The City of Waltham

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

CHRISTOPHER ROAD.

WATER MAIN PROJECT, PHASE 2

The GENERAL BID is due: Thursday February 7, 2019 at 10:00 am

PRE BID Meeting and Briefing on Site: Wednesday January 30, 2019 at 1:00 pm

Meet in the Auditorium of 119 School Street

LAST DAY FOR WRITTEN QUESTIONS: 12 Noon Thursday January 31, 2018

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

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SECTION 00010

INVITATION TO BID

Christopher Road Water Main Replacement Project – Phase 2

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of the **Christopher Road Water Main Replacement Project – Phase 2** will be received by Joseph Pedulla, CPO, Purchasing Department 610 Main Street Waltham, Massachusetts until **10:00 a.m., Thursday February 7, 2019** at which time and place all bids will be publicly opened and bids read aloud. Bids submitted after this time will not be accepted. The project involves the following major items:

1. The installation of approximately 620 linear feet of 8" Class 56 CLDI water main, fittings, fire hydrant, and other related water system work on Christopher Road.
2. Removal, disposal and abandonment of existing water mains, 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.

Contract Documents may be obtained by visiting the City's web site at 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 **OWNER**.

Project briefing and **pre-bid meeting** will be held **1.00 PM January 30, 2019 in the Auditorium of 119 School Street, Waltham**

The successful bidder must furnish a 100% **PERFORMANCE** and 100% **PAYMENT BOND** and will be required to execute the Contract Agreement within five (5) days following notification of the acceptance of his Bid. The **OWNER** reserves the right to reject any or all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items deemed advisable for the best interests of the **OWNER**. The award of the contract may be contingent upon the appropriation of funds. 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

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 - Phase 2, 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 City's Chief Procurement Officer Jpedulla@city.waltham.ma.us at least seven days before the established date for bid opening. At least five (5) days prior to the receipt of bids, the City's Chief Procurement Officer will publicly issue the addenda to all registered bidders. A copy of the addenda shall be posted in the city web site www.city.waltham.ma.us/ bids

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 <u>all</u> 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, 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 (section 00300) 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 which shall be **120 calendar days** from the

1.11 date of the Notice-to-Proceed

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, not-withstanding 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 through 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 100% Performance Bond and a 100% Labor and Materials Payment Bond in the shall be provided by the successful bidder in the forms acceptable to the City

Performance Bond	Full amount of the Contract
Labor and Material Bond	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 are provided. The City of Waltham shall be a named additional insured on the certificate.

BID ITEM BREAKDOWN

1.17

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:

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

ATTN: Christopher Road Water Main Replacement - Phase 2

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 December 2018 liquid asphalt price per ton, which is $527.50/ 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 inplace 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 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

WATER MAIN REPLACEMENT - PHASE 2

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 - PHASE 2

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 Massachussetts and dated December 13, 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 five (5) 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, or as certified check 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.

PENNY LINE BIDDING and FRONT LOADING of CHARGES

Interested parties are herewith notified that penny-bidding lines, although permitted under the law,it poses a certain compensatory risk to the contractor. Compensation at the rate of the Penny bid line shall be paid by the City in the event additional quantities are required . The contractor acknowledges that front loading charges to tasks performed in the early stage of the service delivery, as a source to the contractor to fund the remaining or portion of the remaining project, may be source of disqualification as this poses a risk to the City. The successful contractor maybe required to present to the City financial statements proving the contractor has the financial ability to complete the project.

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			
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 ($_____)	625	L.F.	$_____
1B.	Furnish and Install 6" Dia. Class 56 Cement Lined Ductile Iron (CLDI) Water Pipe, all depths of cover, per Linear Foot _____dollars and_____cents ($_____)	20	L.F.	$_____
1C.	Furnish and Install 6" Gate Valve, With Valve Box, as specified, Each _____dollars and_____cents ($_____)	1	EA.	$_____
1D.	Furnish and Install New Hydrant, American Darling B-62, Waltham Colors, as specified, Each _____dollars and_____cents ($_____)	1	EA.	$_____
1E.	Furnish and Install Ductile Iron Fittings, per Pound _____dollars and_____cents ($_____)	650	LBS.	$_____

Subtotal for Page $_____
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 1" Dia. Type K Copper Tubing for Water Services, As Specified, per Linear Foot _____dollars and_____cents ($_____)	20 L.F.	$ _____
1G.	Furnish and Install 1" Dia. Corporation Cocks, As Specified, Each _____dollars and_____cents ($_____)	3 EA.	$_____
1H.	Furnish and Install 4” Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and_____cents ($_____)	25 L.F.	$_____
1I.	Furnish and Install 2" Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and_____cents ($_____)	400 L.F.	$_____

Subtotal for Page **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.		
1J.	Furnish and Install 1" Dia. Bypass Piping and Fittings, per Linear Foot _____dollars and_____cents ($_____)	200 L.F.	$_____
1K.	Furnish and Install Temporary Hydrant, As specified, Each _____dollars and_____cents ($_____)	2 EA.	$_____
1L.	Temporary Water Main Bypass Connection to House Services, and reconnection to permanent City water, Each _____dollars and_____cents ($_____)	3 EA.	$_____
	4. EARTHWORK		
4A.	Unclassified Excavation, Disposal and Backfill, per Cubic Yard _____dollars and_____cents ($_____)	150* C.Y.	$_____
4B.	Rock Excavation, Disposal and Backfill, per Cubic Yard _____dollars and_____cents ($_____)	50* C.Y.	$_____

Subtotal for Page $_____
Base Bid

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY	TOTAL PRICE (UNIT PRICE X QUANTITY)
4.	EARTHWORK CONT.		
4C.	Gravel Borrow Fill and /or Gravel Borrow Refill of Unsuitable Material, per Cubic Yard. _____dollars and_____cents ($_____)	150* C.Y.	$_____
4D.	Fine Grading and Compacting of Roadway Subgrade areas, per Square Yard _____dollars and_____cents ($_____)	1,725 S.Y.	$_____
5.	PAVEMENT		
5A	Reclaim Existing Pavement and prepare for Paving, per square yard _____dollars and_____cents ($_____)	1,725 S.Y.	$_____
5C.	Furnish and Place (Machine Method) Permanent Base Course Pavement, 3" minimum depth, per Ton _____dollars and_____cents ($_____)	320 TON	$ _____
5D.	Furnish and Place (Machine Method) Top and Leveling Course Pavement 1 1/2" minimum depth, per Ton _____dollars and_____cents ($_____)	160 TON	$ _____
		Subtotal for Page **Base Bid**	$_____

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

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY		TOTAL PRICE (UNIT PRICE X QUANTITY)
5.	PAVEMENT CONT.			
5E.	Furnish and Place Bituminous Concrete Pavement (Hand Method) for Test Pits and Miscellaneous Areas, per Ton _____dollars and_____cents ($_____)	40	TON	$_____
5F.	Furnish and Place Temporary Trench Pavement, 3" minimum paving depth, per Linear Foot _____dollars and_____cents ($_____)	700	L.F.	$ _____
6.	INCIDENTAL WORK			
6A.	Concrete for Encasement, Cradles, and Miscellaneous Work, per Cubic Yard _____dollars and_____cents ($_____)	10*	C.Y.	$_____
6B.	Uniformed Police for Traffic Control, Per Man-hour Fourty-four dollars and Zero cents ($ 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

ITEM NO.	BID PRICE ENTERED IN BOTH WORDS AND FIGURES (UNIT PRICE)	ESTIMATED QUANTITY		TOTAL PRICE (UNIT PRICE X QUANTITY)
6.	INCIDENTAL WORK CONT.			
6F.	Remodel Existing Drain or Sewer Manhole or Catch Basin Structure, As Required, per Vertical Foot _____dollars and_____cents ($_____)	15*	V.F.	$_____
6G.	Furnish and Install Bituminous Concrete Sidewalk/Driveway, All widths, 3" min. depth, per square yard _____dollars and_____cents ($_____)	50	S.Y.	$_____
6H.	Loam & Seeding or Mulch for Landscaping Repair, per Square Yard _____ dollars and_____cents ($_____)	500*	S.Y.	$_____
6I.	Furnish and Install Straw Filter Tubes, "Wattles", Per Linear Foot _____dollars and_____cents ($_____)	700	L.F.	$_____
6J.	Controlled Density FIll, per Cubic Yard _____dollars and_____cents ($_____)	25*	C.Y.	$_____

*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)
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 BASE BID (Pages 00300-5 through 00300-11) $_____

In Figures

$_____

In Words

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

END OF SECTION

Section 00450

COMPLIANCE FORMS

(PLEASE COMPLETE AND SUBMIT THESE FORMS WITH YOUR RESPONSE)

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

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

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

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

_____
(Name of business)

TAX COMPLIANCE CERTIFICATION

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

_____, _____
Signature of person submitting bid or proposal Date

_____
Name of business

NOTE

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

CERTIFICATE OF VOTE AUTHORIZATION

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

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

I further certify that _____ is duly elected/appointed _____ _____ of said Corporation whose signature appears below as an officer

_____
Signature of Officer

SIGNED:

_____ (Corporate Seal)
Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of _____ Date:

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

Notary Public;

My Commission expires: _____

CORPORATION IDENTIFICATION

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

If a Corporation:

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

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

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

If an Individual:
Name _____
Residence _____

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

Signature _____

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

CERTIFICATE OF AUTHORITY
LIMITED LIABILITY COMPANY

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

Does Hereby Certify that

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

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

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

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

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

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

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

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

_____

(Signature)

STATE OF MASSACHUSETTS, COUNTY OF _____

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

Notary Public: _____

My Commission Expires: _____

Notary Stamp:

RIGHT TO KNOW LAW

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

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

Signature Date

Print Name

NOTE

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

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

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

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

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

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

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

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

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

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

Date Received by Awarding Authority
/ /

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

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

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

STATEMENT OF COMPLIANCE

_____, 20_____

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

do hereby state:

That I pay or supervise the payment of the persons employed by

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

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

Signature _____

Title _____

05/14

DEBARMENT CERTIFICATION

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

Company Name _____

Address _____

City _____, State_____, Zip Code _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative: _____

_____Print name. Date _____

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

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

Company Name: _____

Address: _____

Signature:_____

Title: _____

Print Name _____

Date _____

See following Chapter 306 of the Acts of 2004

NOTE

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

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

Request for Taxpayer Identification Number and Certification

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

Fill Out This Section

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

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

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

☐ Other (see instructions) ▶

☐ Exempt payee

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

City, state, and ZIP code

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

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

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

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

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

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

Fill out this sect. either SS or FID

Part II Certification

Under penalties of perjury, I certify that:

