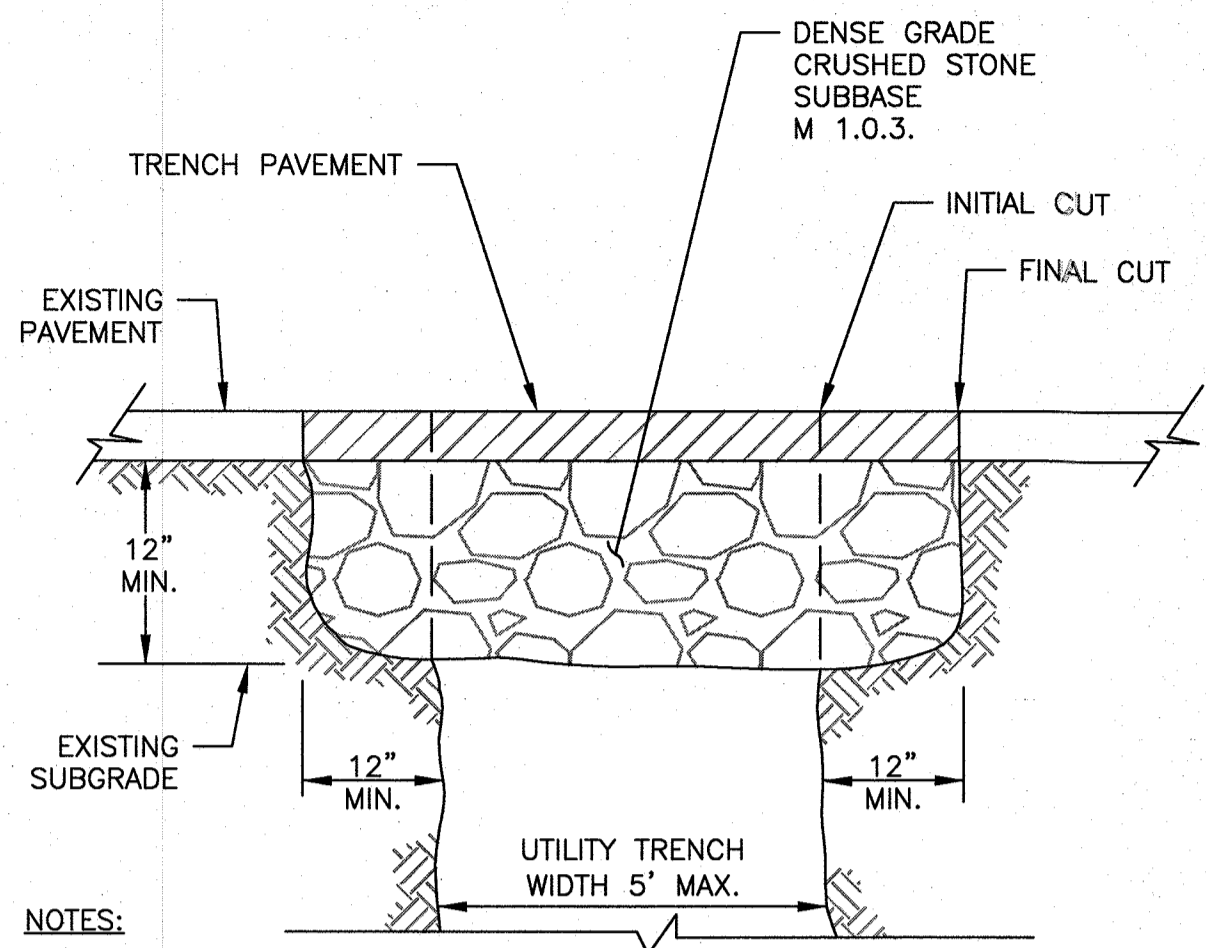
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CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT DETAILS I

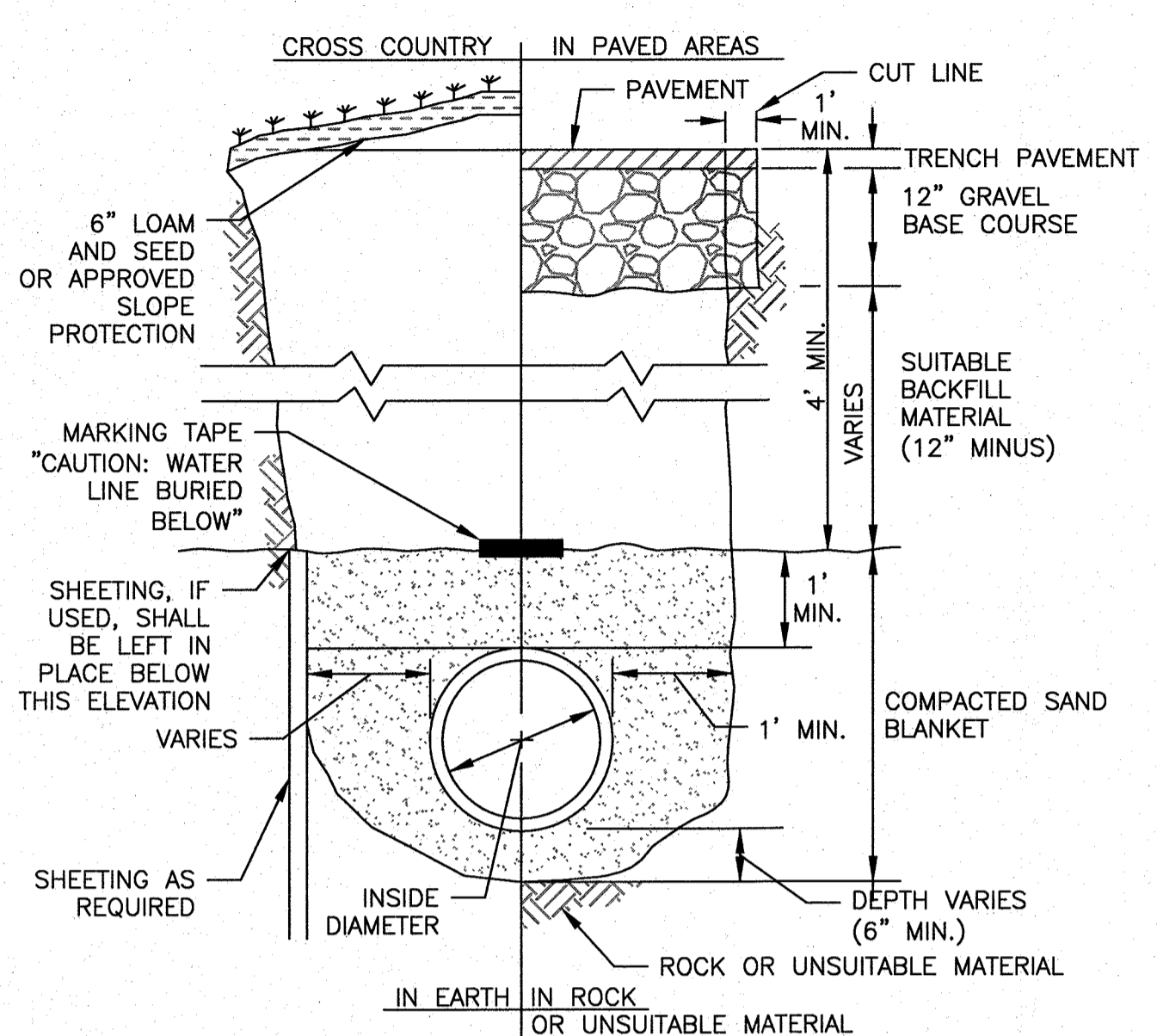


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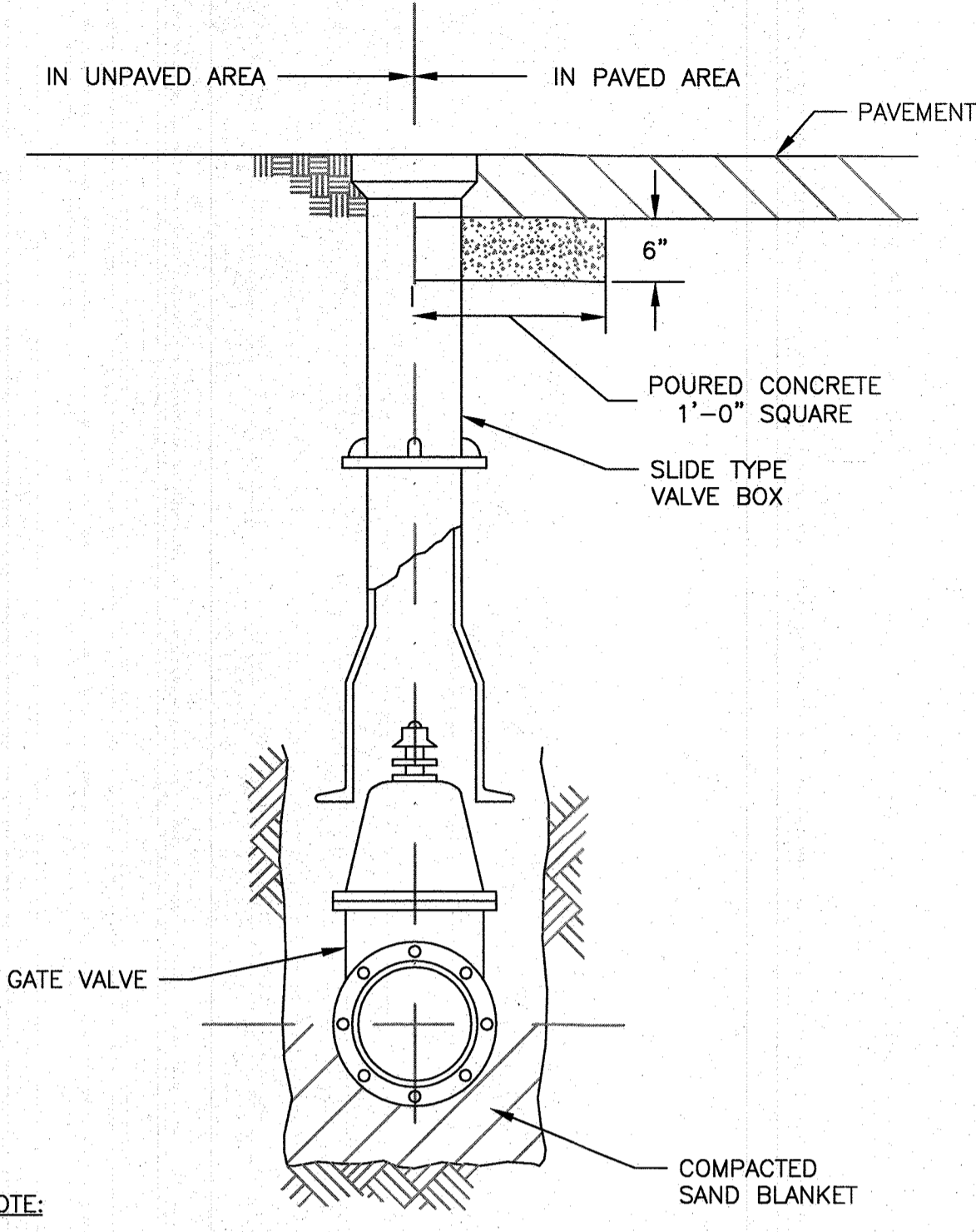
- NOTES:
1. **TEMPORARY TRENCH PAVEMENT:** 5" OF HOT MIX ASPHALT TO BE PLACED AND COMPACTED IN TWO SEPARATE LIFTS - 3" BINDER COURSE AND 2" TOP COURSE. IF THE EXISTING PAVEMENT IS GREATER THAN 5" IN DEPTH, THE CONTRACTOR SHALL PLACE PERMANENT TRENCH MATCHING THE DEPTH OF THE EXISTING PAVEMENT. THE CONTRACTOR SHALL MAINTAIN THE TEMPORARY TRENCH PAVEMENT THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITY AT NO ADDITIONAL COST TO THE CONTRACT.
  2. 3" BINDER COURSE OF PAVEMENT SHALL BE PLACED AT THE END OF EACH WORK WEEK. 2" TOP COURSE OF PAVEMENT SHALL BE PLACED AFTER A 30 DAY SETTLEMENT PERIOD.
  3. ALL TRENCHES SHALL BE SAW CUT ONLY. NO OTHER METHOD OF CUTTING THE EXISTING PAVEMENT SHALL BE ACCEPTABLE. THIS WORK SHALL BE INCLUDED IN THE ASSOCIATED TRENCH ITEM.

TRENCH PAVEMENT DETAIL  
N.T.S.



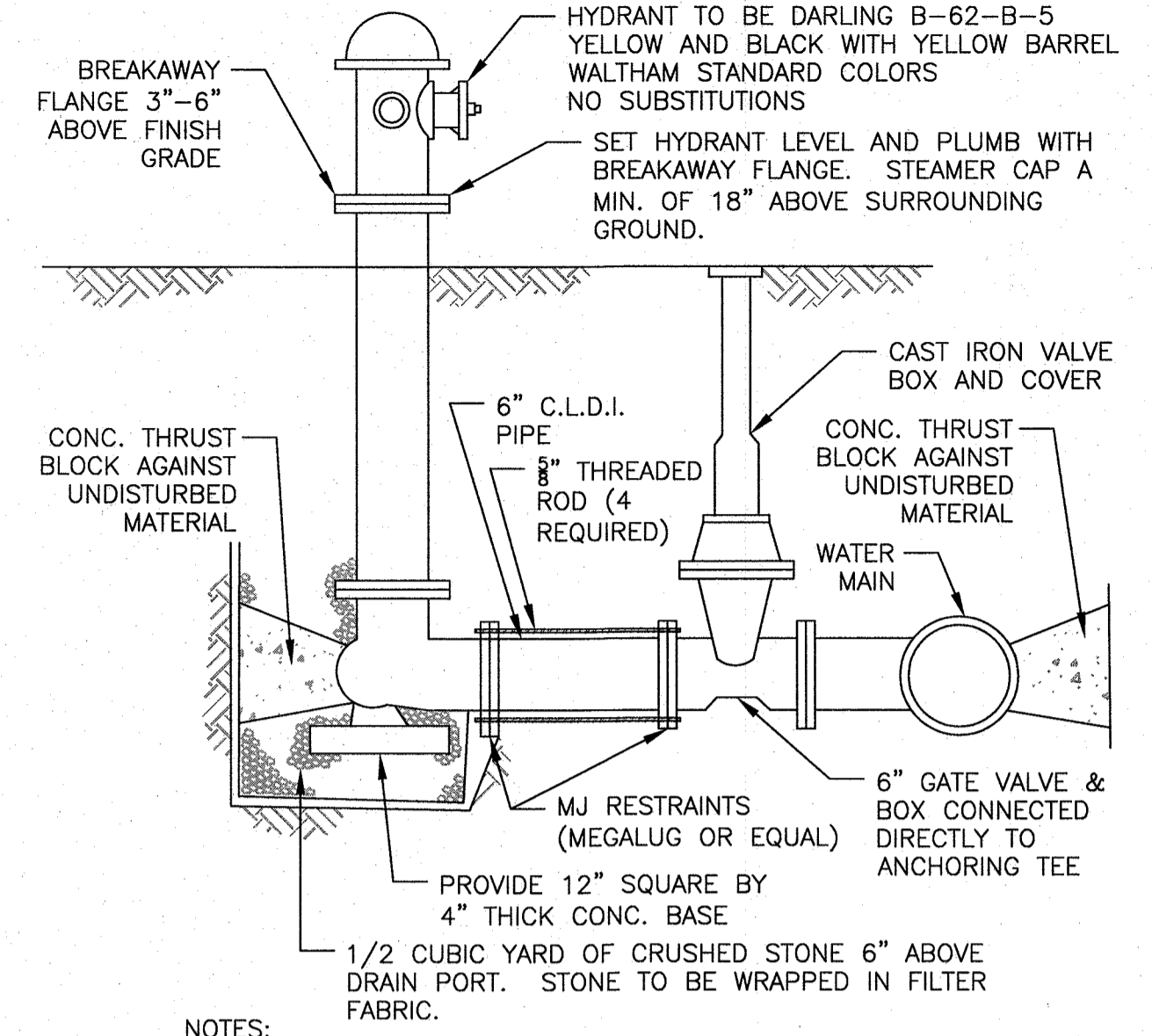
- NOTES:
1. WATER PIPE SHALL BE CLASS 56 C.L.D.I. PIPE - DOUBLE CEMENT LINED.
  2. ALL TRENCHES SHALL BE SAW CUT. NO OTHER METHOD OF CUTTING THE EXISTING PAVEMENT SHALL BE ACCEPTABLE.
  3. WATER MARKING TAPE SHALL BE PLACED A MINIMUM OF 1' ABOVE INSTALLED WATER PIPE.

TYPICAL WATER MAIN TRENCH  
N.T.S.



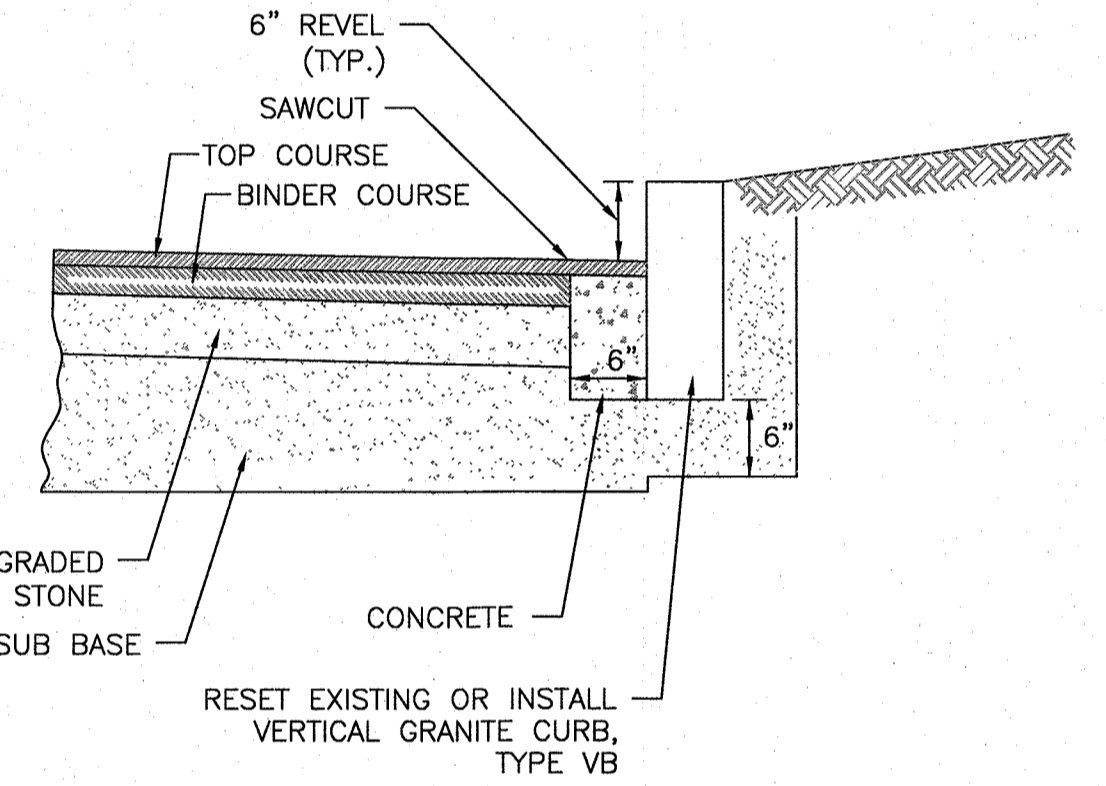
- NOTE:
1. ALL VALVES MUST OPEN RIGHT
  2. ALL VALVES TO BE MANUFACTURED BY MUELLER CO.

TYPICAL GATE VALVE DETAIL  
N.T.S.



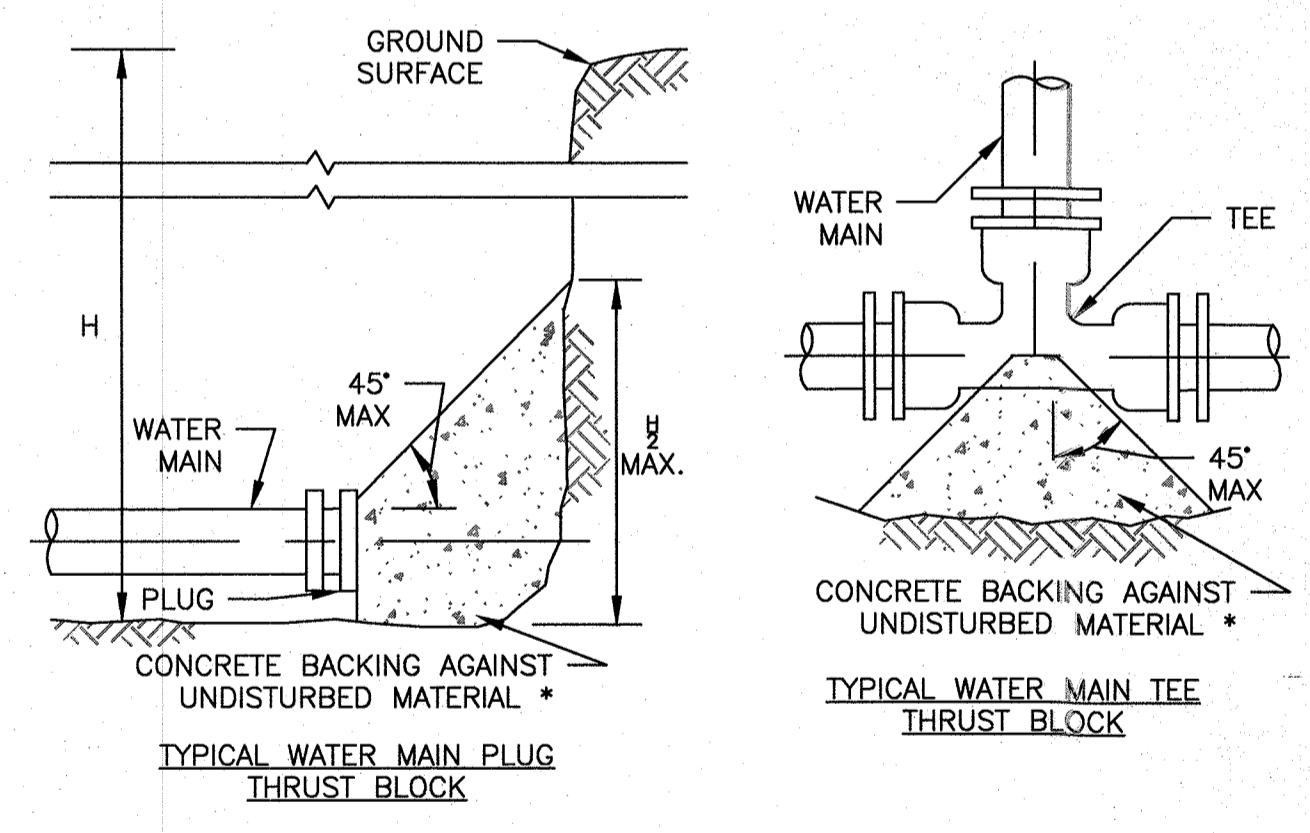
- NOTES:
1. HYDRANT VALVE AND TEE SHALL BE RODDED TOGETHER.
  2. ALL VALVES OPEN RIGHT
  3. ALL HYDRANTS SHALL BE PLACED AT BACK OF SIDEWALK WHERE POSSIBLE WITH HYDRANT MARKER.

TYPICAL FIRE HYDRANT DETAIL  
N.T.S.



- NOTE:
1. CONTRACTOR SHALL REMOVE AND RESET EXISTING GRANITE CURBING AS REQUIRED. TO SALVAGE EXISTING GRANITE CURBING, THE CONTRACTOR SHALL CAREFULLY REMOVE, CLEAN AND STORE THE UNDAMAGED CURB. ANY CURBING DAMAGED BY THE CONTRACTOR'S NEGLIGENCE SHALL BE REPLACED AT THE CONTRACTOR'S OWN EXPENSE.
  2. CONTRACTOR SHALL LOAM AND SEED ALL DISTURBED AREAS BEHIND RE-SET CURBING.

VERTICAL GRANITE CURBING  
DETAIL  
N.T.S.



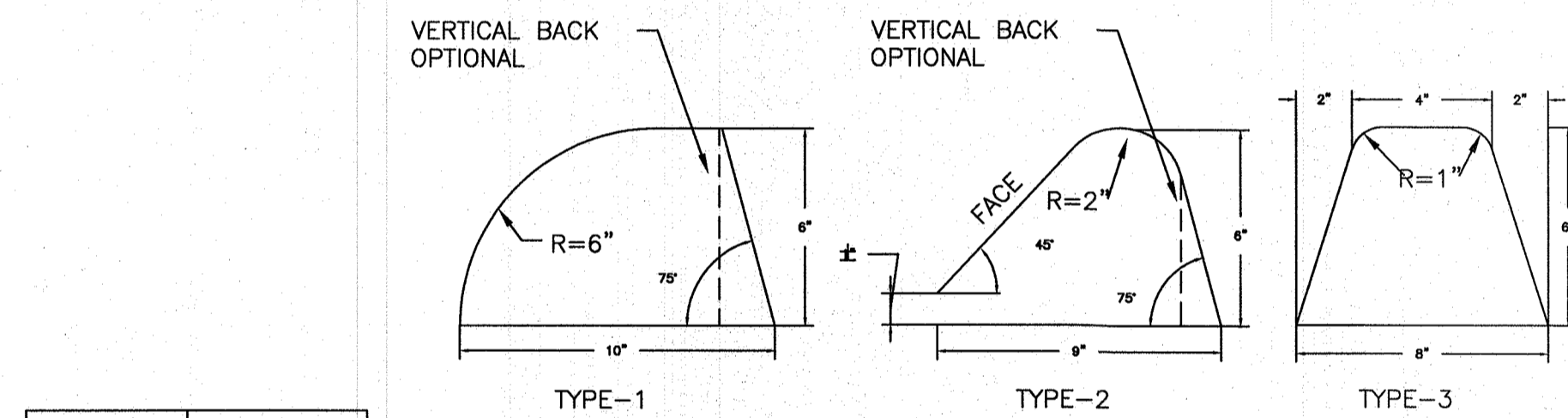
THRUST BLOCK BEARING AREAS FOR WATER PIPE

SIZE OF MAIN (IN.)	90° BEND	TEES AND PLUGS	45° BEND
6	4	2.5	2
8	6	4	3
12	12	9	7
16	21	16	12

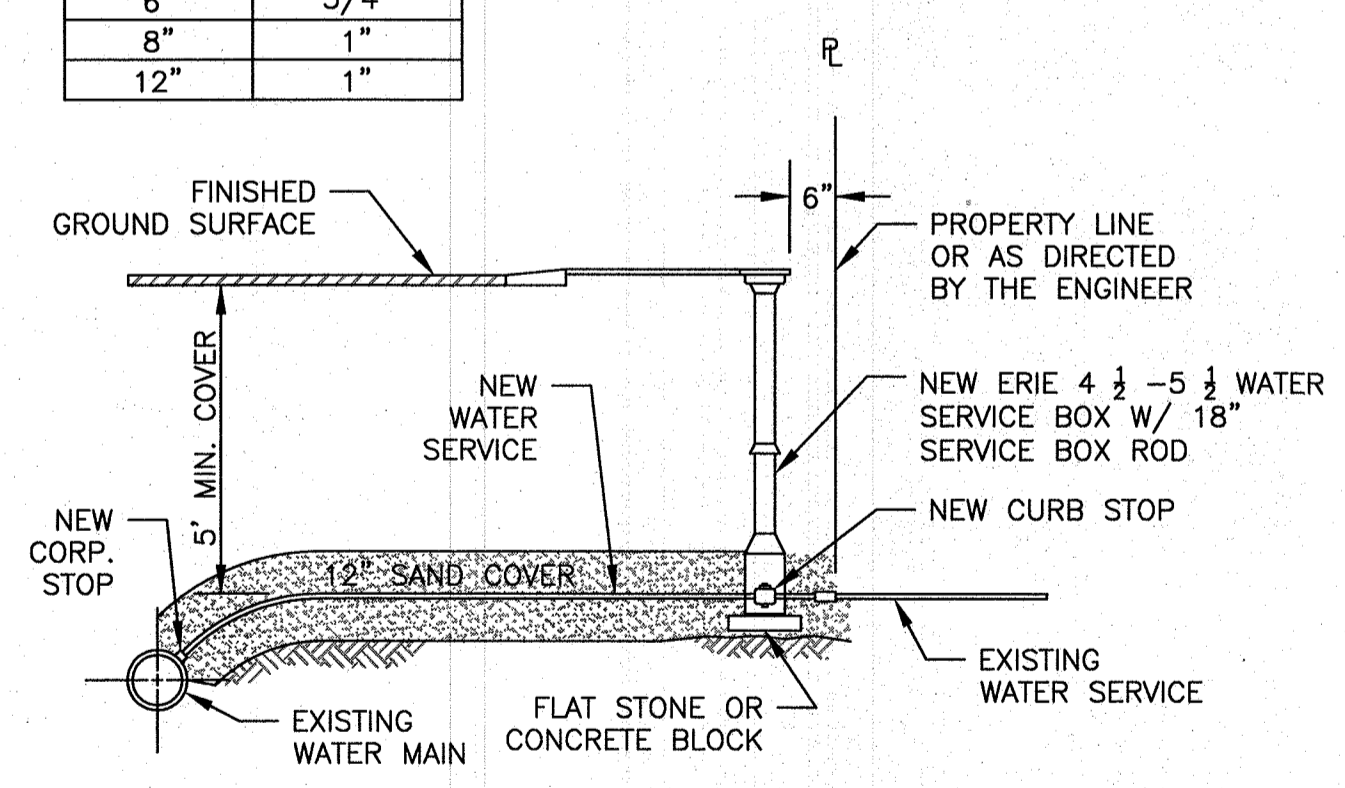
\* TYPE OF SOIL IS MEDIUM CLAYEY, 6 OR MORE BLOWS PER FOOT, OR LOOSE GRANULAR, 9 OR MORE BLOWS PER FOOT. SOIL CONDITIONS OTHER THAN THOSE GIVEN WILL REQUIRE LARGER BEARING AREAS.

- NOTES:
1. FOR FITTINGS WITH LESS THAN 45° DEFLECTION, USE BEARING AREAS FOR 45° BEND.
  2. BEARING AREAS BASED ON HORIZONTAL PASSIVE SOIL PRESSURE OF 2000 POUNDS PER SQUARE FOOT (PSF) AND INTERNAL WATER PRESSURE OF 150 POUNDS PER SQUARE INCH GAUGE (PSIG). JOINTS SHALL NOT BE ENCASED IN CONCRETE. BEARING AREAS MAY BE DISREGARDED FOR TRENCHES IN ROCK WHERE THE TOP OF THE ROCK FACE IS AT OR ABOVE THE CROWN OF THE PIPE. HOWEVER, CONCRETE BACKING SHALL BE PLACED BETWEEN THE PIPE AND THE ROCK FACE.
  3. ALL FITTINGS AND VALVES SHALL BE DUCTILE IRON MECHANICAL JOINT AND RESTRAINED WITH MJ RESTRAINTS (MEGALUG OR EQUAL).
  4. WATER MAINS SHALL BE C.L.D.I. CLASS 52 - DOUBLE CEMENT LINED.

TYPICAL THRUST BLOCK DETAIL  
N.T.S.

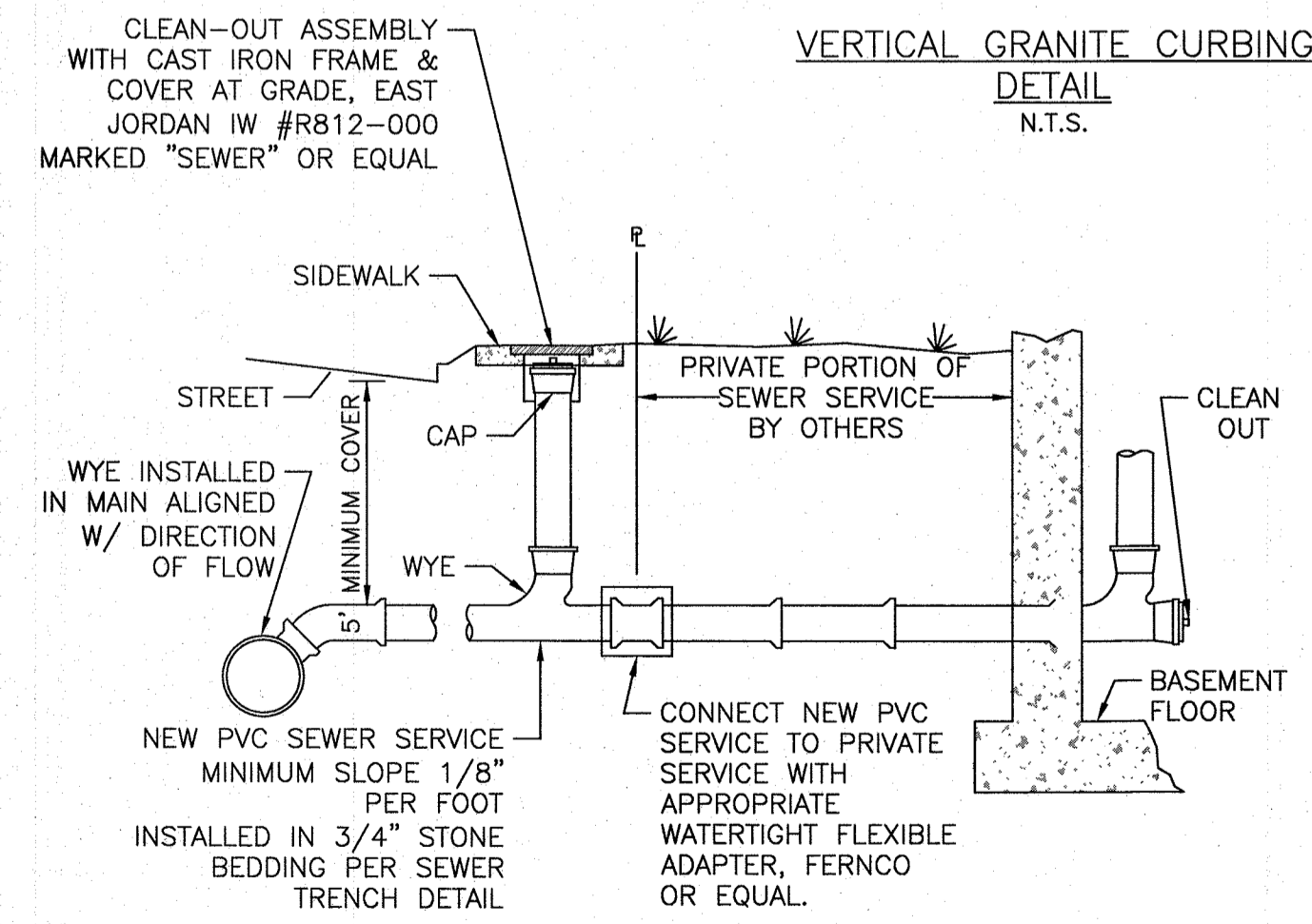


BITUMINOUS CONCRETE  
CURB DETAIL  
N.T.S.