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

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

Sign & Date

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

General Instructions

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

Purpose of Form

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

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

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

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

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

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

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

SECTION 00500
AGREEMENT
CITY OF WALTHAM

This agreement, made this _____ day of _____, 2019 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

_____ hereinafter called the CONTRACTOR.

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

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

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

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

_____
Stephen Casazza, City Engineer
Date: _____

_____
Joseph Pedulla, Purchasing Agent
Date: _____

_____
Paul Centofanti, Auditor
Date:_____

I CERTIFY THAT SUFFICIENT FUNDS ARE AVAILABLE FOR THIS CONTRACT

FOR THE COMPANY

_____
CONTRACTOR (Signature),
Date: _____

_____
Company

_____
Address

Section 00700

GENERAL CONDITIONS

GENERAL CONDITIONS

1. **INFORMATION**

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

2. **SUITS**

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

3. **LAWS AND REGULATIONS**

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

4. **PROTECTION OF PROPERTY**

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

5. **PROTECTION OF PERSONS**

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

6. CONTRACT DURATION.

This contract is for the period required to complete the project but no more than 120 Calendar days from the date of the Notice to Proceed

7. INSURANCE

A. WORKMAN'S COMPENSATION: The Contractor shall provide by insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor.

B. COMPREHENSIVE GENERAL LIABILITY

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

C. AUTOMOBILE (VEHICLE) LIABILITY

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

D. UMBRELLA POLICY

General liability	**$2,000,000**

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

Office of the Chief Procurement Officer
Purchasing Department
City of Waltham
610 Main Street
Waltham, MA 02452

8. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Labor and Materials or Payment Bond equal to 100% of the contract value. This contract shall not be in force until said bond

has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

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

9. **PERSONNEL:**

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

10. **PREVAILING WAGES**

    The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. A copy of the prevailing Wages Schedule will be found at www.city.waltham.ma.us/bids

11. **MATERIALS**

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

12. **TERMINATION OF CONTRACT**

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

13. CONTRACT OBLIGATIONS

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

14. BIDDER EXPERIENCE EVALUATION

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

15. NOT-TO-EXCEED AMOUNT

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

16. FINANCIAL STATEMENTS.

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

17 BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be

liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

18 RIGHT TO AUDIT

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

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

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

20. BID OPENING INCLEMENT WEATHER

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

21. SIGNATURES

No electronic signatures will be accepted in the Vote authorization form. The Notary Public signature must be an original Signature.

22. NOTARY PUBLIC

The notary public signature certification must be from a notary certified in any of the 50 United States

SECTION 00810

SUPPLEMENTAL CONDITIONS

Unless otherwise noted, all paragraphs are additive to similarly numbered paragraphs in SECTION 00700 – GENERAL CONDITIONS. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2013, Rev1 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

PART I AMENDMENTS TO GENERAL CONDITIONS

Article No.

1.0	DEFINITIONS AND TERMINOLOGY
2.0	PRELIMINARY MATTERS
3.0	DOCUMENTS: INTENT, REQUIREMENTS AND REUSE
4.0	COMMENCEMENT AND PROGRESS OF WORK
5.0	AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS
6.0	BONDS AND INSURANCE
7.0	CONTRACTOR'S RESPONSIBILITIES
8.0	OTHER WORK AT THE SITE
9.0	OWNERS RESPONSIBILITIES
10.0	ENGINEER'S STATUS DURING CONSTRUCTION
11.0	AMMENDING CONTRACT DOCUMENTS: CHANGES IN WORK
12.0	CLAIMS
13.0	COST OF WORK:ALLOWANCES: UNIT PRICE WORK
14.0	TEST AND INSPECTIONS
15.0	PAYMENTS TO CONTRACTOR
16.0	SUSPENSION OF WORK AND TERMINATION
17.0	FINAL RESOLUITION OF DISPUTES
18.0	MISCELLANEOUS

PART II ADDITIONS TO GENERAL CONDITIONS

PART III STATE AND FEDERAL GOVERNMENT PROVISIONS

PART I AMENDMENTS TO GENERAL CONDITIONS

1.0 DEFINITIONS AND TERMINOLOGY

A. The following language shall be added at the beginning of the definition entitled "Contract Documents" in the General Conditions (1.01.A.13).

"The Invitation to Bid, Instructions to Bidders"

B. 1.01.A.18, Add the words "or plans" after the word "drawings in the first line of the definition entitled "Drawings" in the General Conditions.

C. 1.01.A.38, Delete the definition of Specifications in the General Conditions in its entirety and add the following in its place:

"Sections included under Division 1 through Division 16 of the Contract Documents"

D. 1.01.A.40 The definition of Substantial Completion shall be deleted in the General Conditions in its entirety and add the following in its place:

Substantial completion shall mean either that the work required by the Contract has been completed except for work having a contract price of less than one percent o the then adjusted total contract price, or substantially all of the work has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the Contract.

E. The following new definitions shall be added at the end of Article 1 of the General Conditions:

Conditions of the Contract–The combined General Conditions and Supplementary Conditions.

Engineer – GCG Associates, Inc., 84 Main Street, Wilmington, MA, 01887, said corporation to be considered an agent of the Owner.

Site – The specific area adjacent to and including the area upon which the construction work is performed.

2.0 PRELIMINARY MATTERS

A. Delete paragraph 2.03A in its entirety and insert in it place:

2.03. A: Contract time will commence on the date specified in the Notice to Proceed.

3.0 DOCUMENTS: INTENT, REQUIREMENTS AND REUSE

Four paragraphs shall be added immediately after paragraph 3.01.E of the General Conditions which is to read as follows:

3.01.F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

3.01.G. Contract Documents shall forthwith be physically amended to make such insertion.

3.01.H. In case of any discrepancy between these Conditions of the Contract and any Federal Government provisions, the Federal Government provision shall prevail.

3.01.I. In case of any discrepancy between these between these Conditions of the Contract and any Commonwealth of Massachusetts provisions, the Commonwealth of Massachusetts provision shall prevail.

3.01.J In the event of conflicts, inconsistencies or discrepancies among the Contract Documents, to the extent applicable, the better quality or greater quantity of work shall be provided without change to the Contract Price. In the event of such conflicts, inconsistencies or discrepancies which do not relate to the quality or quantity of work, the Contractor shall request clarifications or interpretations from the Engineer as provided in Article 10.

5.0 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

A. A new paragraph shall be added immediately after paragraph 5.01.C of the General Conditions which is to read as follows:

D. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, the Contractor shall begin the work upon such land and rights-of-way as the Owner has previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for work, Contractor shall not be entitled to make or assert claim for the damage by reason of said delay, or to withdraw from the Agreement except by consent of the Owner. Time for

completion of the work will be extended as provided in Article 11, to such time as the Owner determines will compensate for the time lost by such delay.

B. A new paragraph shall be added immediately after paragraph 5.03.B of the General Conditions which is to read as follows (if borings performed):

5.03.C. The Engineer has relied upon the data obtained from subsurface investigations made at the site in the form of test borings and probes. Such data is in the form of logs which are included in the Section 00220 and soil samples which may be examined at the Engineer's office during regular business hours. The locations of the test borings and probes are indicated on the Drawings. Such logs and samples are not part of the Contract Documents.

C. Two new paragraphs shall be added immediately after paragraph 5.05.E of the General Conditions which is to read as follows:

5.05.F. Information on Drawings and any statements of the Contract Documents referring to the conditions under which the work is to be performed or the existence of utilities or other underground structures are not guaranteed to be correct or to be complete representation of all existing data with reference to conditions affecting the work. Efforts have been made however, to make this information complete and accurate on the basis of all data and information which could be procured by Engineer. If, in the opinion of Engineer, permanent relocation of a utility not otherwise provided for, is required, he shall direct the Contractor, in writing, to perform the work. Work, so directed, will be paid as provided in Article 11 of the General Conditions.

5.05.G. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law, Chapter 30, Section 39N.

6.0 BONDS AND INSURANCE CONTRACTOR'S (AND SUBCONTRACTOR'S) PUBLIC LIABILITY, PROPERTY DAMAGE AND VEHICLE LIABILITY INSURANCE

The following shall be added to 6.0.

A. The liability limits for the insurance required by the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

The Contractor shall purchase and maintain such insurance as will protect him for claims set forth herein which may arise out of or result from the Contractor's operations be by himself or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them are liable.

1. Claims under workman's compensation, disability benefit and other similar employee benefit and other similar employee benefit acts;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and

5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

B. The required insurance shall be written for not less than the following limits of liability, or as required by law, whichever is greater.

The work shall be entirely at the contractor's risk until the same is fully completed and accepted, and he will be held liable to the amount of the City's interest in the same as shown by payments account.

The contractor shall, during the progress of the work, maintain insurance on all work included in the contract until the final or conditional acceptance of the work**. The City shall be named as an additional insured on all insurance.** Failure to provide and continue in force such insurance as specified shall be deemed a material breach of the contract and shall operate as an immediate termination thereof.

A contractor shall not commence work under any contract until he has obtained all insurance required, nor shall the contractor allow any subcontractor to commence work on a sub-contract until all similar insurance required has been obtained.

1. Workmen's Compensation Insurance

   The contractor will maintain, during the life of the contract, the statutory Worker's Compensation and Employer's Liability for all employees to be engaged in work on the project under the contract and in case any such work is sublet. The contract shall require the sub-contractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all employees engaged in the project.

2. Automobile Bodily Injury and Property Damage

   There shall be provided insurance for not less than $1,000,000 for injuries, including wrongful death, to any one person, $3,000,000 aggregate. Any one accident shall be covered to a limit of $1,000,000 bodily injury each

occurrence, $3,000,000 aggregate. There shall be property damage insurance provided to the amount of $1,000,000 on account of any one accident and included owned, hired and non-owned automobiles.

3. Comprehensive General Liability

   The contractor shall purchase and maintain such insurance as required to protect the owner's interest for the duration of the contract and until acceptance of the work.

   Comprehensive General Liability Coverage covering bodily injury and property damage with limits of $1,000,000 each occurrence, $3,000,000 aggregate, shall include coverage for premises, operations XCU included, products completed operations, contractual insurance, brand form property damage, independent contractor's personal injury coverages.

4. Property Coverage

   For materials and supplies being transported by the contractor.