- 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 DISPOSE OF EXISTING PIPE AND GATE BOX.

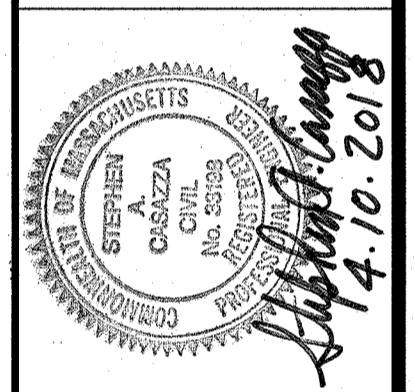
TYPICAL WATER SERVICE  
N.T.S.



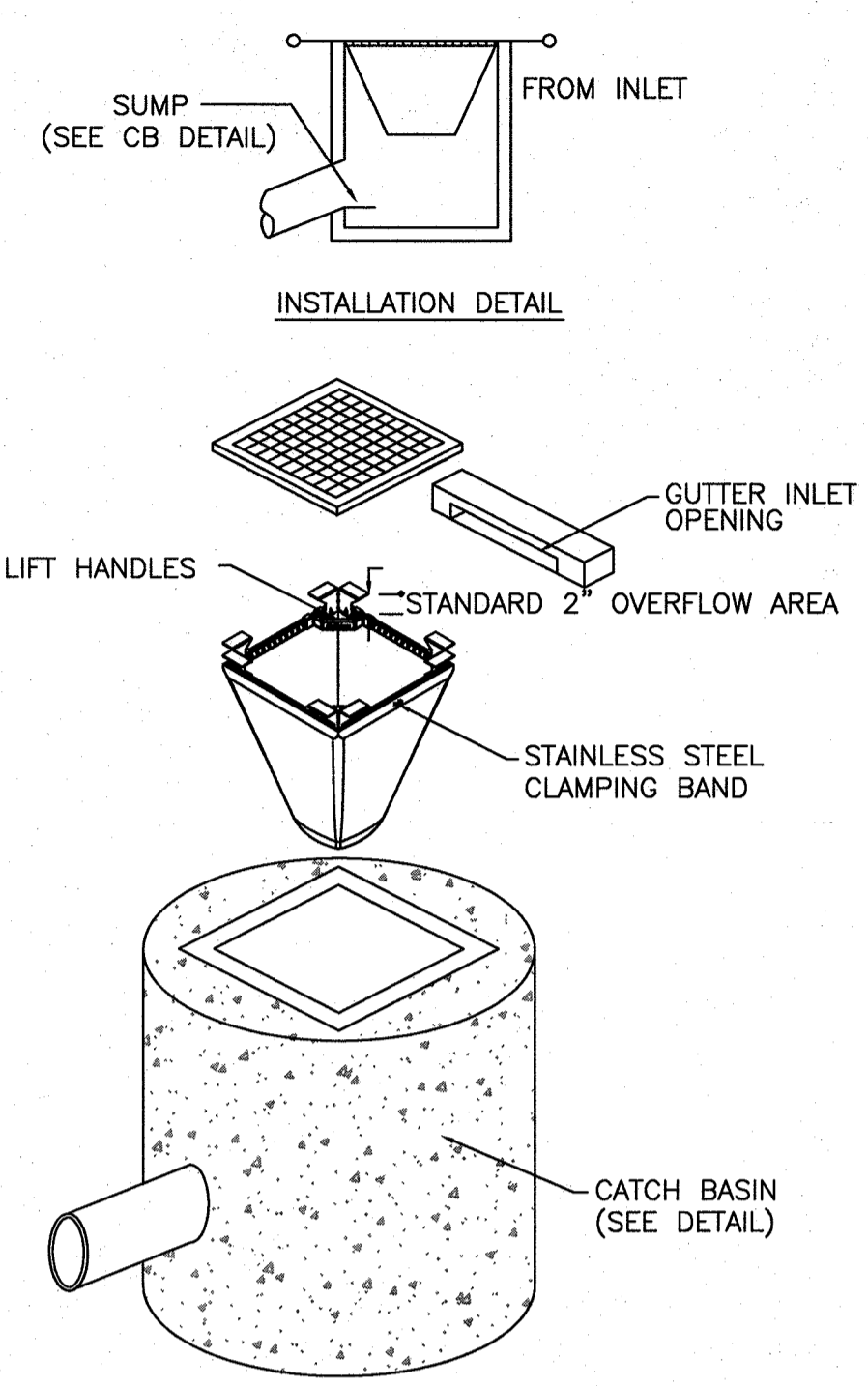
SEWER SERVICE DETAIL  
N.T.S.



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT DETAILS II

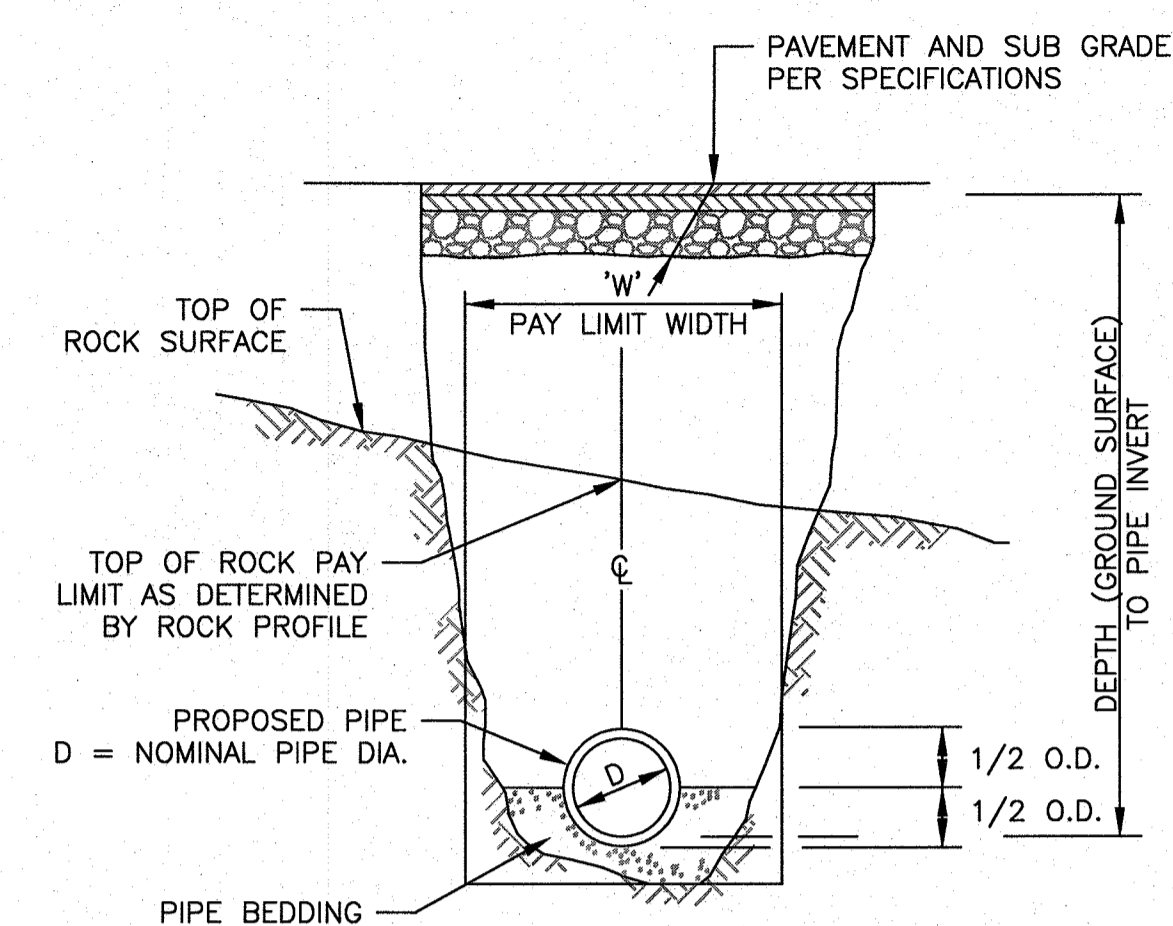


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CATCH BASIN SILT SACK DETAIL  
 N.T.S.

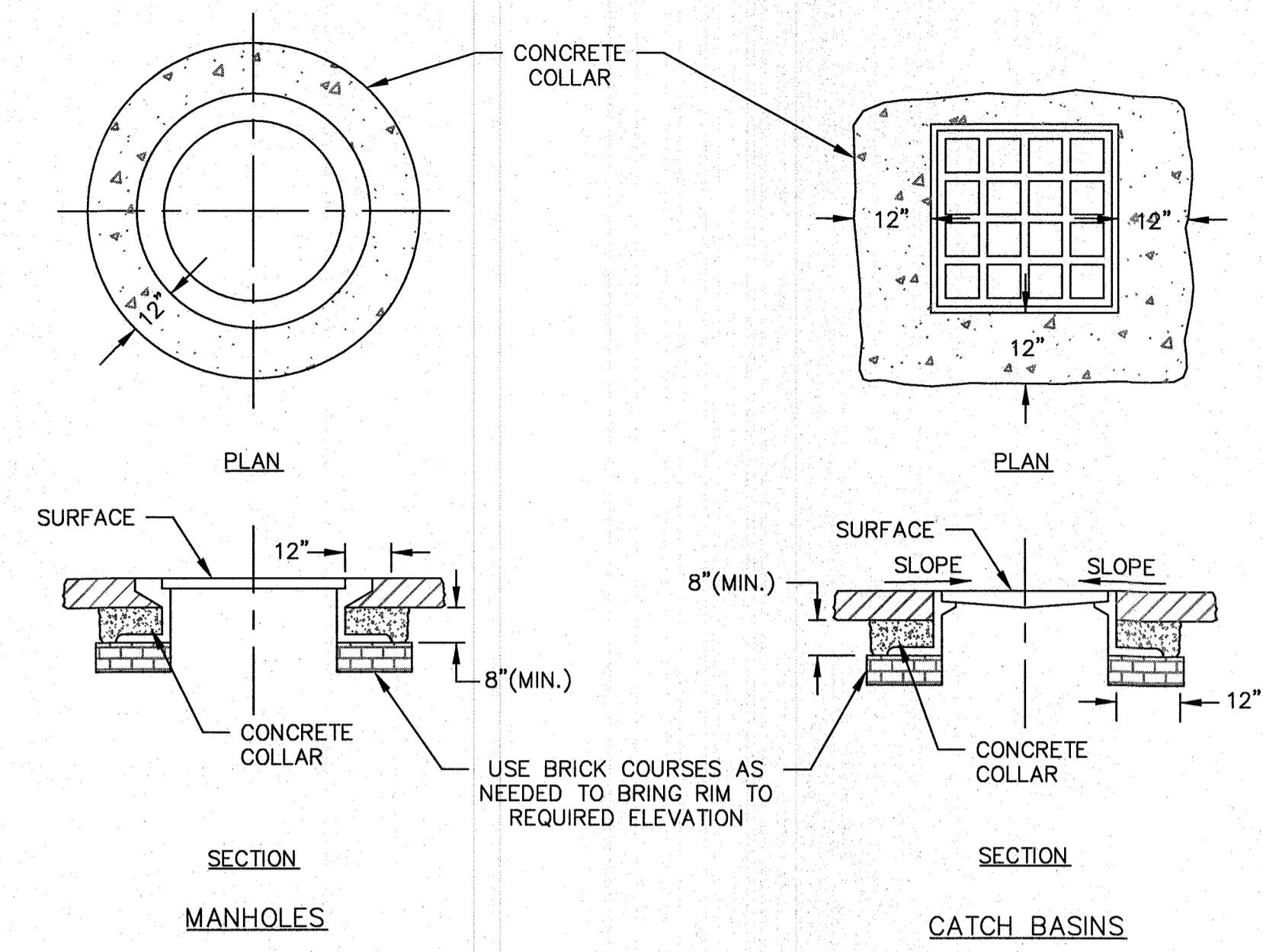
NOTE:  
 1. SILTSACKS SHALL BE FLEXSTORM CATCH-IT OR APPROVED EQUAL.  
 2. SILTSACKS SHALL BE INSTALLED IN ALL CATCH BASIN UNTIL DRAINAGE AREA HAS BEEN FULLY STABILIZED.



DEPTH FROM GROUND SURFACE TO INVERT OF PIPE	PAY WIDTH 'W' NOMINAL PIPE DIA. 'D'	
	D < 24"	D > 24"
DEPTH ≤ 12'	5'-0"	D+3'-0"
12' < DEPTH ≤ 20'	7'-0"	D+5'-0"
DEPTH > 20'	9'-0"	D+7'-0"

TYPICAL PAY LIMITS FOR ROCK EXCAVATION DETAIL  
 N.T.S.

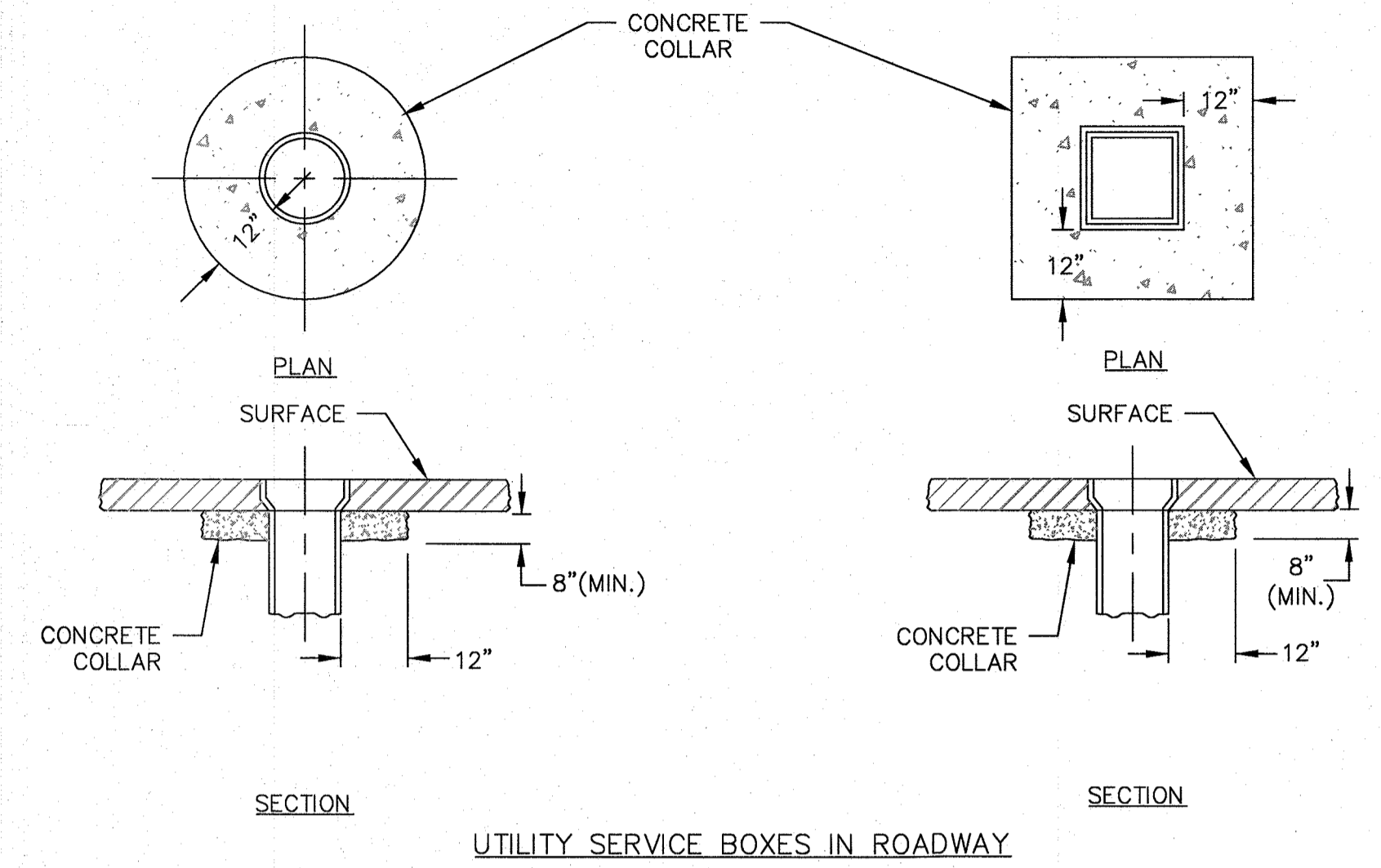
NOTE:  
 1. THE MAXIMUM PAY LIMIT FOR ROCK REMOVAL OUTSIDE OF UTILITY STRUCTURES SHALL BE WITHIN A VERTICAL LINE OFFSET OF ONE FOOT (1') OUTSIDE THE WIDEST DIMENSION OF THE STRUCTURE OR SHALL BE THE MAXIMUM CONNECTING TRENCH WIDTH, WHICHEVER IS GREATER.



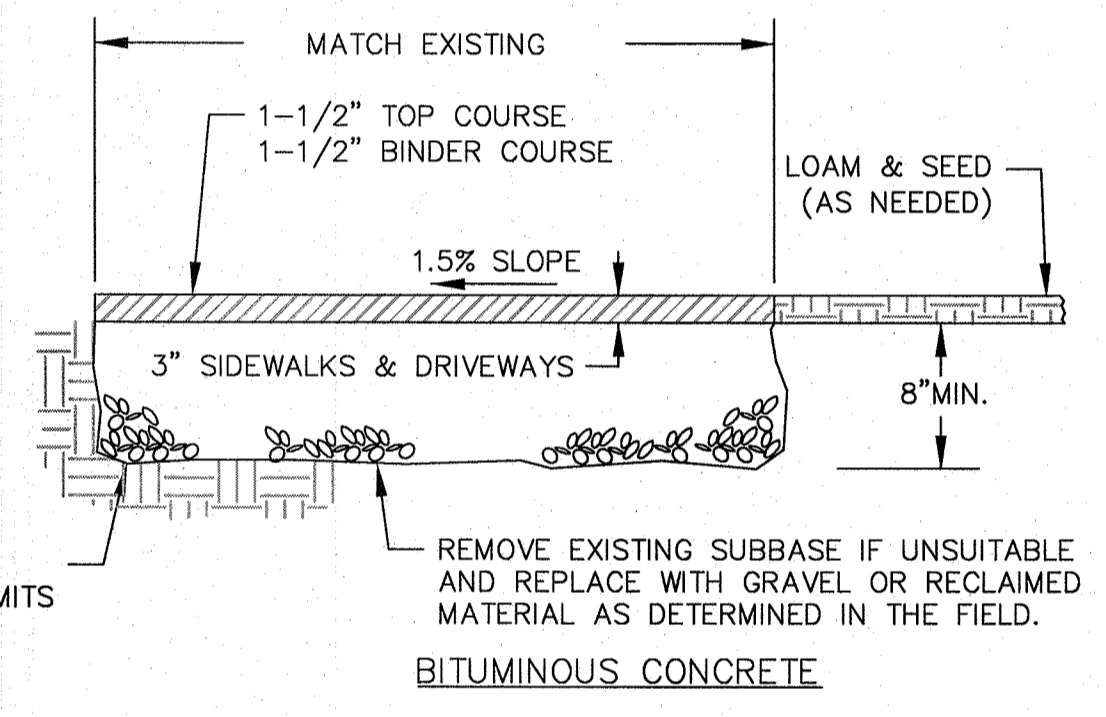
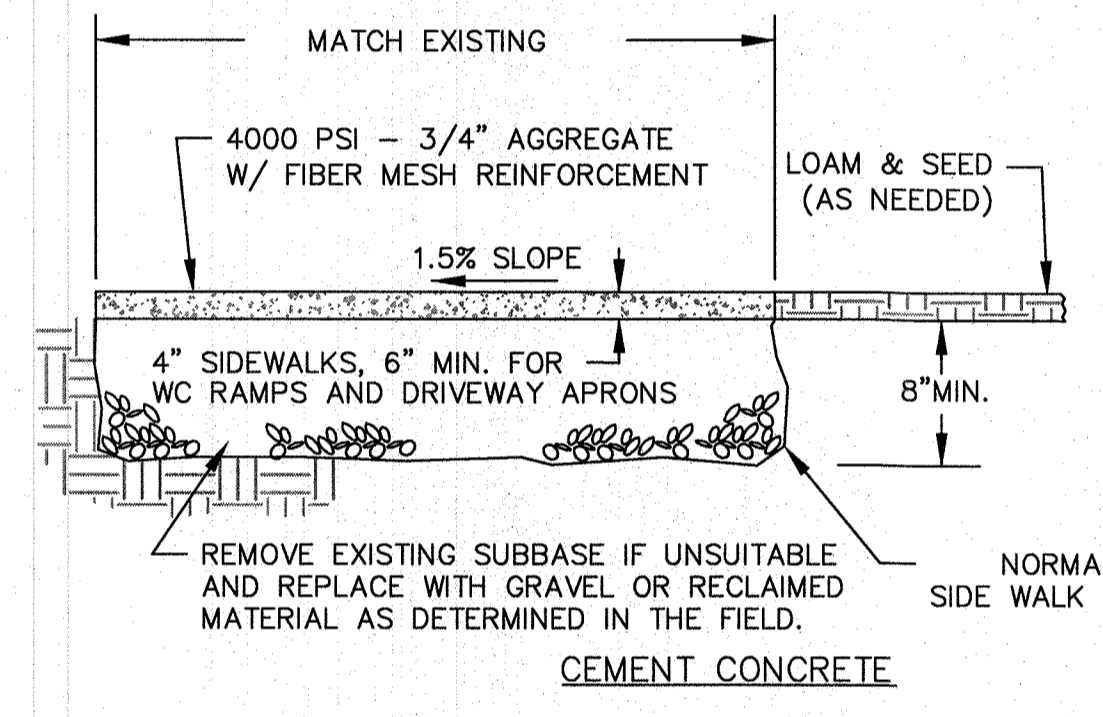
MANHOLES

CATCH BASINS

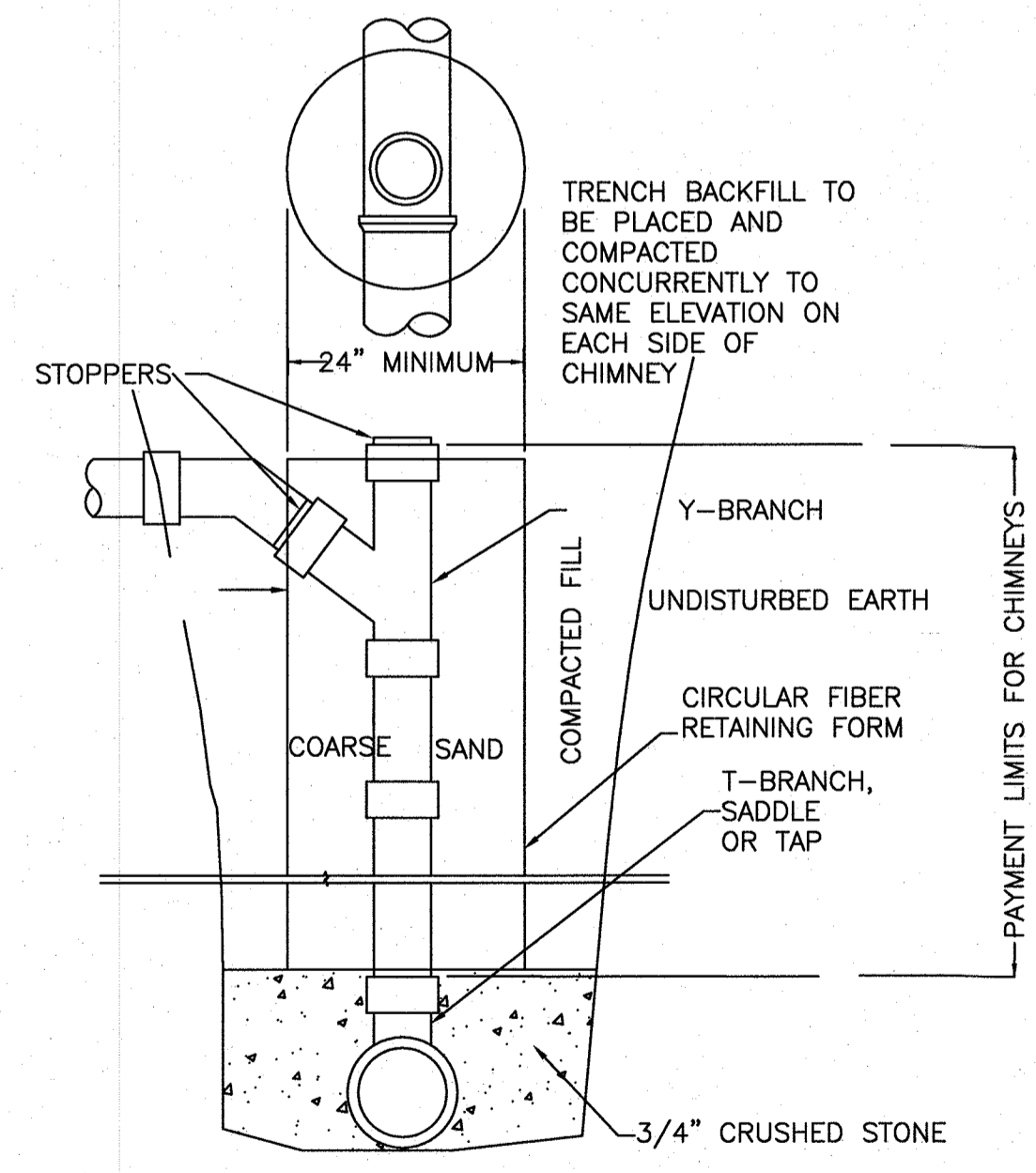
DETAILS FOR RAISING CASTINGS AND VALVE BOXES  
 N.T.S.



UTILITY SERVICE BOXES IN ROADWAY

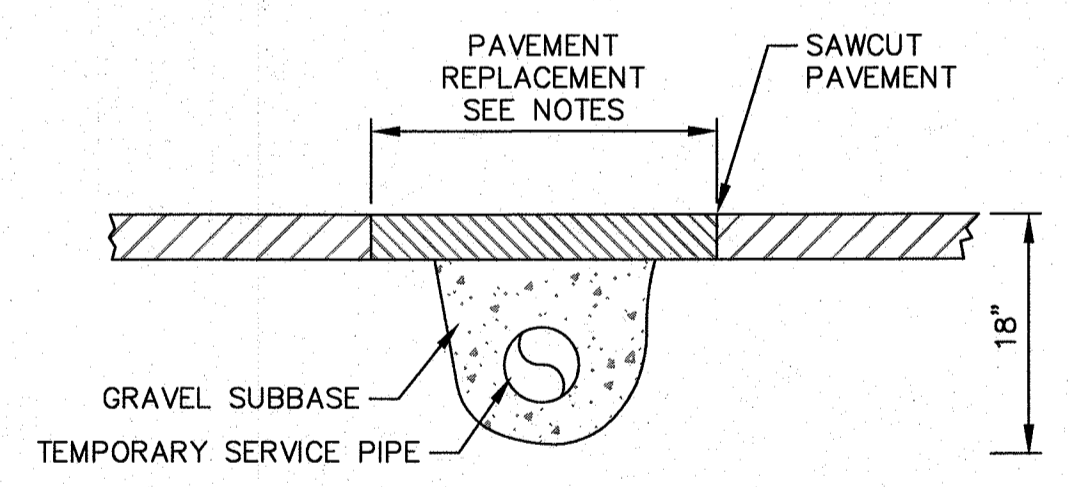


WALKWAY DETAIL  
 N.T.S.



SANITARY SEWER SERVICE CHIMNEY DETAIL  
 N.T.S.

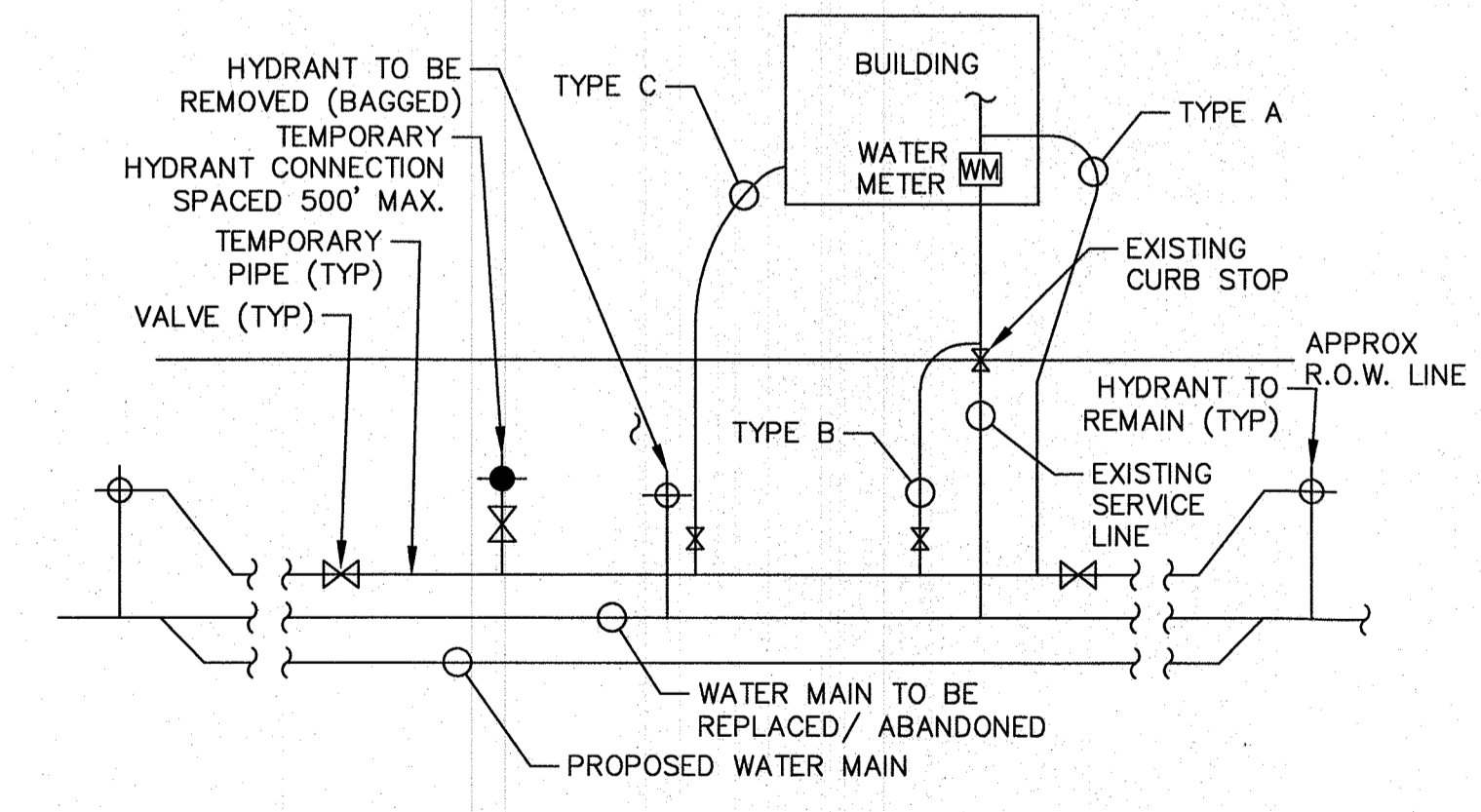
NOTE:  
 1. CHIMNEYS TO BE PAID FOR AT THE PRICE PER VERTICAL PIPE UNDER THE CORRESPONDING PIPE ITEM.



PAVED ROADWAY/DRIVEWAY CROSSING

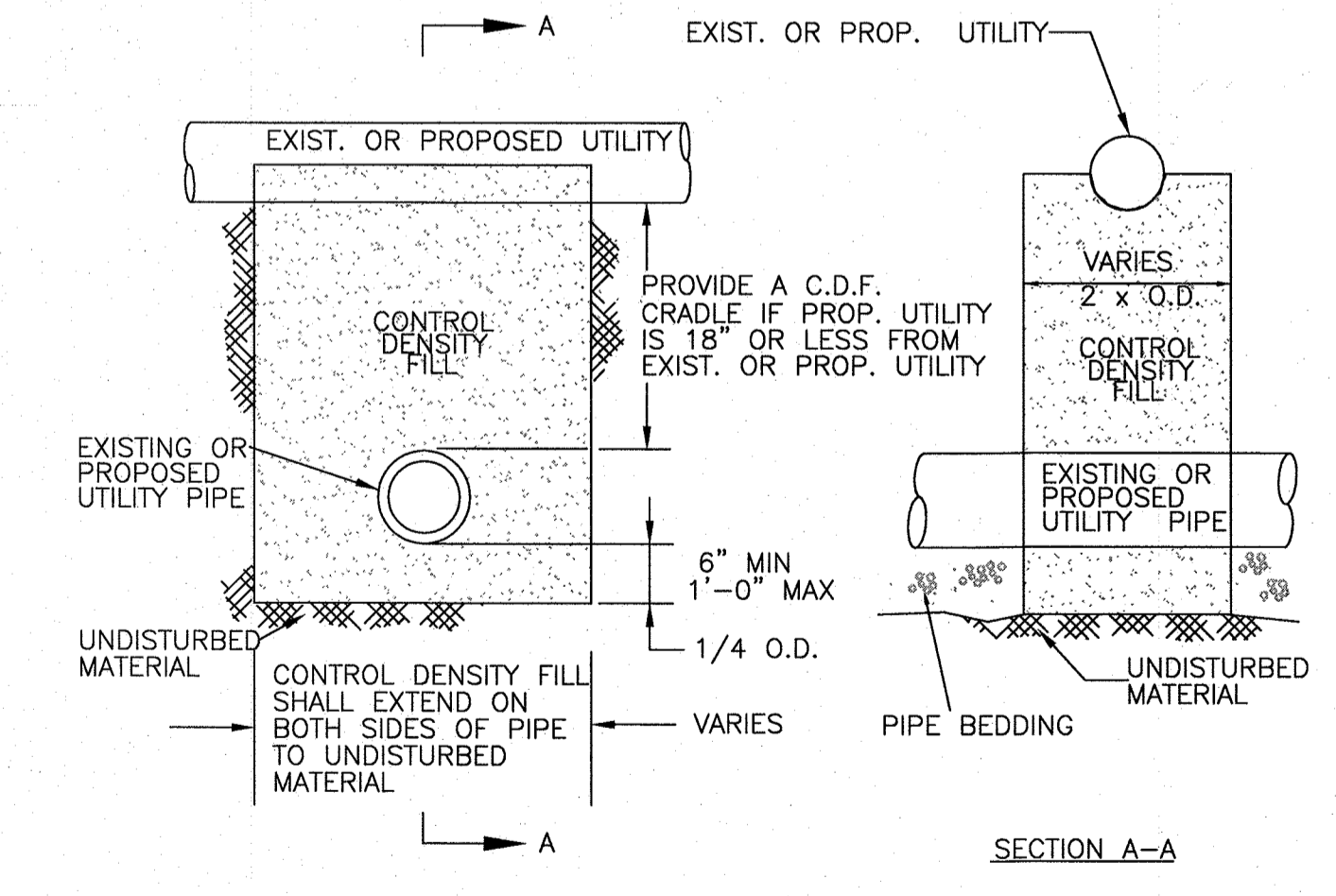
NOTES:  
 1. TEMPORARY PAVEMENT 2" THICK. PERMANENT PAVEMENT 4" PLACED IN TWO (2) LIFTS - 2" BASE, 2" TOP.  
 2. COLD PATCH MAY BE USED FOR TEMPORARY TRENCH PAVING AT THE DISCRETION OF THE ENGINEER.  
 3. ALL TRENCHES SHALL BE SAW CUT, SANDED AND SEALED.