5. Umbrella Liability

   $3,000,000/occurrence, $3,000,000 aggregate.

C. The Contractor shall procure and maintain Owner's Protective Liability Insurance as herein specified.

6. In addition to the Owner the Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

7. Said policy shall provide that the coverage afforded thereby, shall be primary coverage to the full limit of liability state in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

8. The original and one certified copy of the policy specified shall be forwarded to the Engineer for the Owner prior to commencement of any work.

9. The limits of Owner's Protective Liability Insurance shall be not less than One Million Dollars ($1,000,000) on account of any one accident and Three Million Dollars ($3,000,000) on account of all accidents.

D. The Contractor's and Subcontractor's insurance shall provide adequate protection against the following special hazards:

1. Blasting or explosion

2. Collapse of trench walls and underground damage
3. Use of all equipment and tools

E. The Contractor shall not commence work under this Contract until he has obtained all insurance required hereunder and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required of subcontractor has been so obtained and approved. Approval of insurance required under this article shall be kept in force during the life of the Contract.

1. Certificates in triplicate of all General Contractor's policies specified shall be filed with the Engineer for the Owner. Any certificates filed with the Engineer which shall be found to be incomplete or not according to form will be returned as unsatisfactory. Rejected certificates of insurance and copies of policies shall be corrected as necessary and resubmitted until approved.

F. Each and every policy shall contain an endorsement stating that the Insurance Company will to, prior to completion of project or any policy expiration date shown on policy and certificate, whichever occurs first, terminate policy or change any coverage therein without first mailing by registered mail, written notice of such action at least fifteen (15) days prior to termination or change, to Owner at whose request policy and certificates are issued.

G. Delete paragraph 6.05 of the General Conditions in its entirety.

H. Delete paragraph 6.06 of the General Conditions in its entirety.

I. Delete paragraph 6.07 of the General Conditions in its entirety.

J. The following new paragraphs shall be added immediately after paragraph 6.07 of the General Conditions which is to read as follows:

6.08. The Contractor may purchase and maintain excess liability insurance in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the general conditions in the form of a certificate indicating the policy numbers and limits of liability of all underlying insurance. The umbrella liability insurance shall have a combined single limit of not less than $3,000,000. Such insurance shall contain a provision that the coverage afforded will not be cancelled or materially changed until at least thirty days prior written notice has been given to Owner.

6.09. If the aggregate limits of liability indicated in the Contractor's insurance provided in accordance with above limits is not sufficient to cover all claims for damages arising from his operations under this contract and from any other work performed by him or if policies of insurance do not provide that the aggregate limits of liability for bodily injury and property damage apply to each

contract or project separately, Contractor shall have such policies amended so that the aggregate limits of liability required by this Contract will be available to cover all claims for damages due to operations under this Contract.

6.10 PROOF OF CARRIAGE OF INSURANCE

Policies shall contain a clause automatically extending date of expiration to coincide with any extended date of completion granted under the Contract.

6.11 OWNER'S PROTECTIVE LIABILITY INSURANCE

The Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

Said policy shall provide that the coverage afforded thereby shall provide that the coverage afforded thereby shall be primary coverage to the full limit of liability stated in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

7 CONTRACTOR'S RESPONSIBILITIES

A. The following new paragraphs shall be inserted immediately after paragraph 7.02.B of the General Conditions.

C. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or subcontractor contracting for any part of the work shall require or permit any laborer or mechanic to be employed on the work in excess of eight hours in any calendar day or in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such work week, as the case may be.

D. Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by the Owner's governing body or other duly designated official.

E. The Contractor shall employ only competent men to do the work and whenever the Owner shall notify Contractor, in writing, that any man on the work appears to be incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such man shall be removed from the project and shall not again be employed on it except with the consent of the Owner.

F. The Contractor and all subcontractors shall, insofar as practicable, give preference in the hiring of workers for the project to qualified local residents

with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

G. The Contractor and all subcontractors shall pay to all laborers and mechanics employed for the construction covered by this contract the minimum rates of pay as determined by the Secretary of Labor in accordance with the Act of March 3, 1931, as amended, known as the Davis-Bacon Act (40 U.S.C. 276a through 276a-7). Furthermore, the Contractor and subcontractors shall adhere to the stipulations and provisions published by the Secretary of Health, Education, and Welfare in "Labor Standards (Federal Water Pollution Control Act)". The Wage Rate Schedule as prepared by the Secretary of Labor and the "Labor Standards" are part of this Contract and are included in Part II of these Supplementary Conditions.

H. The Contractor and all subcontractors shall comply with the Regulations of the Secretary of Labor made pursuant to the Anti-Kickback Act of June 30, 1940 (40 U.S.C. 276c) and all amendments or modifications thereto. The Contractor and all subcontractors shall furnish the Owner with weekly Statements of Compliance. In case of subcontracts, the Contractor shall cause appropriate provision to be inserted in all subcontracts for the work which he may let to insure compliance with said Anti-Kickback Act by all subcontractors subject thereto, and Contractor shall be responsible for the submission of all Statements of Compliance required by subcontractors by said Anti-Kickback Act except as the Secretary of Labor may specifically provide for reasonable limitations, variations, and exemptions from the requirements thereof. These Regulations are part of this Contract and are included in Part II of these Supplemental Conditions.

B. Paragraph 7.06.A of the General Conditions shall be deleted in its entirety and insert the following in its place:

7.06.A The Contractor shall not employ any subcontractor, supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Acceptance of any subcontractor, other person or organization by the Owner shall not constitute a waiver of any right of Owner to reject defective work. The Contractor shall not be required to employ any subcontractor, other person or organization against whom the Contractor has reasonable objection.

C. The following language shall be added at the end of paragraph 7.09 of the General Conditions:

7.09.B. Except as required otherwise by Massachusetts General Law Chapter 149, Section 44F.

The materials and supplies to be used in the work of this contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. The Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of Chapter 14 of the Acts of 1966 and any amendments thereto.

F. The following language shall be added at the end of paragraph 7.12.G of the General Conditions:

7.12H. In the event of temporary suspension of the work, or during inclement weather, or whenever the Engineer may direct; the Contractor shall, and shall cause Subcontractors, to protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

J. A new paragraph shall be added immediately after paragraph 7.19.E of the General Conditions which is to read as follow:

7.19.F The Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records. This requirement primarily provides for the Contractor to maintain for at least six years after final payment books, records, and accounts in reasonable detail, available for examination. This requirement further provides for the Contractor to document and submit descriptions and reasons for any changes in record keeping methods, and to prepare and submit annual financial statements.

10.0 ENGINEER'S STATUS DURING CONSTRUCTION

A new paragraph shall be added immediately after paragraph 10.09 of the General Conditions which is to read as follows:

10.10 The Engineer's interpretations will be made in accordance with Massachusetts General Law Chapter 30, Section 39P which is included in Part II of the ADDITIONAL ARTICLES.

15.0 PAYMENTS TO CONTRACTORS AND COMPLETION

A new Paragraph 15.09 of the General Conditions shall be added after 15.08.

15.09 Progress Payments will be made in accordance with Massachusetts General Law, Chapter 30, Section 39G. Retainage shall be 5%, in accordance with M.G.L., Chapter 30, Section 39G.

15.10. If, after 60 days following submission of a monthly payment estimate for pipe and fitting items, the pipe and fittings for which payment is requested has not been successfully tested, the Owner may withhold up to 10% of the amount requested for such pipe and fitting items until the pipe has been so tested, however, in the case of a major (pipe diameter 24 inches or greater) pipe and fitting instillation, sums retained by the Owner pursuant to this paragraph shall not exceed two percent (2%) of the costs of such pipe items. This retainage shall be in addition to any other retainage required by this Contract.

The Contractor shall make payments to subcontractors in accordance with Massachusetts General Law, Chapter 30, Section 39F which is included in ADDITIONAL ARTICLES.

15.11. If, on the basis of the Engineer's observation of the work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation – all as required by the Contract Documents, Engineer is satisfied that the work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Engineer will indicate in writing his recommendation of payment and present the Application to the Owner for payment. Thereupon the Engineer will give written notice to the Owner and the Contractor that the work is acceptable subject to the provisions of paragraph 14.16. Otherwise, the Engineer will return the Application to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application. If the Applications and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Massachusetts General Law, pay Contractor the amount recommended by Engineer.

15.12. Final payment will be reduced by excessive costs of plant inspection of pipe; the Contractor shall have no claim thereto. Excessive inspection costs are defined as the costs of inspection of that amount of pipe which exceeds 125 percent of the aggregate length of each type installed.

16.0 SUSPENSION OF WORK AND TERMINATION

Paragraph 16.01 of the General Conditions shall be deleted in its entirety and insert the following in its place:

16.01. The Owner may order, at any time and without cause, suspension of the work in accordance with Massachusetts General Law, Chapter 30, Section 39O.

17.0 DISPUTE AND RESOLUTION

Article 17 of the General Conditions shall be deleted in its entirety.

18.0 MISCELLANEOUS

A new paragraph shall be added immediately after paragraph 18.08 of the General Conditions which is to read as follows:

18.09. Both the address given in the Bid Form upon which this Agreement is founded, and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters, and other communications to the Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, if any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor: and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor, and delivered to the Owner and shall be deemed to preclude or render inoperative the service of any notice, letter, or other communications upon the Contractor personally.

WAGE RATES

The following 4 new paragraphs shall be added immediately after paragraph 18.09 of the General Conditions:

18.10. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be part of these Contract Documents. Copies of the wage schedule are included in Section 00820. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such approved minimum rate shall be paid at not less than such rates as shall be determined by the officials administrating the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the Owner of his intention to employ persons in trades or occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations.

A. The schedules of wages referred to above are minimum rates only, and the Owner will not consider any claims for additional compensations made by the Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be adjusted by Contractor.

B. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the

work. Minimum Wage Rates as determined by the Commissioner of the Department of Labor and Industries, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who are not covered by this schedule of wage rates, but who may be employed for the proposed work under this Contract.

C. State schedules of minimum wage rates are included in Section 00820 – ADDITIONAL ARTICLES. Where rates differ, the higher rates shall apply as a minimum for that trade.

PART 2 ADDITIONS TO GENERAL CONDITIONS

None this Contract

PART 3 STATE AND FEDERAL GOVERNMENT PROVISIONS

State and Federal Government Provisions are included in Section 00820 and selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contact shall be deemed to be also inserted in herein.