TEMPORARY SERVICE PIPE CROSSING DETAIL IN ROADWAY/DRIVEWAY  
 N.T.S.



CONNECTION TYPE A - TEMPORARY SERVICE WITH METER REMOVED  
 CONNECTION TYPE B - TEMPORARY SERVICE AT EXISTING CURB STOP  
 CONNECTION TYPE C - TEMPORARY SERVICE AT OTHER SUITABLE LOCATION

TYPICAL TEMPORARY SERVICE PIPE DETAIL  
 N.T.S.



CONCRETE UTILITY SUPPORT DETAIL  
 N.T.S.

**TRAFFIC MANAGEMENT NOTES:**

**GENERAL:**

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE MHD STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TRAFFIC MANAGEMENT PLANS.
- THE TRAFFIC MANAGEMENT PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D. AND AS APPROVED OR REQUIRED BY THE CITY. THE CONTRACTOR SHALL SUBMIT ALTERNATE TRAFFIC CONTROL PLANS FOR APPROVAL WHEN NECESSARY.
- WORK WITHIN THE TRAVELED WAY SHALL BE DETERMINED DURING THE PRE-CONSTRUCTION MEETING.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- 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.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
- CONTRACTOR SHALL MAINTAIN ABUTTER ACCESS AT ALL TIMES EXCEPT FOR VERY SHORT PERIODS APPROVED BY THE TOWN. CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
- THE FIRST THREE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE AS SHOWN ON THESE PLANS OR AS DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER. ONE (1) THROUGH TRAVEL LANE HAVING A MINIMUM WIDTH OF 11 FEET MAY BE PROVIDED FOR BOTH DIRECTIONS (LANE TO BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE IN SOME SITUATIONS UNDER POLICE CONTROL) EXCEPT WHERE ROAD CLOSURE IS SHOWN ON THE DRAWINGS OR OTHERWISE PERMITTED BY ENGINEER.
- LANE RESTRICTIONS MAY NOT REMAIN DURING NON-WORKING HOURS. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
- IF APPROVED BY OWNER & AGENCY WITH JURISDICTION, NIGHT WORK OPERATIONS SHALL INCLUDE PROPERLY LIT & PLACED LUMINAIRES MEETING THE REQUIREMENTS OF THE MUTCD AND MASSDOT.
- ALL TRAFFIC MANAGEMENT SETUPS SHOULD ACCOMMODATE LARGE VEHICLES (WB-50) UNLESS A TRUCK EXCLUSION IS PRESENT.
- ALL WORK ZONE AREAS SHOULD BE PROTECTED APPROPRIATELY. ALL EXPOSED WORK ZONES SHOULD BE STEEL PLATED OR BACK FILLED WHEN NO WORK IS UNDERWAY/PERFORMED AND APPROPRIATELY SIGNED.

**GRADE DIFFERENCES:**

- WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN THE EXISTING PAVEMENT AND COLD PLANED OR NEW PAVEMENT, THE CONTRACTOR SHALL PATCH A TEMPORARY HOT MIX ASPHALT WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.
- CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.
- CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.
- A MINIMUM SLOPE OF 4:1 MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, NEXT SHEET). A MINIMUM SLOPE OF 8:1 MUST BE MAINTAINED ON ALL ABUTTED ACCESS DRIVES AND A MINIMUM SLOPE OF 12:1 MUST BE MAINTAINED ON ALL SIDEWALKS.

**CONSTRUCTION SIGNING:**

- THE FIRST CONSTRUCTION SIGN IN A SERIES ON EACH APPROACH TO THE PROJECT SHALL BE FLUORESCENT ORANGE, HIGH PERFORMANCE (OR HIGH DENSITY) SHEETING.
- ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED AND SHALL CONFORM TO THE MUTCD.
- EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS REQUIRED BY THE TOWN.
- ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.
- IF USED, W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY LANE RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT IN ACCORDANCE WITH NOTE ABOVE.
- USE W20-8 SIGNS ONLY WHILE POLICE ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH WORK DAY.
- SIGNS MUST BE PROFESSIONALLY LETTERED. NO HANDWRITTEN/PAINTED SIGNS SHALL BE ALLOWED.
- WHERE LANE SHIFTS, WORK ZONES, OR OTHER CONSTRUCTION ACTIVITIES INFRINGE UPON ON-STREET PARKING AREAS, THE CONTRACTOR SHALL INSTALL TEMPORARY 'NO PARKING/TOW AWAY ZONE' SIGNS (R8-3/R7-201) AS APPROPRIATE AT LEAST 24 HOURS IN ADVANCE. THE R8-3/R7-201 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY UNLESS PARKING RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT AS REQUIRED BY THE TOWN.

**PAVEMENT MARKINGS:**

- PAVEMENT MARKINGS WHICH ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TRAFFIC MANAGEMENT PLANS AND AS REQUIRED BY THE TOWN.
- ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT TAPE, AS REQUIRED BY THE TOWN. FOR THE FULL DURATION OF THE PHASE IN PROGRESS, TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

**FORMULAS FOR DETERMINING TAPER LENGTHS**

Speed Limit (S)	Taper Length (L) Feet
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR MORE	$L = WS$

WHERE: L = TAPER LENGTH IN FEET (METERS)

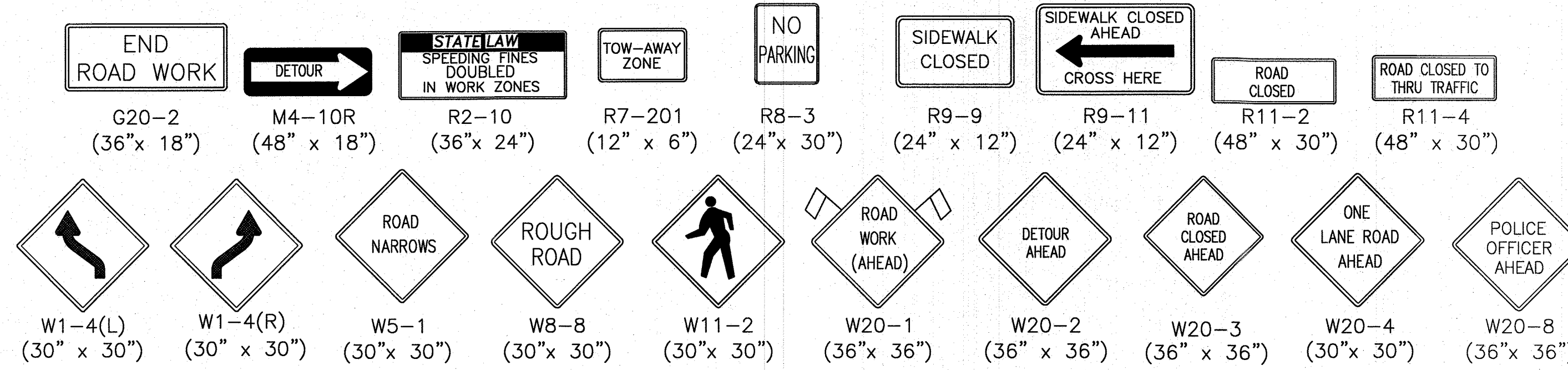
W = WIDTH OF OFFSET IN FEET (METERS)

S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO

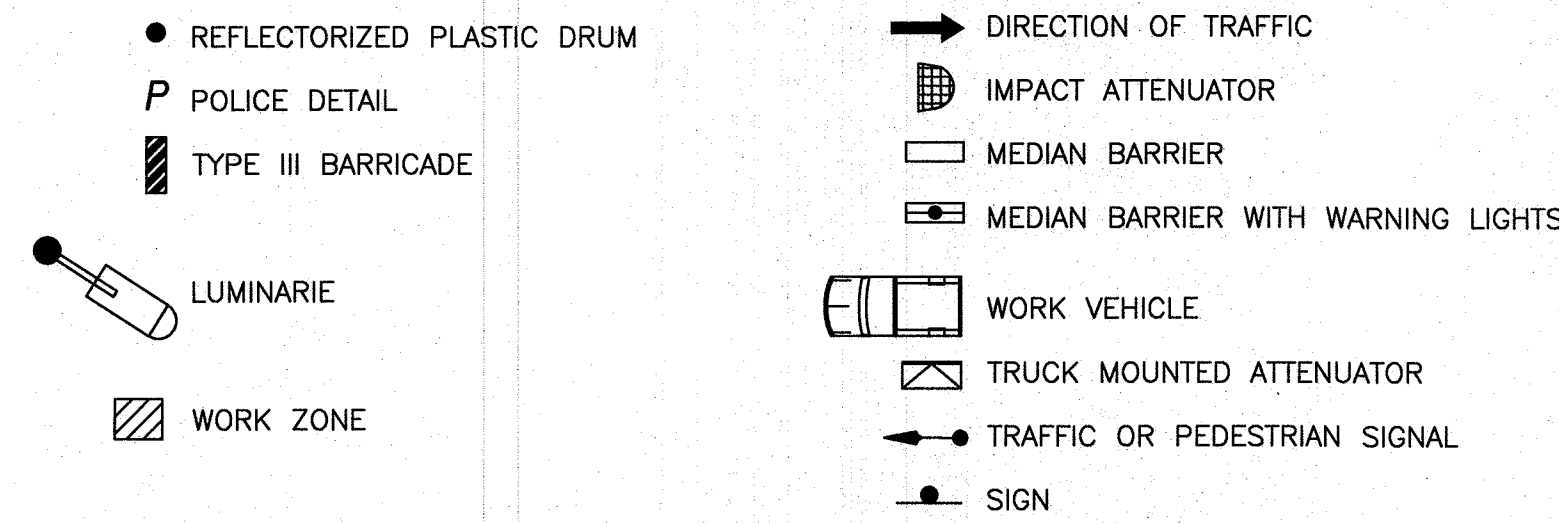
WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 2003 MUTCD

**SIGN LEGEND:**



**LEGEND:**



**TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES**

Type of Taper	Taper Length (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	100 FT MAXIMUM
DOWNSTREAM TAPER	100 FT PER LANE

Source: Table 6C-3 2003 MUTCD

**SUGGESTED WORK ZONE WARNING SIGN SPACING**

Road Type	Distance Between Signs**		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350	350	350
MOST OTHER ROADWAYS*	500	500	500
FREeways AND EXPRESSWAYS*	1,000	1,500	2,640

\* SPEED CATEGORY TO BE DETERMINED BY MASSDOT.

\*\* DISTANCES ARE SHOWN IN FEET. THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS REFERRED TO AS THE INITIAL ADVANCE WARNING SIGN ON THE TMP SETUPS. IT IS THE ONE WHICH MAY OFTEN HAVE THE "STANDARD RED OR RED-ORANGE FLAGS (16 in. X 16 in.)" MOUNTED ON IT. THESE INITIAL ADVANCE WARNING SIGNS ARE LOCATED AT THE PROJECT LIMITS ON ALL APPROACHES (I.E. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10 SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS.

R2-10, W20-1 AND G20-2 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

**STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED**

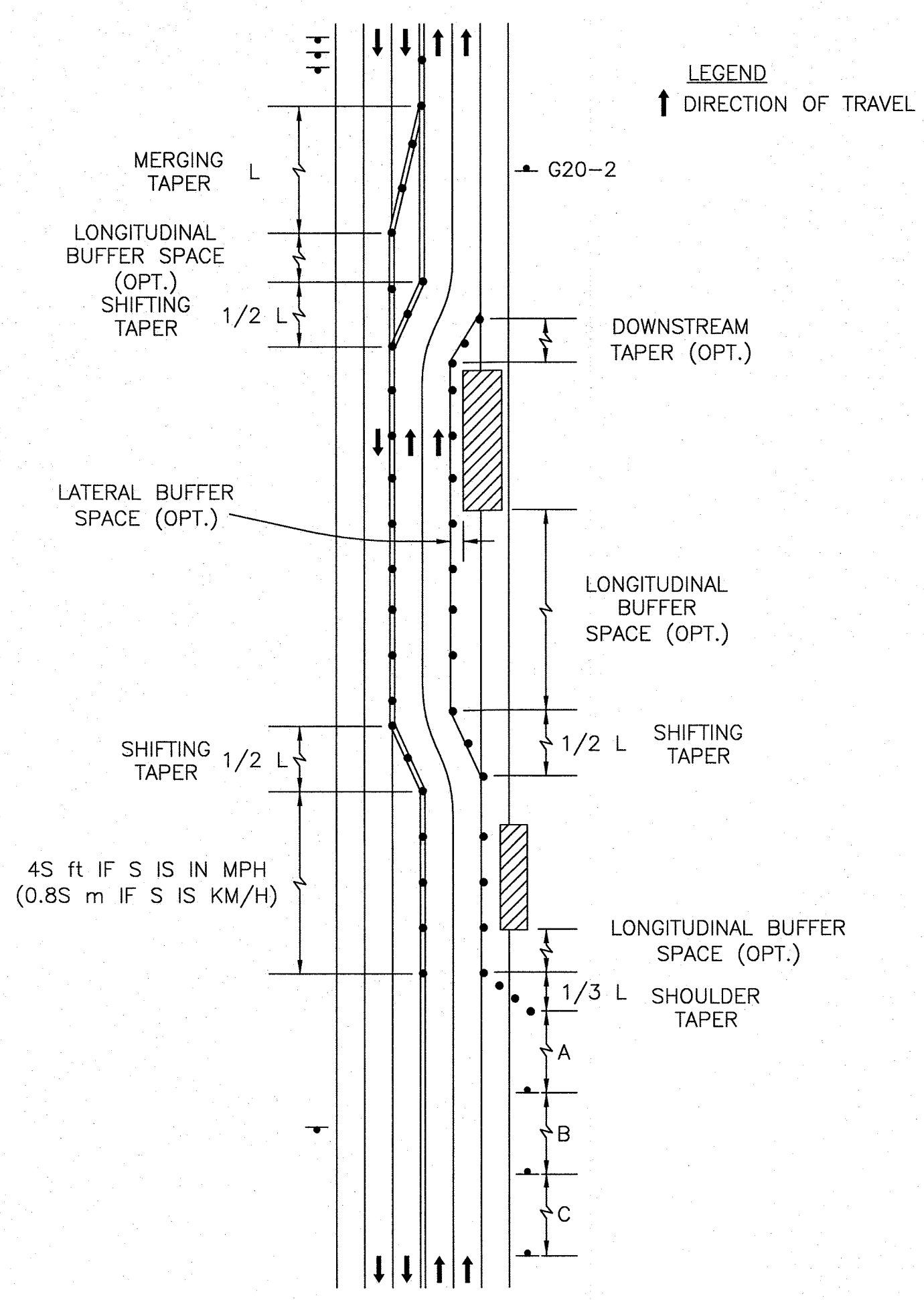
SPEED* (mph)	DISTANCE (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