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

END OF SECTION

SECTION 00821

PERMITS

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

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

1.02 PERMITS

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

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

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

END OF SECTION

SECTION 01000
TECHNICAL SPECIFICATION

PART 1 GENERAL

PART 1 GENERAL

1.01 GENERAL

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

1.02 TRAFFIC CONTROL

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

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

1.03 INTERFERENCE WITH/AND PROTECTION OF STREETS

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

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

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

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

1.04 MAINTAINING STORMWATER AND SANITARY SEWER FLOWS

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

1.05 HANDLING AND DISTRIBUTION

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

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

1.06 INSPECTION OF WORK AWAY FROM THE SITE

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

1.07 LINES, GRADES, AND MEASUREMENTS

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

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

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

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

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

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

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

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

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

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

1.08 DIMENSIONS OF EXISTING STRUCTURES

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

1.09 PIPE LOCATIONS

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

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

1.10 PRECAUTIONS DURING ADVERSE WEATHER

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

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

1.11 CUTTING AND PATCHING

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

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

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

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

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

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

1.12 PROTECTION AGAINST ELECTROLYSIS

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

END OF SECTION

SECTION 01010
SUMMARY OF WORK

1. GENERAL SCOPE OF WORK

A. The Work under the Contract consists of:

1. Replacement of an existing 6” water main with approximately 625 linear feet of 8” cement lined ductile iron (CLDI) Class 56 water pipe and appurtenances, including reconnection of existing 1" copper water services to the new main, 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 120 calendar days.

END OF SECTION

SECTION 01025

MEASUREMENTS AND PAYMENT

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.

Pipe Size	Depth Below Invert
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:

	Size	Width
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	
	0-12 ft.	Over 12 ft.
Pipe Size	Invert Depth	Invert Depth
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: 6" GATE 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 1D: 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 1E: 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 1F & 1G: 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 1H THROUGH 1L: 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, thermoplastic pavement markings, 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 / DRIVEWAY

A. Measurement for payment under this Item shall be the actual number of square yards of bituminous concrete sidewalk, driveways, 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.

ITEM 6J: CONTROLLED DENSITY FILL

A. The quantity to be measured for payment under this Item shall be the actual number of cubic yards of Excavatable Controlled Density FIll (CDF) used as backfill material within the limits of normal trench excavation, abandonment of structures, or other locations as specified or 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, disposal of materials, site restoration and clean-up and all incidental work, not specifically mentioned, to satisfactorily complete this Item.

C. Controlled Density Fill shall be measured in place by the 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.

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: 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 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.

D. 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: 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.

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

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

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

1.02 MATERIALS - SAMPLES - INSPECTION - REVIEW

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

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

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

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

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

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

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

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

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

1.03 SHOP AND WORKING DRAWINGS

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

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

B. Such drawings shall show the principal dimensions, weight, structural and operating features, performance characteristics and wiring diagrams, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.

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

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

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

F. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the drawings and specifications in all respects; that the electrical characteristics are correct; and that the dimensions of work submitted fit the available space. Any deviations from the Contract requirements shall be clearly noted on the shop drawings. The Contractor shall stamp each submittal with his firm's name, date, and approval, thereby representing that the above has been complied with. Shop drawings not so checked and stamped will be returned without being examined by the Engineer.

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

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

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

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

1.04 RECORD OR AS-BUILT DRAWINGS

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

B. Contractor shall be responsible to keep record of and submit accurate ties and measurements of new water services, corps, service boxes, gate valves, bends and fittings.

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

1.05 OPERATION AND MAINTENANCE INSTRUCTIONS

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

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

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

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

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

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

END OF SECTION

SECTION 01500

TEMPORARY PROVISIONS AND PROTECTION

OF UTILITIES AND PROPERTIES

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

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

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

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

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

PART 2 EXECUTION OF WORK

2.01 COORDINATION WITH OTHERS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.02 PUBLIC SAFETY AND CONVENIENCE

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

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

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 GENERAL
1.01 DUST CONTROL OPERATIONS
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

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

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

B. SECTION 01710 - CLEANING UP

PART 2 MATERIALS

2.01 POLLUTION AND EROSION CONTROL MATERIALS

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

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

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

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

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

PART 3 EXECUTION

3.01 PRECONSTRUCTION CONFERENCE

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

3.02 PROCEDURAL DETAILS

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

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

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

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

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

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

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

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

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

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

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

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

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

3.03 DUST CONTROL OPERATIONS

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

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

3.04 ACCEPTANCE

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

END OF SECTION

SECTION 01570

TRAFFIC CONTROL AND POLICING

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

PART 2 MATERIALS

2.01 GENERAL

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

PART 3 EXECUTION OF WORK

3.01 SCHEDULE OF OPERATIONS

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

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

3.02 LOCATION OF SIGNS

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

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

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

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

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

END OF SECTION

SECTION 01710
CLEANING UP

PART 1 GENERAL
1.01 SCOPE OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

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

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

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

END OF SECTION

SECTION 02016

PRE/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

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

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 that 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

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

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

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

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

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

1.03 SITE INFORMATION

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

1.04 PROTECTION OF EXISTING CONDITIONS

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

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

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

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

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

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

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

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

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

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

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 DESCRIPTION

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

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

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

3.02 OPEN EXCAVATION

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

3.03 SEPARATION OF SURFACE MATERIALS

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

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

3.04 EXCAVATED MATERIAL

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

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

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

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

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

3.05 DRAINAGE

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

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

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

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

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

3.06 STRUCTURE EXCAVATION

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

3.07 SLABS ON GRADE

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

3.08 TRENCH EXCAVATION

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

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

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

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

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

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

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

3.09 TRENCH EXCAVATION IN FILL

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

3.10 TRENCH LIMITS

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

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

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

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

3.11 EARTH EXCAVATION BELOW NORMAL GRADE

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

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

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

3.12 EXCAVATION NEAR EXISTING STRUCTURES

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

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

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

3.13 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

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

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

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

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

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

3.14 CARE AND RESTORATION OF PROPERTY

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

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

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

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

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

3.15 DUST CONTROL

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

3.16 BACKFILLING - GENERAL

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

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

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

3.17 BACKFILLING AROUND STRUCTURES

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

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

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

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

3.18 BACKFILLING IN OPEN TRENCH

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

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

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

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

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

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

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

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

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

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

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

3.19 MATERIAL FOR FILLING AND EMBANKMENTS

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

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

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

3.20 GRADING

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

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

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

END OF SECTION

SECTION 02220

RECLAMATION OF BASE COURSE

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 form 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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 -SITE WORK

PART 2 MATERIALS - NOT APPLICABLE

PART 3 EXECUTION OF WORK

3.01 ROCK EXCAVATION - GENERAL

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

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

3.02 ROCK BLASTING

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

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

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

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

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

3.03 EXPLOSIVES

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

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

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

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

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

3.04 BLASTING RECORDS

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

3.05 EXCESS ROCK EXCAVATION

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

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

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

3.06 SHATTERED ROCK

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

3.07 BACKFILLING ROCK EXCAVATIONS

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

END OF SECTION

SECTION 02224

FILL AND BACKFILL MATERIALS

PART 1 GENERAL

1.01 SCOPE OF WORK

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

1.02 APPROVAL OF MATERIALS

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

1.03 RELATED WORK SPECIFIED ELSEWHERE

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

PART 2 MATERIALS

2.01 TYPE 1 - COMMON BORROW

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

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

2.02 TYPE 2 - SAND BORROW

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

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

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

2.03 TYPE 3 - SAND AND GRAVEL

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

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

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

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

2.04 TYPE 4 - COARSE GRAVEL

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

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

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

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

2.05 TYPE 5 - LOAM BORROW AND TOPSOIL

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

2.06 TYPE 6 - SCREENED GRAVEL MATERIALS

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

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

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

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

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

SIEVE SIZE	PERCENT BY WEIGHT PASSING
1 inch	100
¾ inch	90 - 100
$^3/_8$ inch	20 - 55
#4	0 - 10
#8	0 - 5

2.07 TYPE 7 - CRUSHED STONE

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

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

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

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

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

PART 3 EXECUTION OF WORK

3.01 PLACING AND COMPACTING

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

END OF SECTION

SECTION 02226

SAND BLANKET

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

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

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

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

1.03 SUBMITTALS

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

PART 2 MATERIALS

2.01 STEEL SHEET PILING

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

2.02 TIMBER SHEET PILING

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

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

2.03 STEEL SHORING BOXES

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

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

2.04 STEEL PLATES

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

PART 3 EXECUTION OF WORK

3.01 GENERAL

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

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

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

3.02 INSTALLATION OF SHEETING AND PLATES

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

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

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

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

3.03 EXCAVATION UTILIZING SHORING BOXES

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

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

3.04 SHEETING AND PLATES LEFT-IN-PLACE

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

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

3.05 EXTRACTION OF SHEETING AND PLATES

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

END OF SECTION

SECTION 02401

DEWATERING

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 2 - SITE WORK

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

1.04 SUBSURFACE CONDITIONS

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

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

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

PART 2 MATERIALS

2.01 SUBMITTALS

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

PART 3 EXECUTION OF WORK

3.01 GENERAL

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

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

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

3.02 CONCRETE STRUCTURES

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

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

3.03 SURFACE WATER CONTROL

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

3.04 INSTALLATION OF DEWATERING SYSTEM

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

3.05 OBSERVATION WELLS

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

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

3.06 SITE RESTORATION

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

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

END OF SECTION

SECTION 02575

PAVING AND ROAD CONSTRUCTION

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

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

B. The Contractor shall be responsible for maintaining all pavements and sidewalks placed as part of the Contract, in a safe and satisfactory condition until the project is accepted as complete. For any pavement or sidewalk area damaged, the Contractor shall remove 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 02601

MANHOLES, COVERS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere (when applicable):
   1. Final sewer testing is specified in this Division.
   2. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Manhole Base, Barrel and Top Sections:
   1. Conform to ASTM C478-97 except as modified herein, and on the Drawings.
   2. Average strength of 4,000 psi at 28 days.
   3. The precast concrete structure shall be sized to resist floatation. A factor of safety of 1.15 shall be used against flotation 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:

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

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Manhole Sections:
   1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
   2. Install riser sections and tops level and plumb.
   3. Make all joints watertight.
   4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.

B. Drop Manholes:
   1. The difference in elevation between the invert of the inlet pipe and outlet pipe is to be either less than 6-inches (which does not require a drop manhole) or more than 24-inches (which does require a drop manhole).
   2. Where difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe exceeds 24 inches, construct a drop manhole as shown on the Drawings or as directed by the Engineer.