\*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

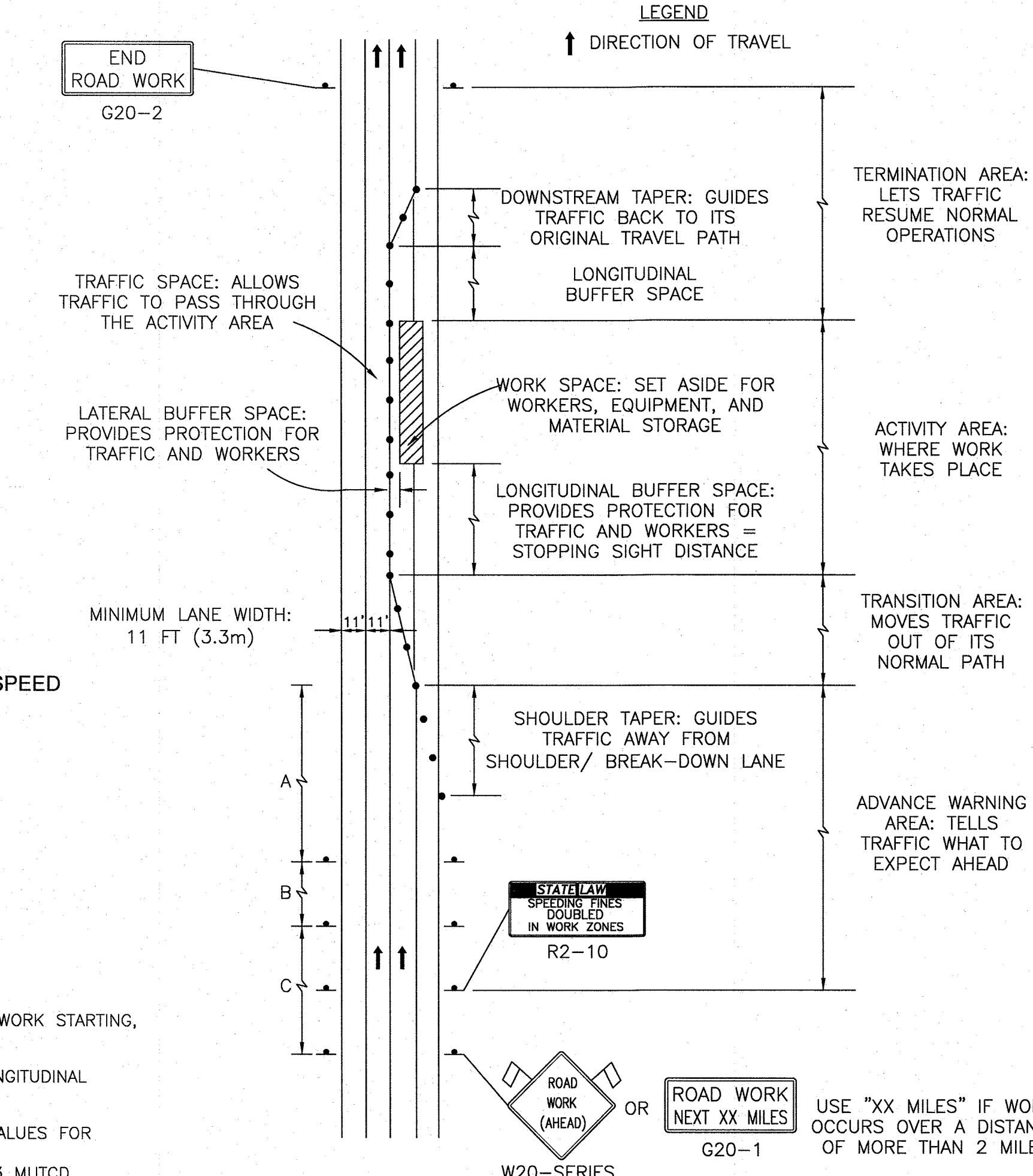
THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 2003 MUTCD



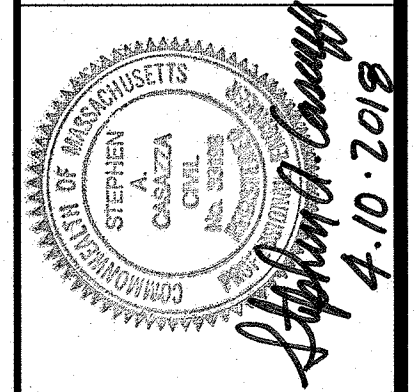
**TYPES OF TAPERS AND BUFFER SPACES**



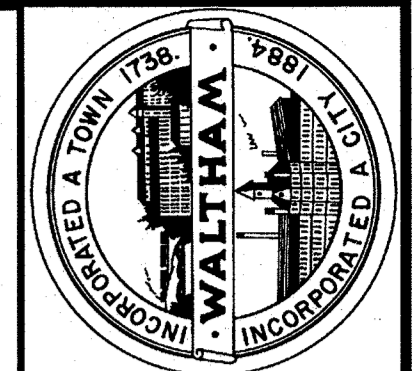
**COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL ZONE**



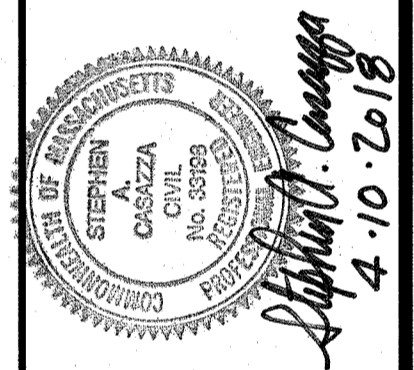
CITY OF WALTHAM ENGINEERING DEPARTMENT  
MONTCLAIR AVENUE  
WATER MAIN REPLACEMENT TRAFFIC DETAIL I