C. Adjust to Grade:
   1. Adjust tops of manholes to grade with brick masonry.
   2. Concrete rings are not acceptable for adjusting to grade.

D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer.

E. Invert Channels:
   1. After manhole and all pipes entering or exiting the manhole have been installed, construct the invert channels and shelf.
   2. Channels to be smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
   3. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
   4. Stop the pipes at the inside face of the manhole where changes of direction occur.
   5. Form invert channels and shelf with brick.
   6. The maximum change in elevation from the invert of the inlet pipe to the invert of the outlet pipe is 6-inches. Shape invert to make smooth transition in vertical grade.
   7. Slope the floor of the manhole (shelf) to the flow channel, as shown on the Drawings.

F. Masonry:
   1. Laying Brick:
      a. Use only clean bricks in brickwork for manholes.
      b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
      c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
      d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
      e. Outside faces of brick masonry shall be plastered with mortar from ¼-inch to 3/8-inch thick.
      f. Completed brickwork shall be watertight.
   2. Curing:
      a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
      b. Protect brick masonry from the weather and frost as required.

G. Frames and Covers:
   1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
   2. Completely fill all voids beneath the bottom flange to make a watertight fit.
   3. Place a ring of mortar at least one-inch-thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
   4. Clean the frame seats before setting the covers in place.

H. Plugging and Patching:
   1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
   2. Touch up damaged water proofing.

I. Cleaning:
   1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.

J. Bedding and Backfilling:
   1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
   2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

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

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 02641

WATER PIPING SPECIALTIES

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, worn 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 worn 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

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

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 wher 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)	6	8	10	12	16	20	24
Ductile, Gray Cast Iron and PVC Mains Allowable Leakage per 1000 ft.							
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 02768

TEMPORARY BYPASS PIPING WITH SERVICE CONNECTIONS

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 of 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 e 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

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% Potash 15%

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:

	Proportion	Germination Minimum	Purity Minimum
-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 ¾ 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 degressions 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

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

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

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. DIVISION 1 THROUGH 16 - As Appropriate

PART 2 MATERIALS

2.01 GENERAL

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

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

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

PART 3 EXECUTION OF WORK

3.01 INCIDENTAL WORK

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

3.02 RESTORATION OF CROSS COUNTRY AREAS

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

3.03 PRECAUTIONS UNDER ELECTRIC LINES

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

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

3.04 PUBLIC SAFETY

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

END OF SECTION

SECTION 04100

MORTAR

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 DESCTRIPTION 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 ELASEWHERE

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:

	Percent Passing	
Sieve Size	Natural Sand	Manufactured Sand
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, ½ to 1 ¼ part hydrated lime, with sand not less than 2 ¼ nor more than 3 times the sum of volumes of cement and lime used. Alternate—1 part approved masonry cement, 2 ¼ 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, ¼ to ½ part hydrated lime, with sand not less than 2 ¼ nor more than 3 times the sum of the volumes of cement and lime used. Alternate—1/2 part Portland cement, one part masonry cement; 3 ½ to 4 ½ 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

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 alkalies 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 AASHO 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

Sieve Size	Natural Sand	Manufactured Sand
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 ¾ inches wide by 2 ¼ 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 ½ %.

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, ½ 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

DRAWINGS

PLANS SHOWING

CHRISTOPHER ROAD
WATER MAIN REPLACEMENT - PHASE 2
CITY OF WALTHAM, MASSACHUSETTS

DECEMBER 2018

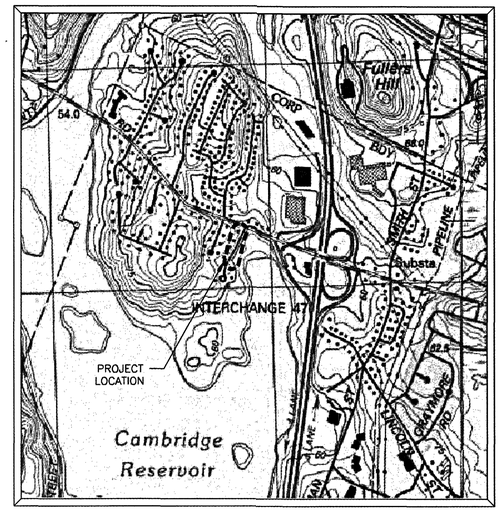
PREPARED BY
CITY OF WALTHAM
ENGINEERING DEPARTMENT
119 SCHOOL STREET
WALTHAM, MA 02451

CITY ENGINEER
STEPHEN A. CASAZZA, PE.

COMMONWEALTH OF MASSACHUSETTS
STEPHEN A. CASAZZA
CIVIL
No. 52199
REGISTERED PROFESSIONAL ENGINEER
12-28-18

INCORPORATED A TOWN 1738.
WALTHAM
INCORPORATED A CITY 1884.

DRAWING INDEX



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
℄	CENTERLINE	PT	POINT OF TANGENCY
CB	CATCH BASIN	PVC	POLYVINYL CHLORIDE
CI	CAST IRON	R	RIM OR RADIUS
CLDI	CEMENT LINED DUCTILE IRON	RCP	REINFORCED 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	UNKOWN
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
- 195 — EXISTING 10' CONTOURS
- 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

- 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
- SS — PROP. SEWER SERVICE

GENERAL NOTES:

1. 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.
2. BUILDING LOCATIONS, AS SHOWN, ARE APPROXIMATE AND FOR REFERENCE PURPOSES ONLY.
3. 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.
4. 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).
5. THE CONTRACTOR SHALL MAINTAIN CONTINUOUS TRAFFIC FLOW DURING CONSTRUCTION SATISFACTORILY TO THE THE ENGINEER AND THE CITY OF WALTHAM.
6. ALL CONSTRUCTION SIGNING SHALL CONFORM TO THE REQUIREMENTS OF MASSDOT AND MUTCD.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETTING 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.
13. THE CONTRACTOR SHALL TAKE SPECIAL CARE NOT TO DAMAGE TREES WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED.
14. 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.
15. POLICE DETAILS SHALL BE COORDINATED BY THE CONTRACTOR.
16. 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.
17. 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.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR THE COMPLETION OF THE WORK.

EROSION & SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH EROSION AND SEDIMENTATION CONTROL DETAILS AND NOTES AS SHOWN IN THESE CONTRACT DRAWINGS.
2. 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.
3. 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.
4. 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.
5. THE CONTRACTOR SHALL PERFORM STREET SWEEPING AT THE END OF EACH DAY.

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 CHRISTOPHER ROAD AND THE UTILITY EASEMENT TO MELODY LANE 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 UP TO THE RIGHT OF WAY OR AS DIRECTED BY THE ENGINEER.
4. ALL NEW WATER SERVICES, CORPORATIONS AND CURB STOPS SHALL BE SIZED AS SHOWN ON THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
5. ALL NEW CORPORATIONS AND CURB STOPS SHALL BE LEAD FREE AND BALL TYPE WITH INSERTS AND RESTRAINTS.
6. ALL CORPORATIONS ALONG THE PROPOSED MAIN SHALL BE INSTALLED PRIOR TO PRESSURE TESTING.
7. ALL HYDRANTS SHALL BE "AMERICAN DARLING B-62", YELLOW BODY WITH BLACK CAPS "WALTHAM COLORS." HYDRANTS SHALL BE FACTORY PAINTED "WALTHAM COLORS"
8. REPLACED HYDRANTS SHALL BE LOCATED AT THE EXISTING LOCATION OR AS DIRECTED BY THE ENGINEER.
9. HYDRANT MARKERS SHALL BE INSTALLED AT EACH HYDRANT LOCATION AND ARE INCLUDED UNDER THE HYDRANT ITEM.
10. 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.
11. LOCATION OF PROPOSED WATER SYSTEM MAY BE ALTERED IN THE FIELD BY THE ENGINEER TO SUIT FIELD CONDITIONS.

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).
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.

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 UTILITITES 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

STOCKPILED MATERIALS & EQUIPMENT NOTES:

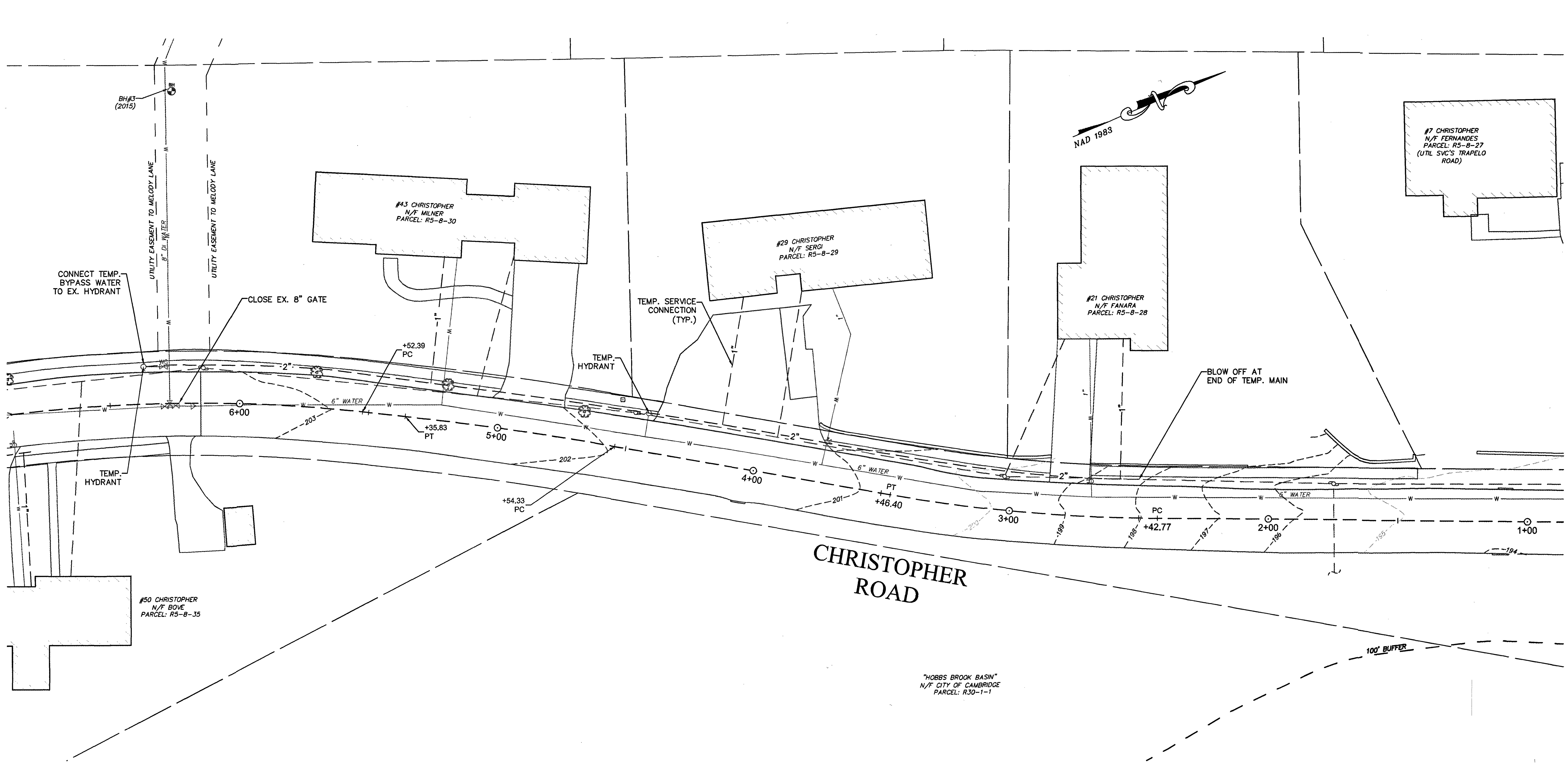
1. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING A LOCATION FOR STAGING AND STORING STOCKPILED MATERIALS AND EQUIPMENT.
2. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF LOCATION AND ANY PRIVATE AGREEMENTS AND ALL FEES THAT MAY BE ASSOCIATED WITH THE USE OF AN AREA FOR STORING STOCKPILED MATERIALS 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.

CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT NOTES

REVISION DATE:

DRAWN BY: JPM
DESIGNED BY: SBH
REVIEWED BY: IAM
APPROVED BY: SAC

DATE: 12/13/2018
SCALE: N.T.S.
FILE: Christopher2017
SHEET 2 OF 7



PLAN VIEW
SCALE: 1" = 20'

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 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.

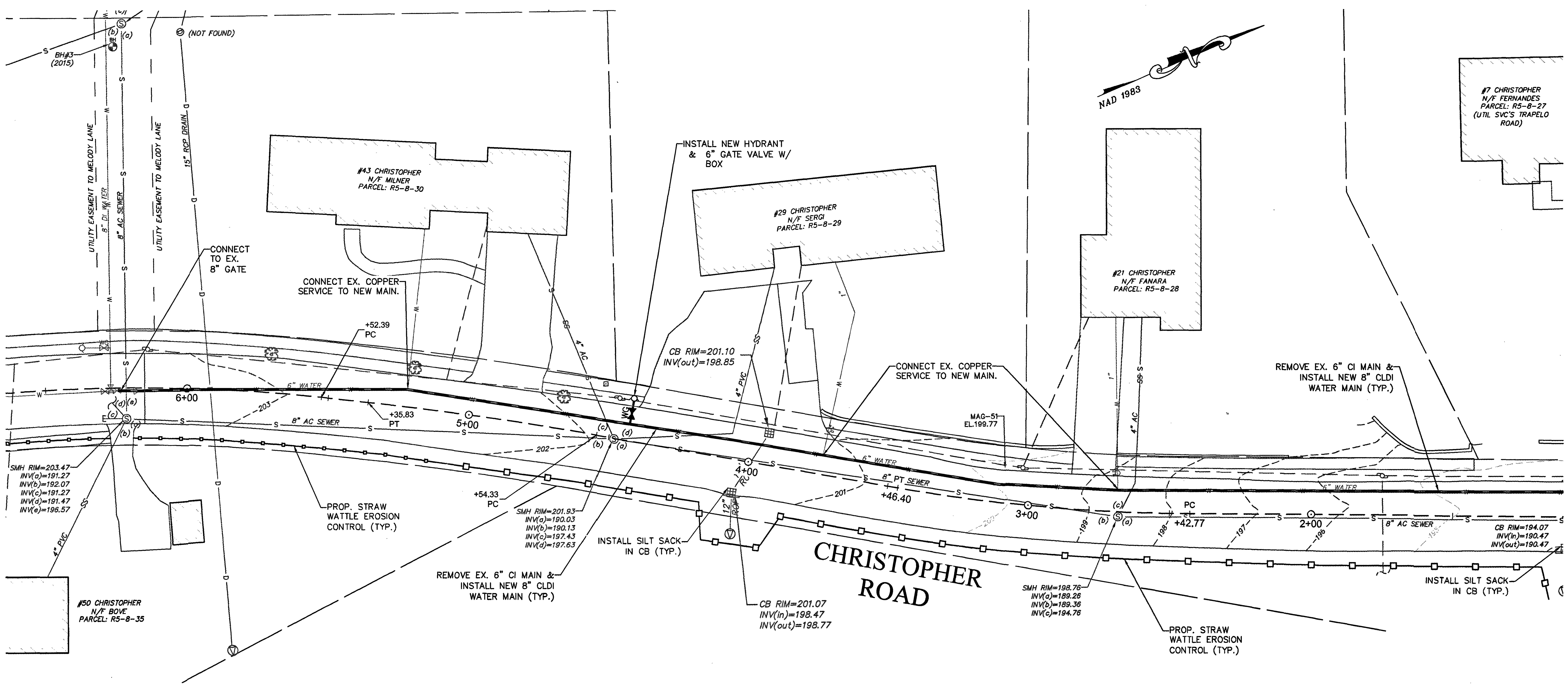
BYPASS SEQUENCING NOTES:

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 #21 CHRISTOPHER ROAD.
3. CHLORINATE AND TEST TEMPORARY MAIN. UPON PASSING RESULTS, CONNECT HOUSES TO TEMPORARY BYPASS WATER.
4. CLOSE EXISTING 8" GATE AT EASEMENT 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.

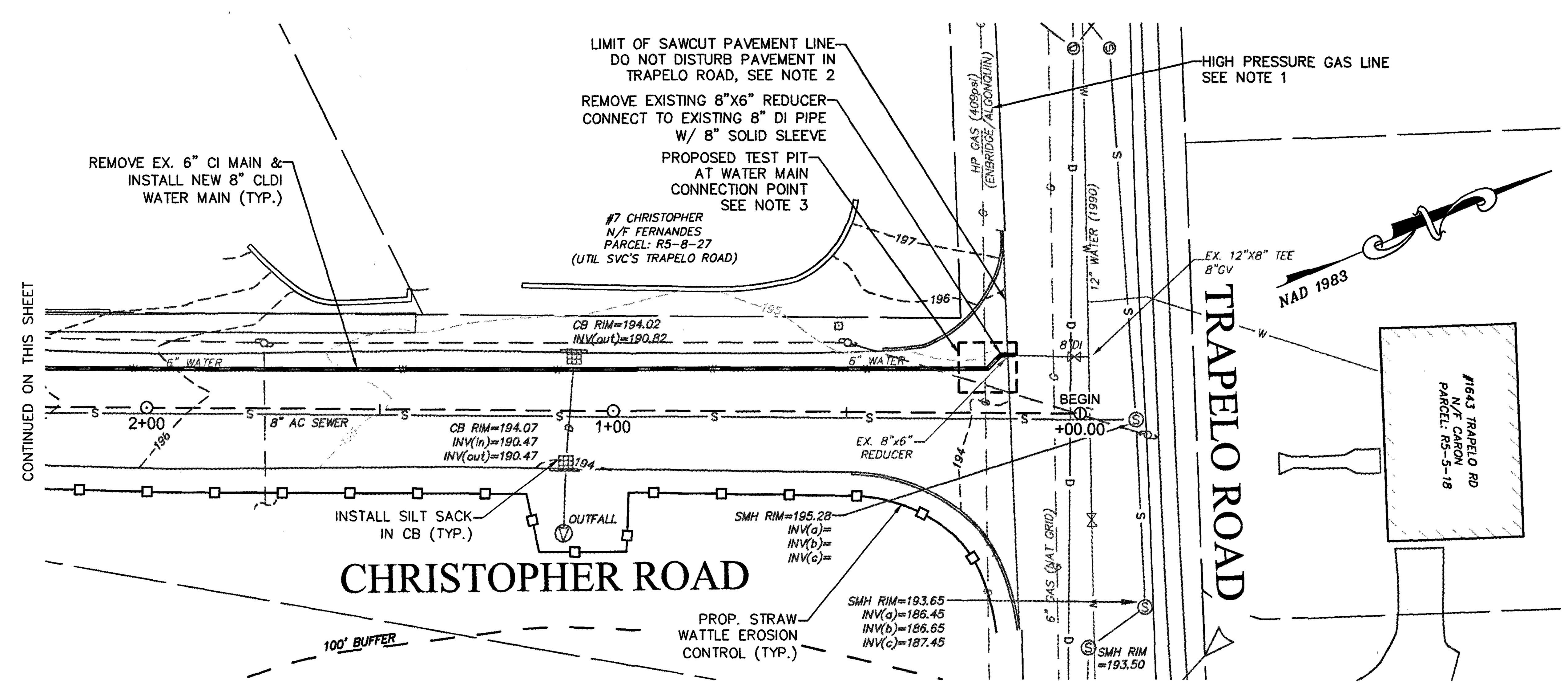
CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT BYPASS PLAN

REVISION DATE:

DATE: 12/13/2018	DRAWN BY: JPM
SCALE: 1" = 20'	DESIGNED BY: SBH
FILE: Christopher2017	REVIEWED BY: IAM
SHEET 3 OF 7	APPROVED BY: SAC



PLAN VIEW
SCALE: 1" = 20'



PLAN VIEW
SCALE: 1" = 20'

NOTES:

1. CONTRACTOR IS REQUIRED TO NOTIFY ENBRIDGE / ALGONQUIN GAS PRIOR TO PROJECT COMMENCEMENT AS WELL AS 48 HOURS PRIOR TO EXCAVATION IN THE ROADWAY APRON OF CHRISTOPHER ROAD AT TRAPELO ROAD. AN ENBRIDGE / ALGONQUIN REPRESENTATIVE MUST BE ON LOCATION DURING WORK NEAR HIGH PRESSURE GAS LINE LOCATED ALONG SOUTH SIDE OF TRAPELO ROAD.
2. CONTRACTOR SHALL PROVIDE A CLEAN SAW-CUT LINE IN PAVEMENT AT LIMIT OF WORK IN THE CHRISTOPHER ROAD APRON ALONG THE SOUTH EDGE OF TRAPELO ROAD. CONTRACTOR SHALL NOT DISTURB TRAPELO ROADWAY PAVEMENT PER CITY OF WALTHAM PAVING MORATORIUM.
3. CONTRACTOR SHALL PERFORM TEST PIT TO VERIFY LOCATION OF 6"X8" REDUCER. TEST PIT SHALL BE PERFORMED PRIOR TO ANY OTHER WORK ON SITE. IF REDUCER IS LOCATED WITHIN TRAPELO ROAD, A PERMIT FROM THE WALTHAM CITY COUNCIL WILL BE REQUIRED. OBTAINING THE PERMIT WILL BE THE RESPONSIBILITY OF THE ENGINEER BUT MAY DELAY WORK. THERE WILL BE NO ADDITIONAL COST TO THE CONTRACT FOR SUCH DELAY.

CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT STA. 5+50 - 9+00

REVISION DATE:

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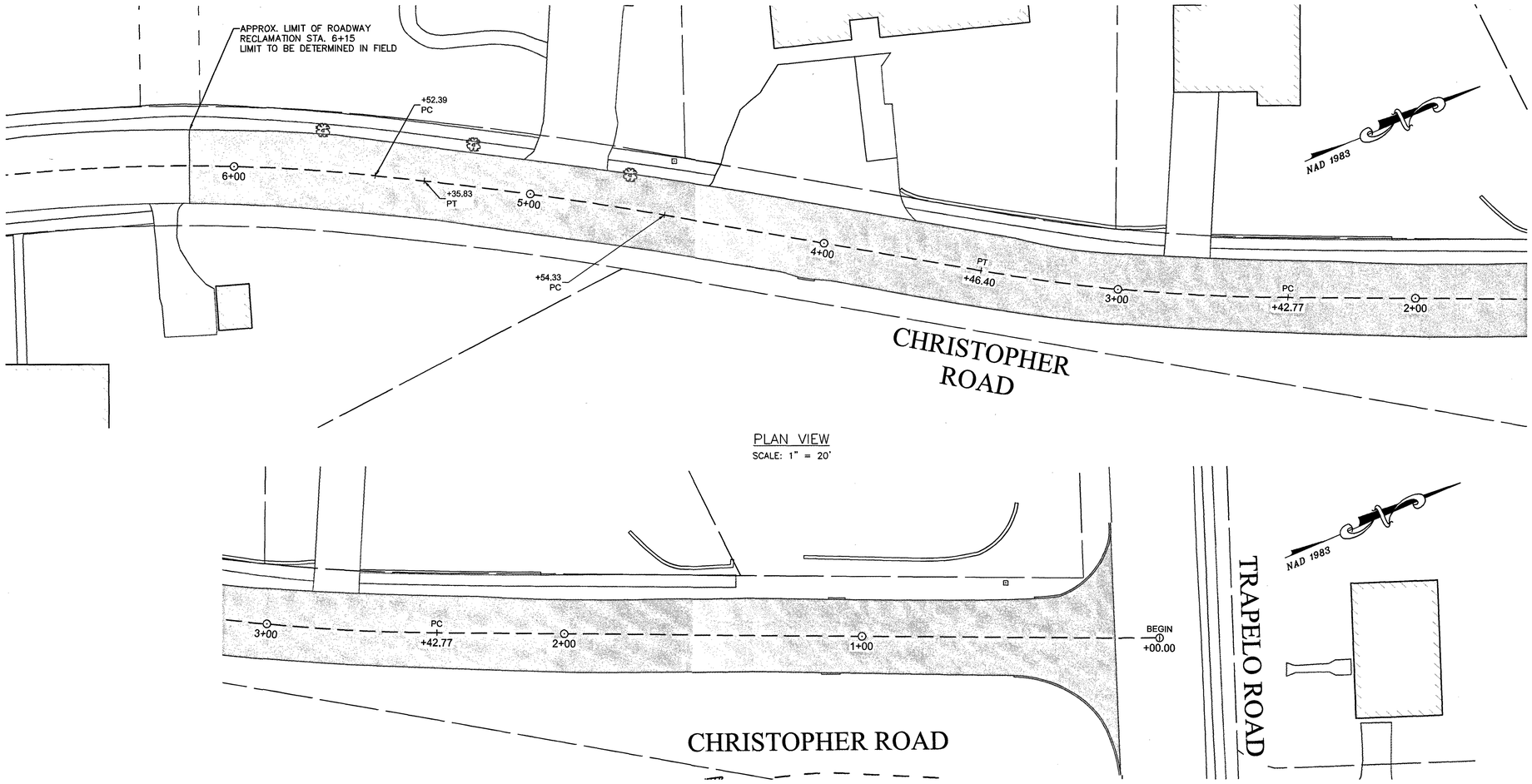

PLAN VIEW
SCALE: 1" = 20'

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 GRAVEL 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 DISPOSED 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. ALL CASTINGS, GATE BOXES, ETC. DAMAGED DURING CONSTRUCTION SHALL BE SUPPLIED AND REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.
4. AFTER INSTALLING SURFACE COURSE PAVEMENT THE CONTRACTOR SHALL INSTALL THERMOPLASTIC PAVEMENT MARKING "STOP BAR" AT THE INTERSECTION OF CHRISTOPHER ROAD AND TRAPELO ROAD. THE COST FOR INSTALLING THIS PAVEMENT MARKING SHALL BE CONSIDERED INCIDENTAL TO PAVING AND ALL COMPENSATION FOR THIS PAVEMENT MARKING SHALL BE CONSIDERED INCLUDED IN THE UNIT PRICE ITEM FOR BID ITEM 5D. LOCATION OF PAVEMENT MARKING WILL BE DETERMINED IN THE FIELD BY THE ENGINEER.

PAVING LEGEND:

FULL WIDTH RECLAMATION –

CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT RECLAMATION

COMMONWEALTH OF MASSACHUSETTS
STEPHEN A. CAMOZZA
CIVIL
No. 32958
REGISTERED PROFESSIONAL ENGINEER
12-28-18

REVISION DATE:	DRAWN BY: JPM	DATE: 12/13/2018
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	REVIEWED BY: IAM	FILE: Christopher2017
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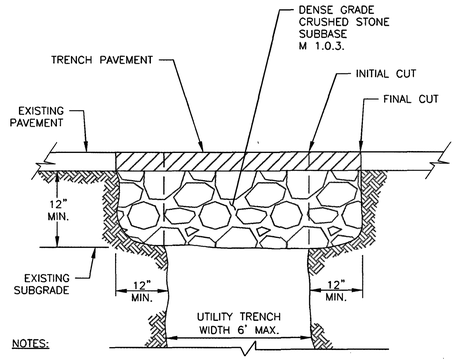
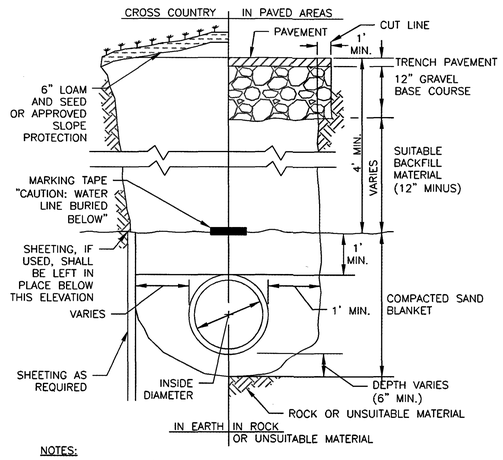


NOTES:

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.

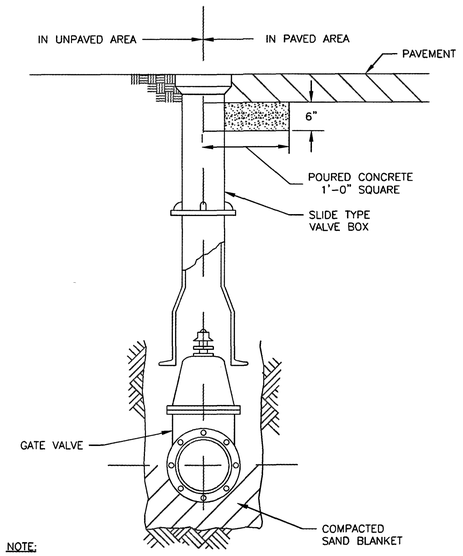
TRENCH PAVEMENT DETAIL
N.T.S.



NOTES:

1. WATER PIPE SHALL BE CLASS 56 C.L.D.I. PIPIE – 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.

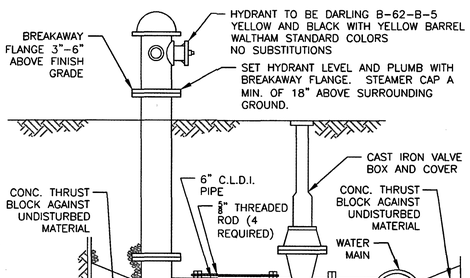
TYPICAL WATER MAIN TRENCH
N.T.S.



NOTE:

1. ALL VALVES MUST OPEN RIGHT
2. ALL VALVES TO BE MANUFACTURED BY MUELLER CO.

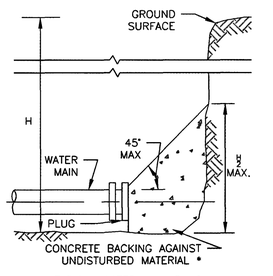
TYPICAL GATE VALVE DETAIL
N.T.S.



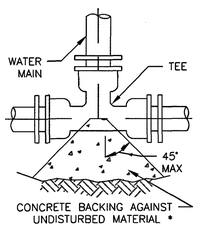
NOTES:

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.

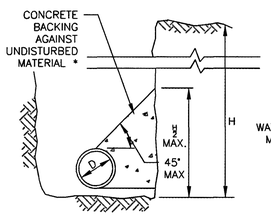
TYPICAL FIRE HYDRANT DETAIL
N.T.S.



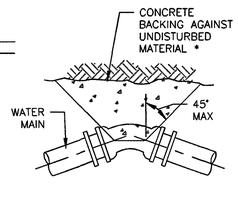
TYPICAL WATER MAIN PLUG THRUST BLOCK



TYPICAL WATER MAIN TEE THRUST BLOCK



TYPICAL WATER THRUST BLOCK SECTION



TYPICAL WATER MAIN BEND THRUST BLOCK

* SEE TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED

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

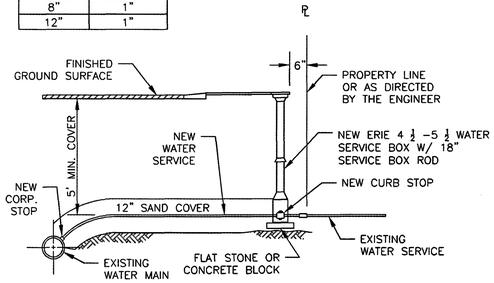
* TYPE OF SOIL IS MEDIUM CLAYEY, 6 OR MORE BLOWS PER FOOT, OR LOOSE GRANULAR, 9 OR MORE BLOWS PER FOOT. SOIL CONDITIONS OTHER THAN THOSE GIVEN WILL REQUIRE LARGER BEARING AREAS.

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.

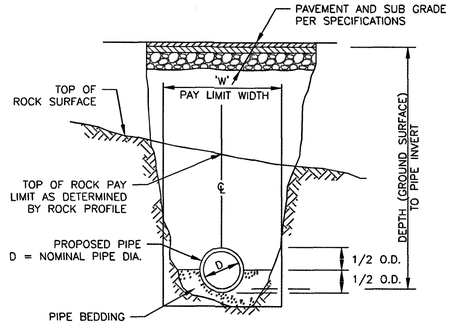
WATER MAIN DIAMETER	MAXIMUM TAP DIAMETER
4"	1/2"
6"	3/4"
8"	1"
12"	1"



NOTES:

1. ALL WATER SERVICES SHALL BE 1" DIA. TYPE K COPPER TUBING UNLESS OTHERWISE NOTED. SERVICE SHALL BE ONE CONTINUOUS LENGTH FROM MAIN TO CURB STOP.
2. ALL WATER SERVICES SHALL BE REPLACED UP TO THE RIGHT OF WAY
3. WHERE THE SIZE OF THE CONNECTION EXCEEDS THAT GIVEN IN THE TABLE, THE CONNECTION SHALL BE MADE MEANS OF A TAPPED SADDLE OR TEE CONNECTION.
4. WHERE GATE BOX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO OPERATE VALVE WITH WRENCH.
5. REMOVE AND 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.

CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT DETAILS I

DATE: 12/13/2018
SCALE: N.T.S.
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REVIEWED BY: IAM
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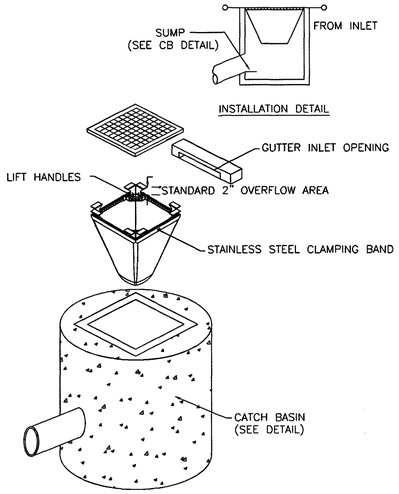
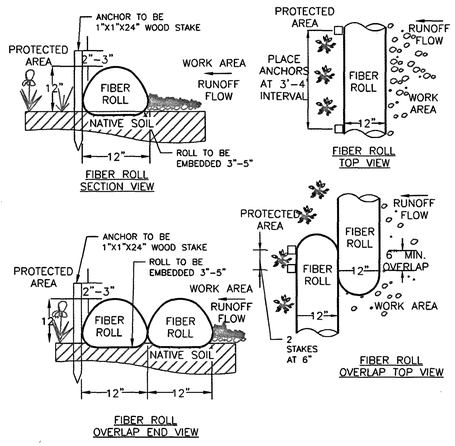
REVISION DATE:

SHEET 6 OF 7

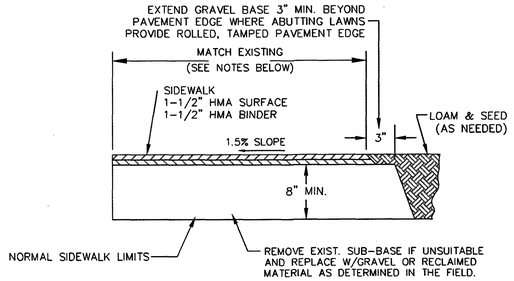


NOTE:
1. SILTSACKS SHALL BE FLEXSTORM CATCH-IT OR APPROVED EQUAL
2. SILTSACKS SHALL BE INSTALLED IN ALL CATCH BASIN UNTIL DRAINAGE AREA HAS BEEN FULLY STABILIZED.

CATCH BASIN SILT SACK DETAIL
N.T.S.



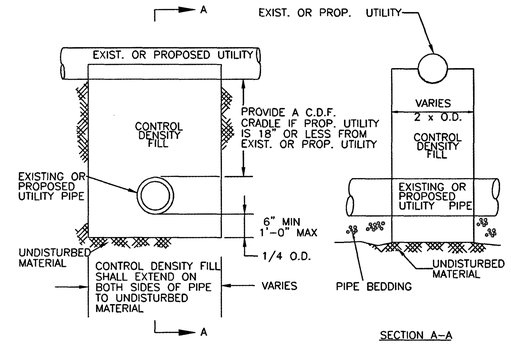
EROSION CONTROL FIBER ROLL
N.T.S.



HMA PAVEMENT

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.

SIDEWALK DETAIL
N.T.S.



CONCRETE UTILITY SUPPORT DETAIL
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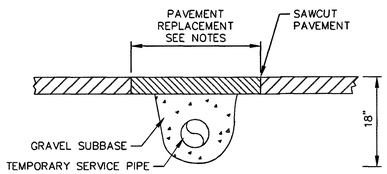
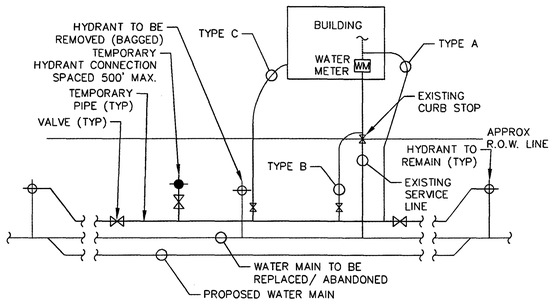


PAVED ROADWAY/DRIVEWAY CROSSING

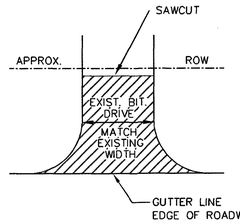
NOTES:
1. TEMPORARY PAVEMENT 2" THICK. PERMANENT PAVEMENT 4" PLACED IN TWO (2) LIFTS - 2" BASE, 2" TOP.
2. COLD PATCH MAY BE USED FOR TEMPORARY TRENCH PAVING AT THE DISCRETION OF THE ENGINEER.
3. ALL TRENCHES SHALL BE SAW CUT, SANDED AND SEALED.

TEMPORARY SERVICE PIPE CROSSING DETAIL IN ROADWAY
N.T.S.

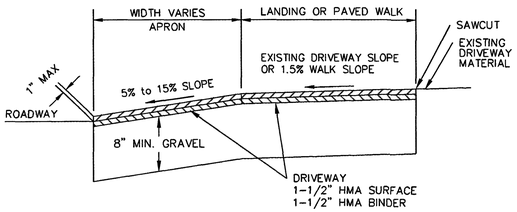


CONNECTION TYPE A - TEMPORARY SERVICE WITH METER REMOVED
CONNECTION TYPE B - TEMPORARY SERVICE AT EXISTING CURB STOP
CONNECTION TYPE C - TEMPORARY SERVICE AT OTHER SUITABLE LOCATION

TYPICAL TEMPORARY SERVICE PIPE DETAIL
N.T.S.

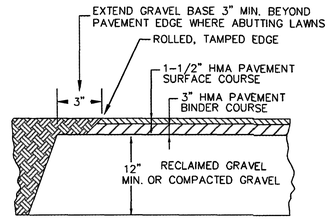


PLAN



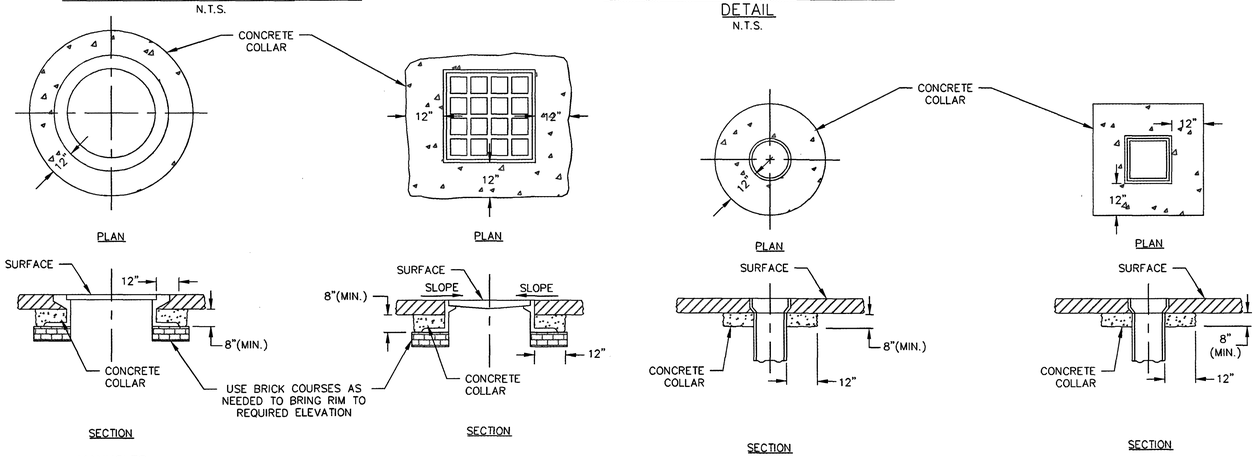
SECTION

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
N.T.S.



DETAILS FOR RAISING CASTINGS AND VALVE BOXES
N.T.S.

CITY OF WALTHAM ENGINEERING DEPARTMENT
CHRISTOPHER ROAD - PHASE 2
WATER MAIN REPLACMENT DETAILS II

REVISION DATE:

DRAWN BY: JPM
DESIGNED BY: SBH
REVIEWED BY: IAM
APPROVED BY: SAC

DATE: 12/13/2018
SCALE: N.T.S.
FILE: Christopher2017
SHEET 7 OF 7