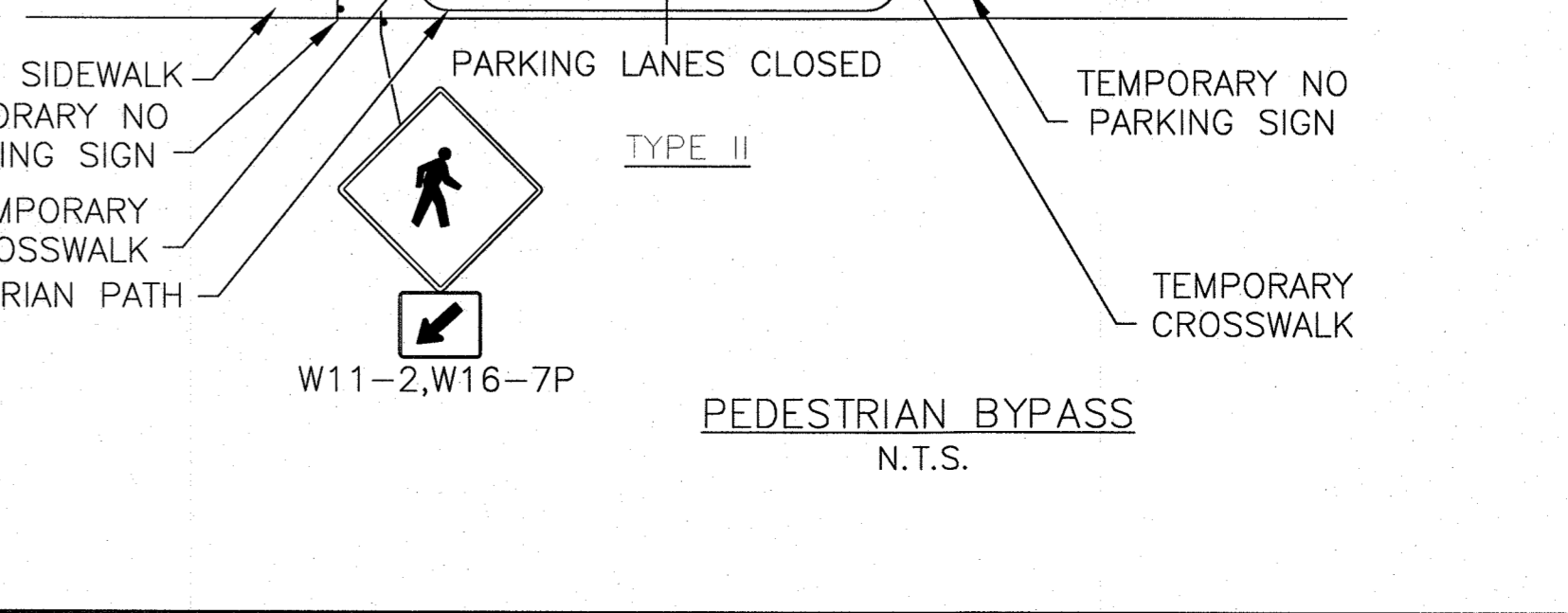
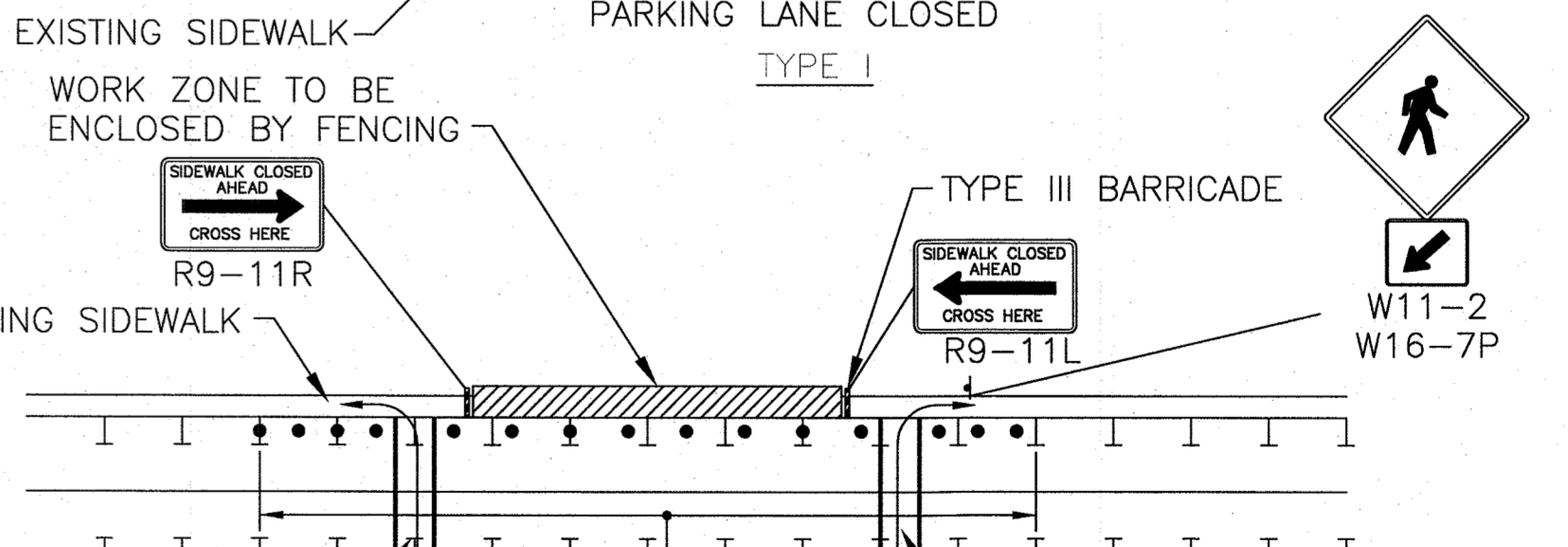
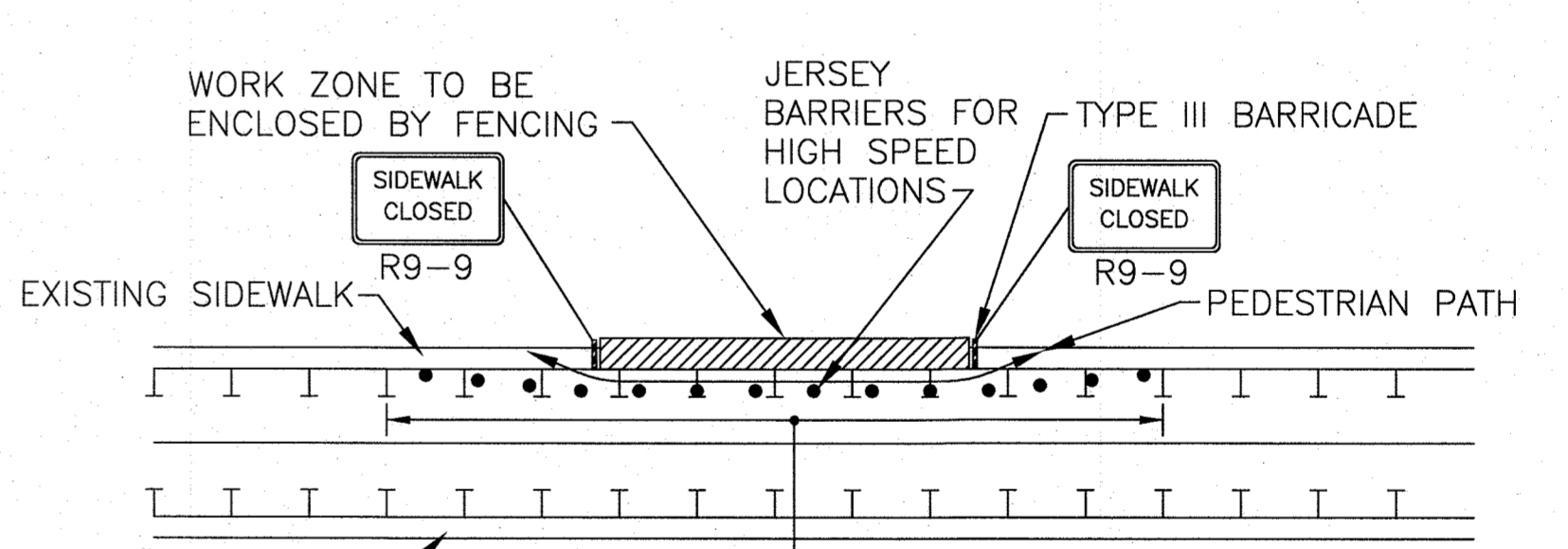
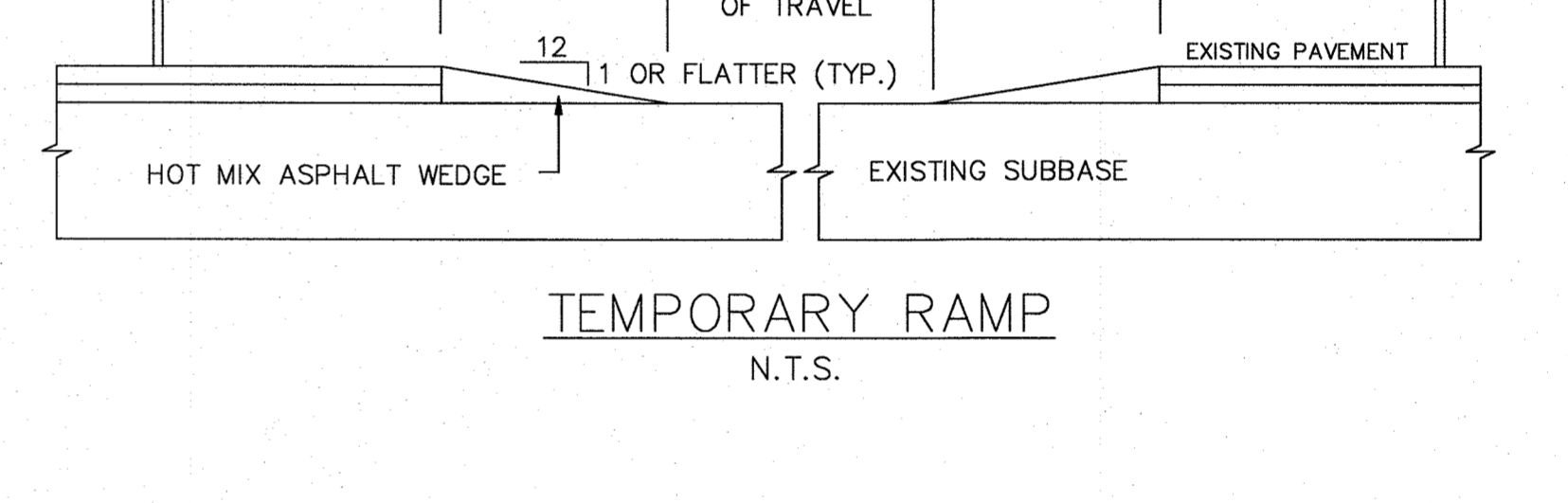
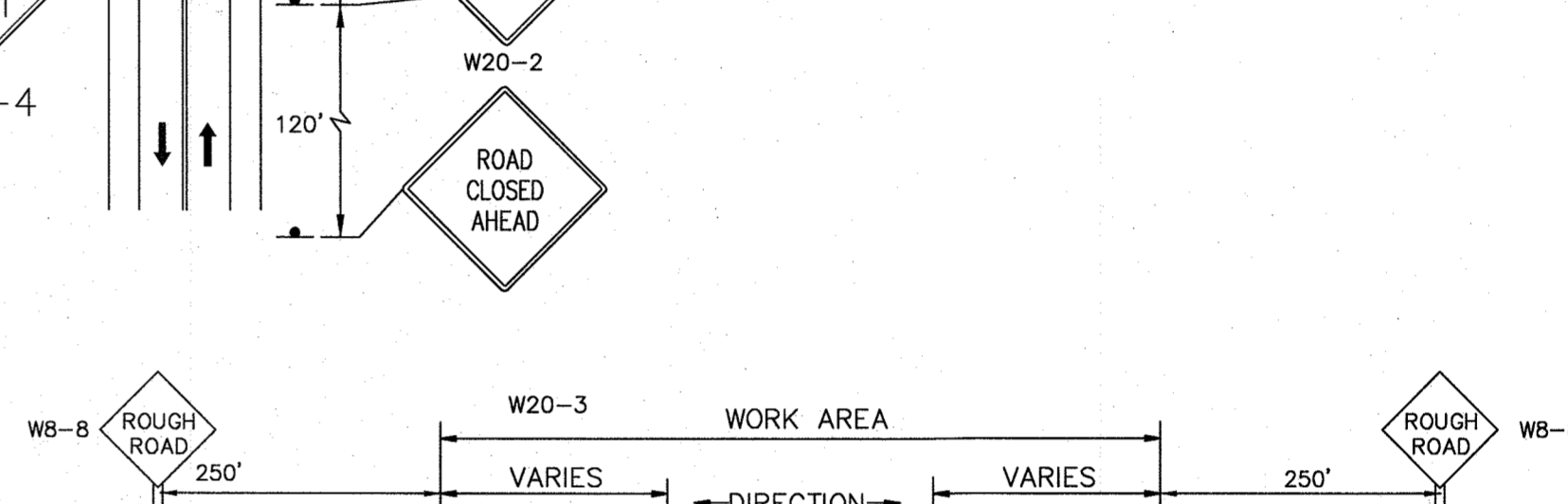
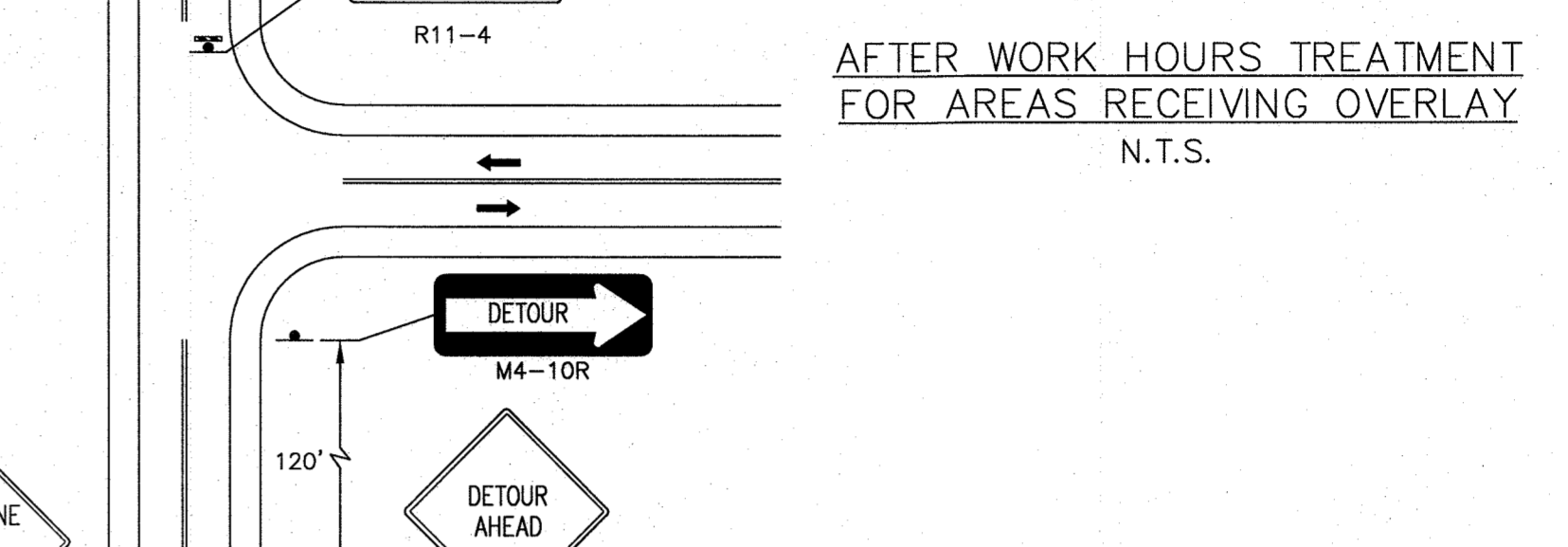
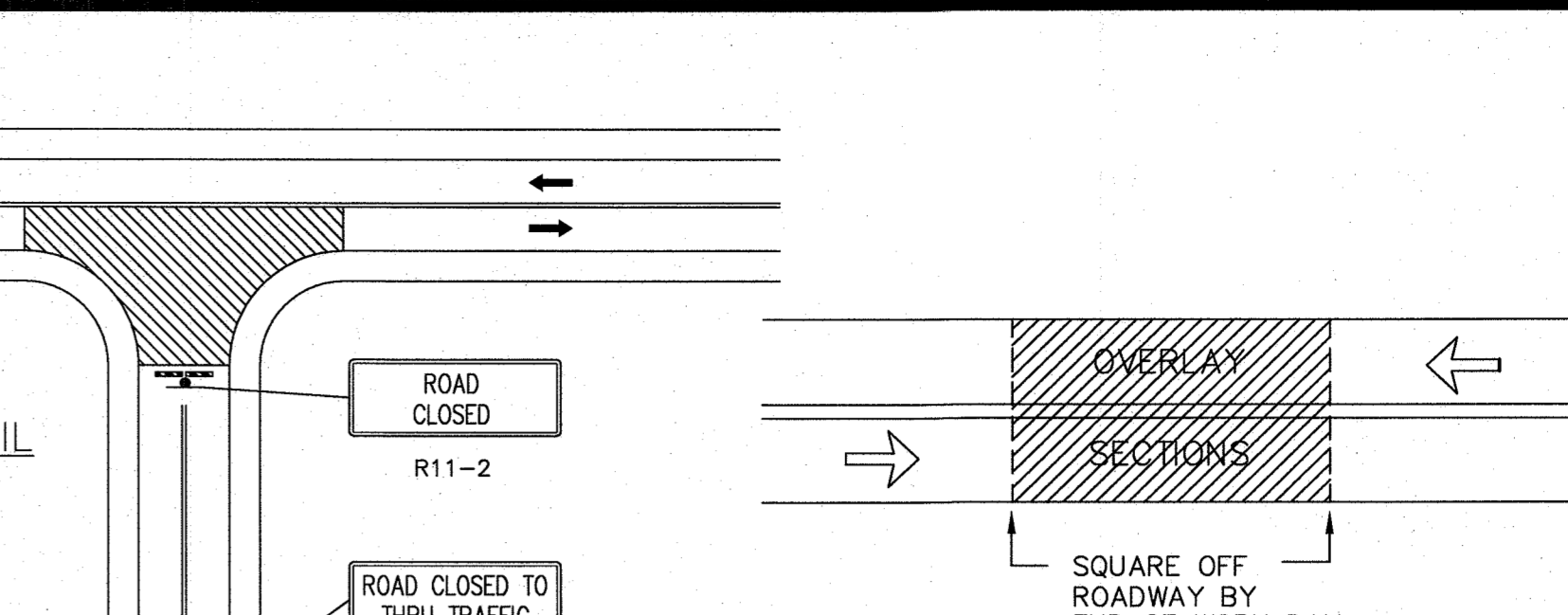
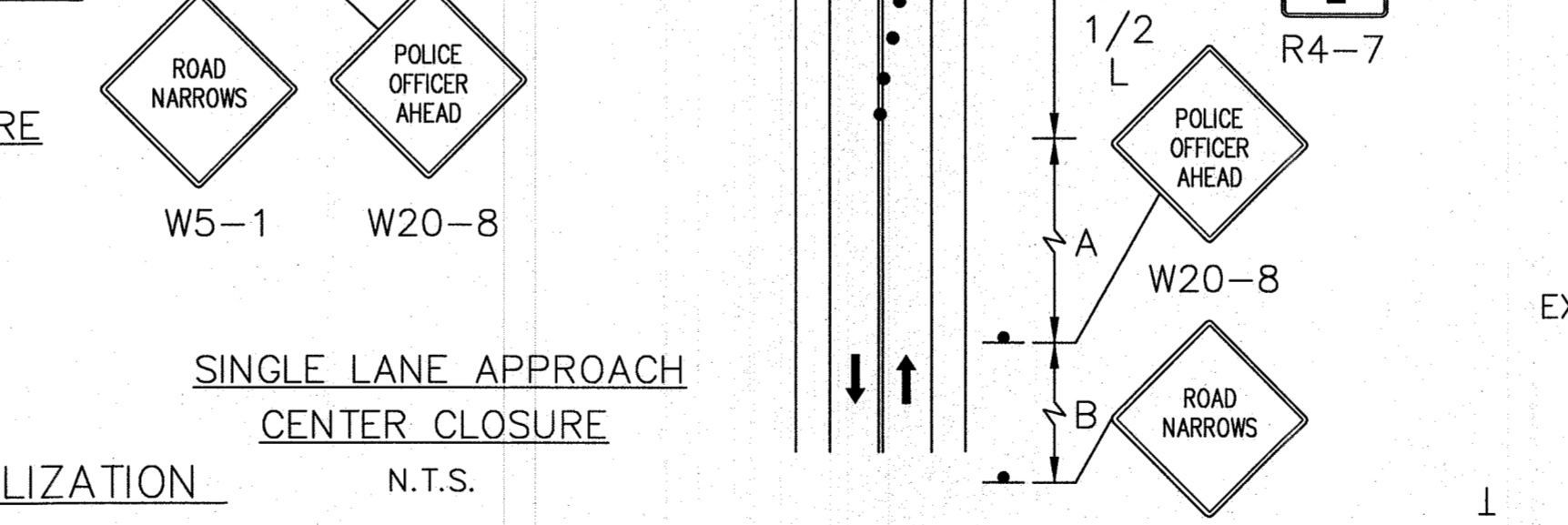
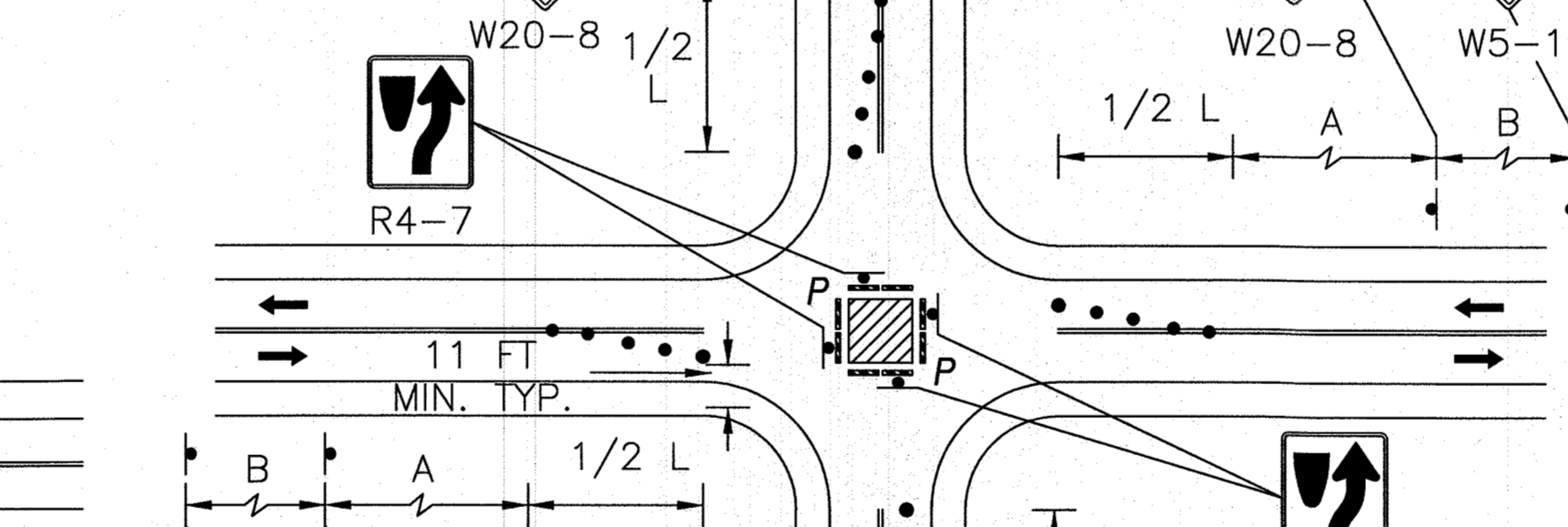
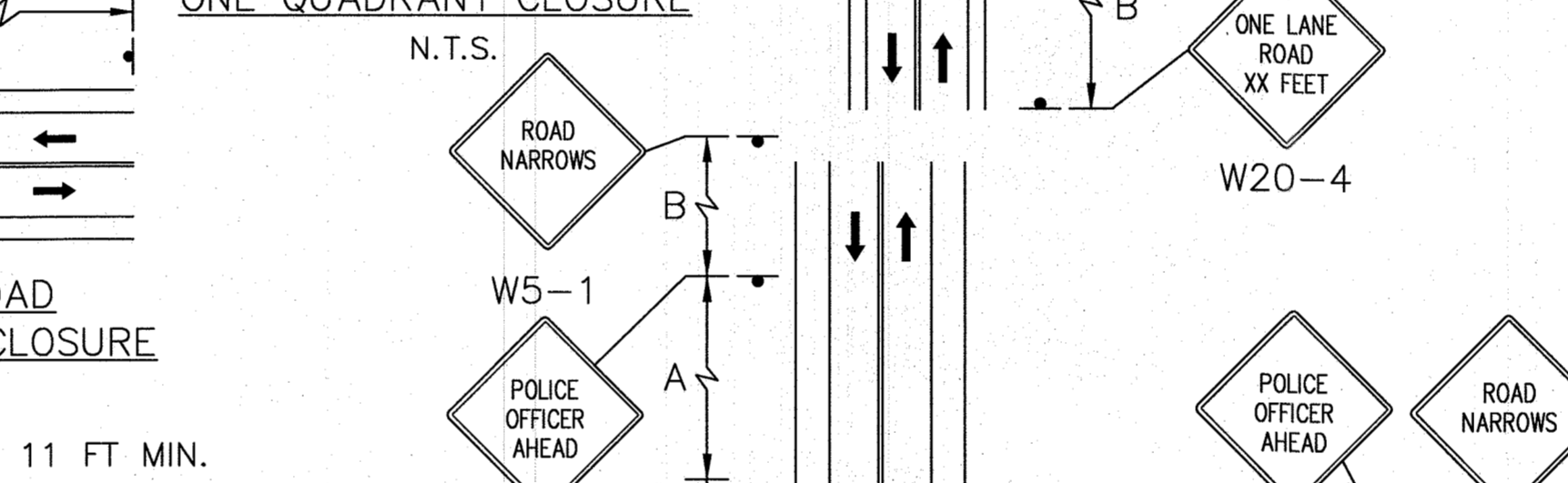
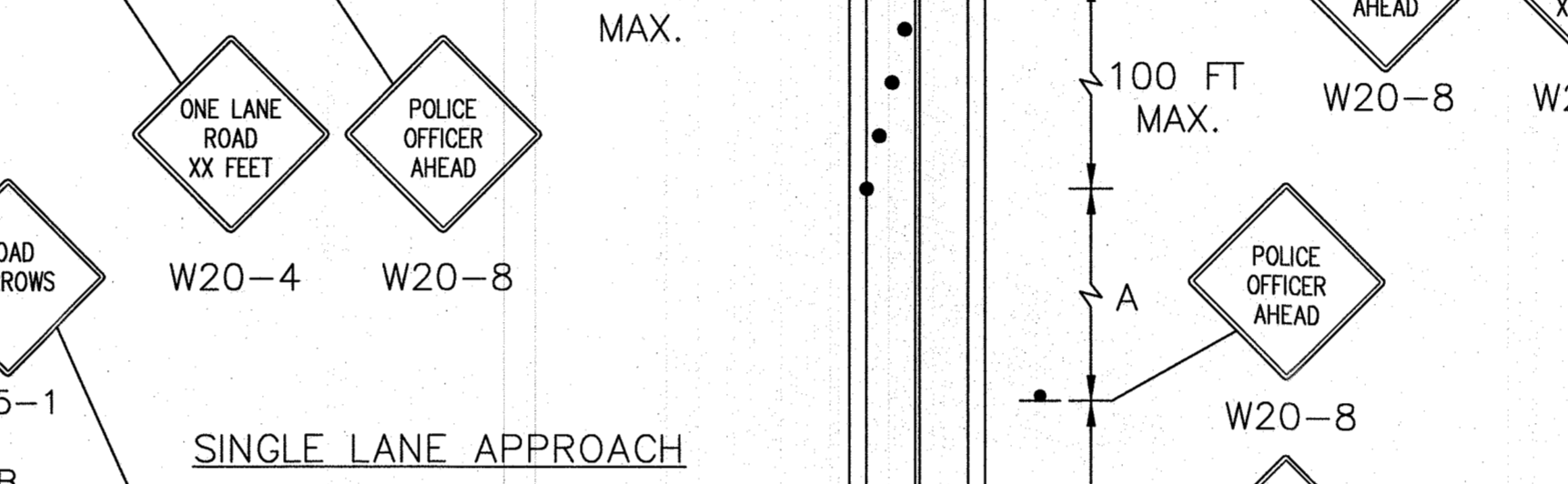
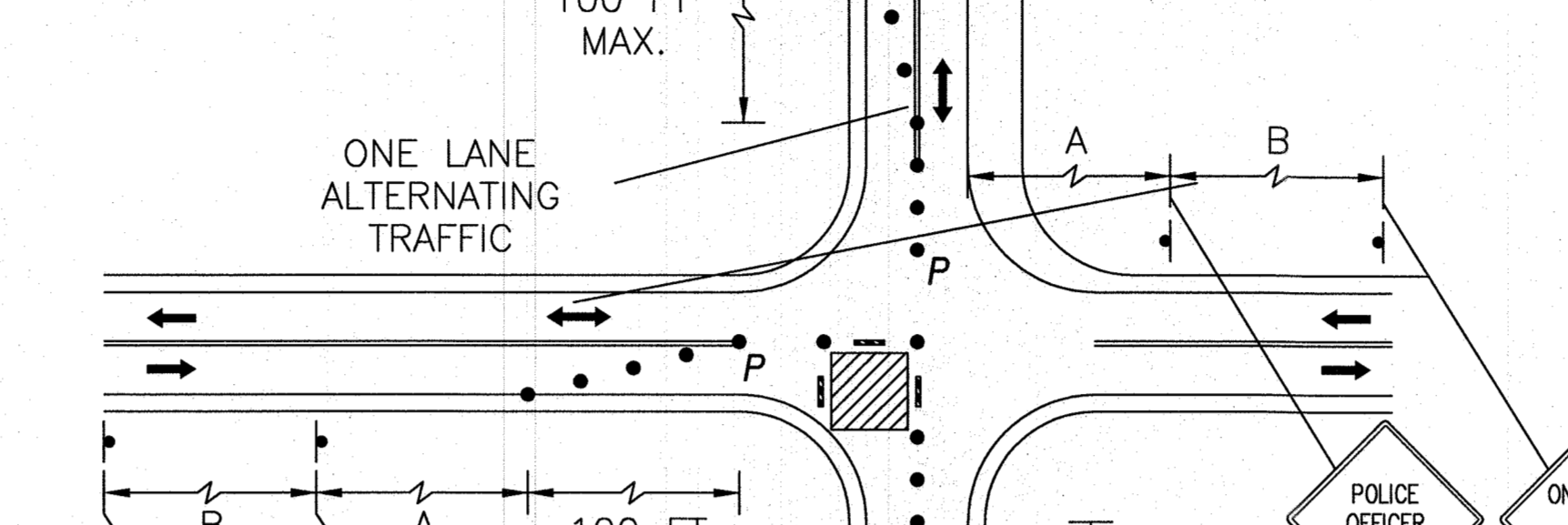
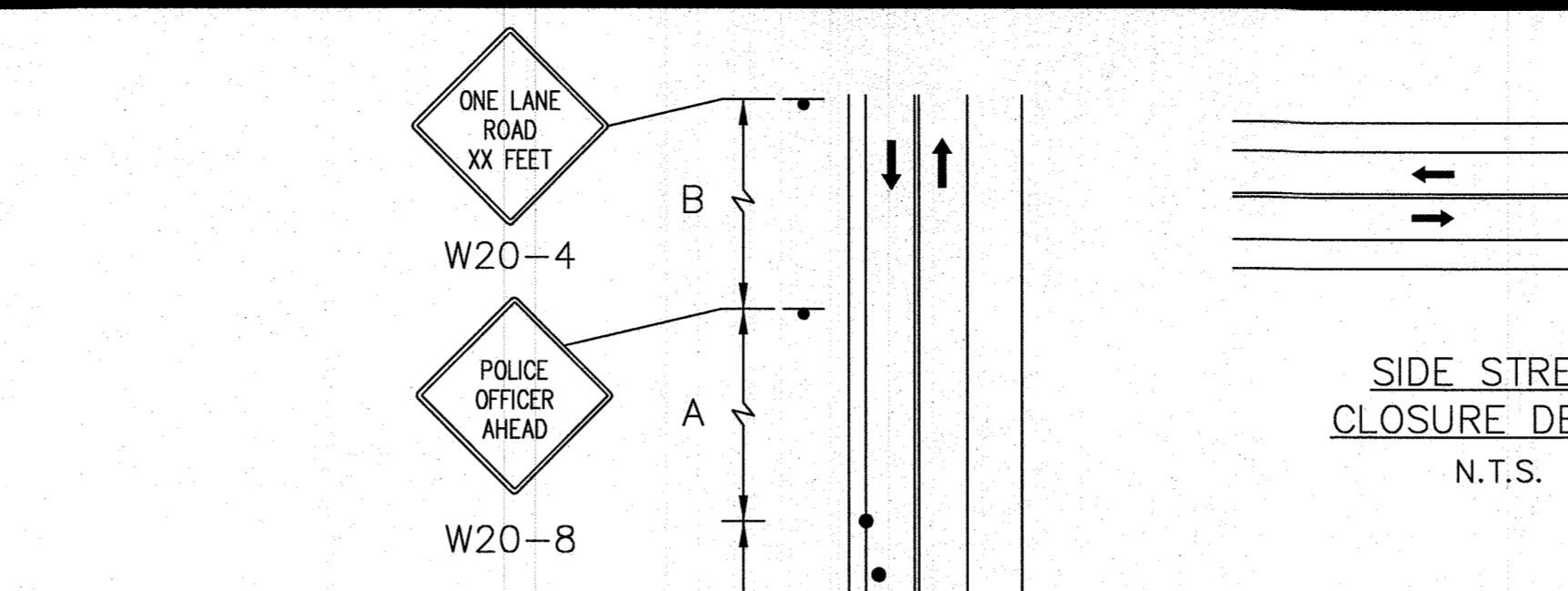
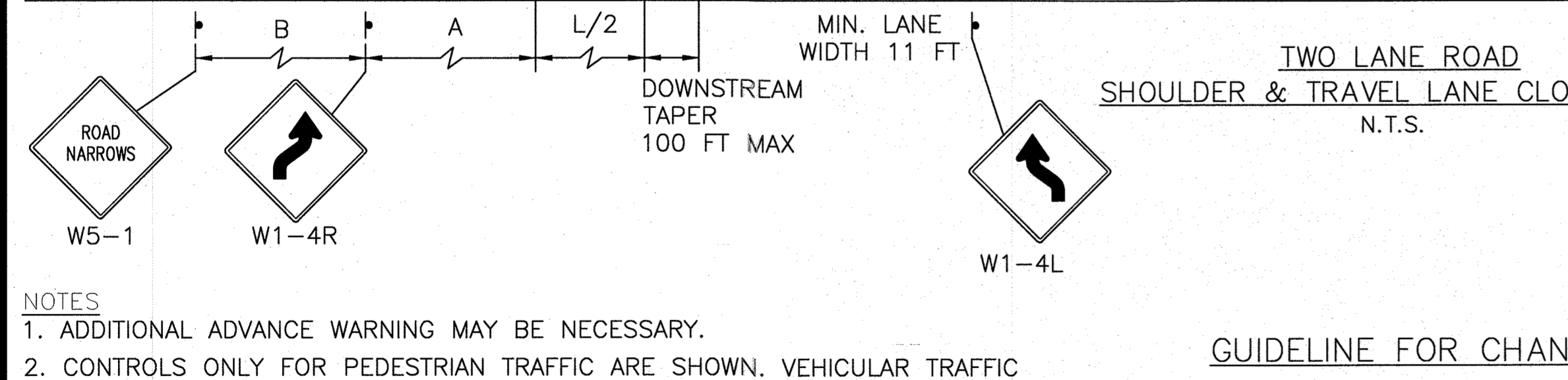
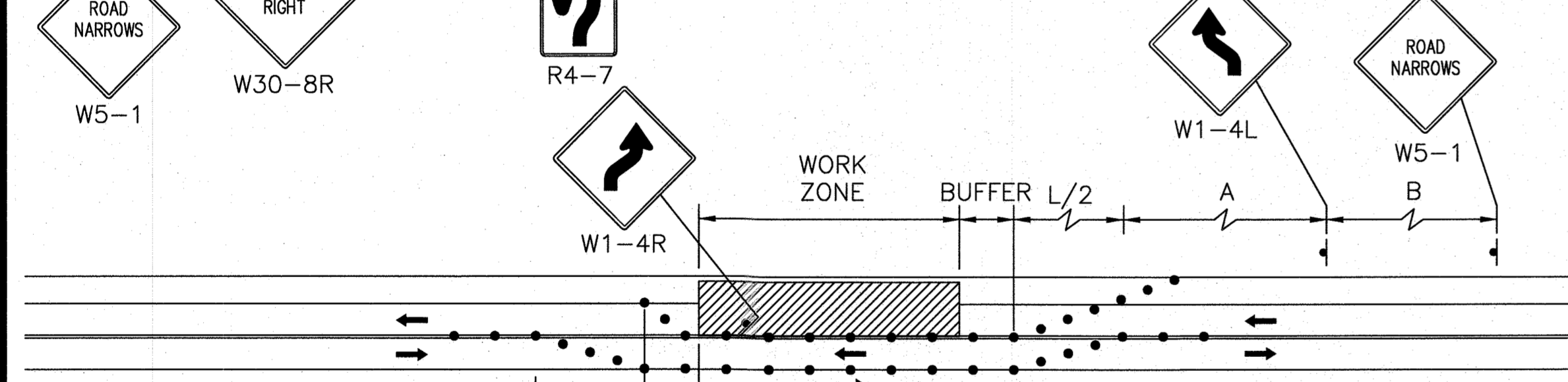
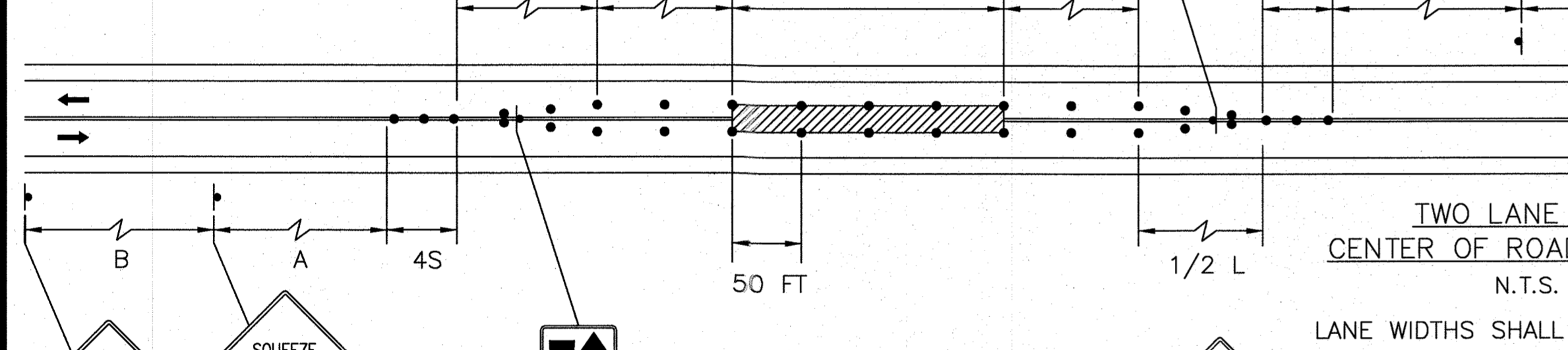
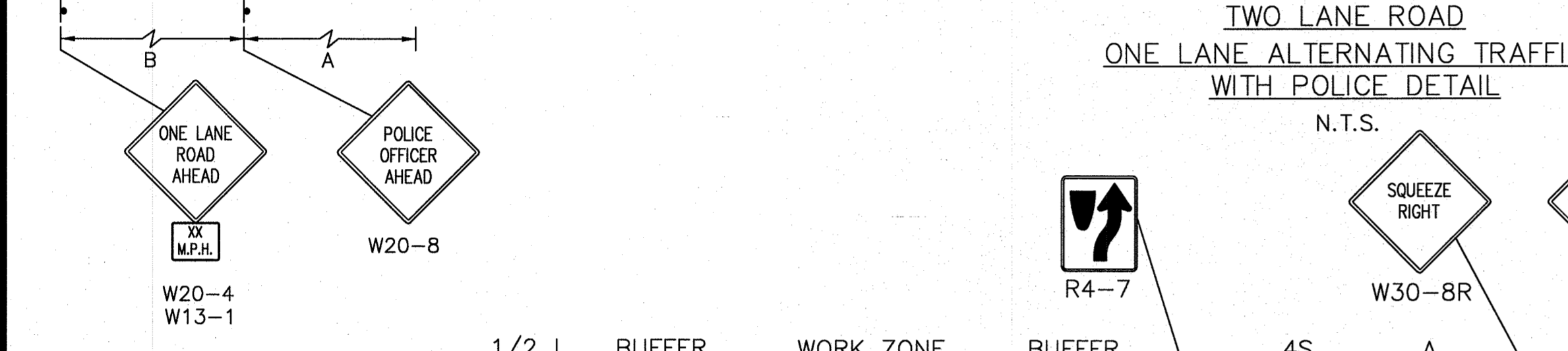
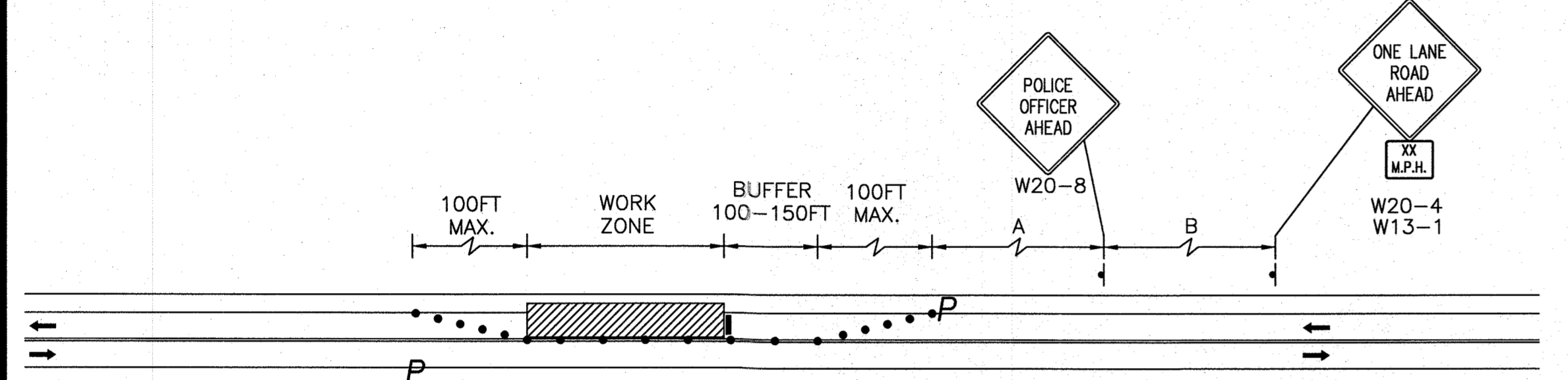
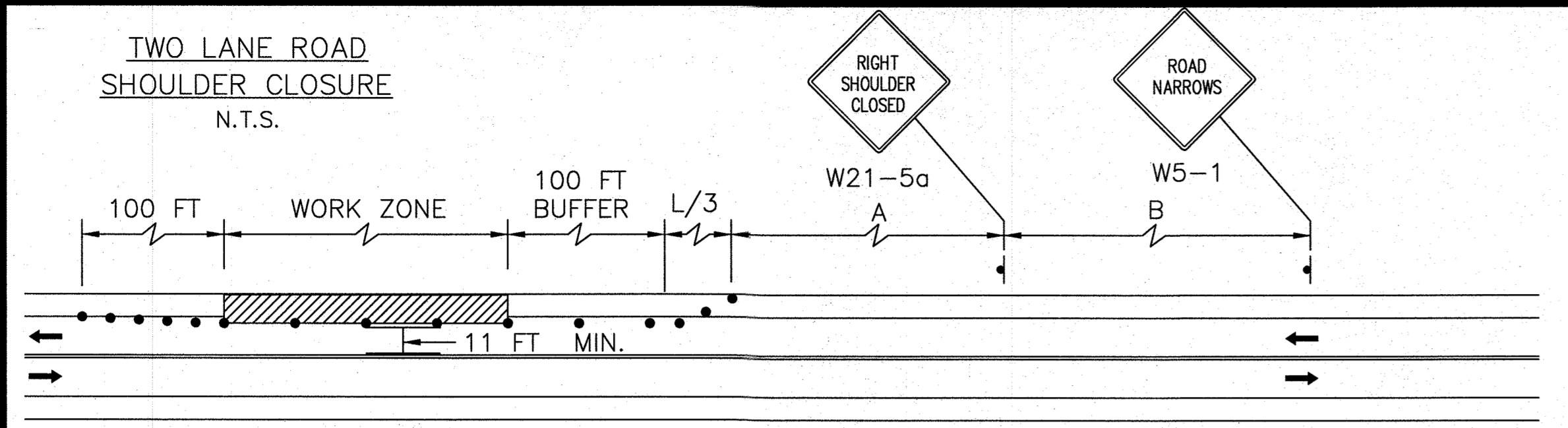
DATE: 04/09/2018	REVISION DATE:
SCALE: N.T.S.	DRAWN BY: IAM
FILE: montclairwater2017	DESIGNED BY: IAM
SHEET 10 OF 11	REVIEWED BY: IAM
	APPROVED BY: SAC



CITY OF WALTHAM ENGINEERING DEPARTMENT  
 MONTCLAIR AVENUE  
 WATER MAIN REPLACEMENT TRAFFIC DETAIL II



DATE: 04/09/2018	REVISION DATE:
SCALE: N.T.S.	DRAWN BY: IAM
FILE: montclairwater2017	DESIGNED BY: IAM
SHEET 11 OF 11	REVIEWED BY: IAM
	APPROVED BY: SAC



- NOTES
- ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
  - CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
  - STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
  - IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE TOWN.
  - BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE TOWN.

GUIDELINE FOR CHANNELIZATION

TAPER LENGTH (ft.)	20 MPH			35 MPH			45 MPH		
	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA	TAPER	BUFFER AREA	WORK AREA
100	5	3	ONE	5	3	ONE	5	3	ONE
150	8	4	ONE	6	3	ONE	6	3	ONE
200	10	5	ONE	7	4	ONE	6	4	ONE
250	12	6	DRUM	9	5	DRUM	7	4	DRUM
300	15	7	DRUM	10	5	DRUM	8	4	DRUM
350	18	9	EVERY	11	6	EVERY	9	5	EVERY
400	20	10	EVERY	13	7	EVERY	10	6	EVERY
450	22	11	EVERY	14	7	EVERY	11	6	EVERY
500	25	12	EVERY	16	8	EVERY	13	7	EVERY
550	27	13	(MAX.)	17	8	(MAX.)	14	7	(MAX.)
600	30	15	(MAX.)	19	10	(MAX.)	15	9	(MAX.)
650	32	16	(MAX.)	20	10	(MAX.)	16	9	(MAX.)

NOTE: MINIMUM SPACING OF DRUMS MAY VARY AND SHALL BE DETERMINED IN THE FIELD.