CONTRACT DOCUMENTS AND SPECIFICATIONS

for

Project 7205

Outer Islington Street Improvements

Bid #33-17

State of New Hampshire

John P. Bohenko, City Manager

Prepared by:

City of Portsmouth
Engineering Division
Public Works Department

TABLE OF CONTENTS

City of Portsmouth
Portsmouth, New Hampshire
Department of Public Works

Outer Islington Street Improvements
Bid #33-17

INVITATION TO BID

Sealed bid proposals, **plainly marked, Outer Islington Street Improvements**, Bid Proposal #33-17 **on the outside of the mailing envelope as well as the sealed bid envelope,** addressed to the Finance/Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, New Hampshire, 03801, will be accepted until February 2, 2017 at 2:00 p.m.; at which time all bids will be publicly opened and read aloud.

This project consists of the installation of concrete sidewalks, granite curbing, drainage pipe & structures, water services, guardrail and roadway reclaiming and paving in the section of Islington Street from Plains Avenue to Essex Avenue. Additionally there is an add/alternate portion of the bid to add sewer pipe & structures in this area.

Work may begin at any time on or after April 15, 2017. Final Completion of the project must occur by September 1, 2017 with no more than 80 days on site working total. Liquidated damages shall be assessed at $200.00 per day. Hours of work will be 7AM to 5 PM weekdays.

The Contractor will be required to keep roadways and sidewalks passable for the public and employees to the maximum degree possible**.**

The General Contractor for this project must be Pre-qualified with NHDOT for Road Construction.

Bidders must determine the quantities of work required and the conditions under which the work will be performed.

Specifications may be obtained at the City's website: http://www.cityofportsmouth.com/finance/purchasing.htm
Addenda to this project, if any, including written answers to questions, will not be provided directly to vendors, but will be posted by 1:00 p.m., on January 31, 2017 on the City of Portsmouth Website under the project heading.

Electronic copies of the plans and specifications may be obtained off of the City's webpage. Documents are not available for pickup.

The City reserves the right, after bid opening and prior to award of the contract, to modify the amount of the work in the event that bids exceed budgeted amounts. The City of Portsmouth further reserves the right to reject any or all bids, to waive technical or legal deficiencies, to re-bid, and to accept any bid that it may deem to be in the best interest of the City. Also, the City reserves the right to approve or deny subcontractors for this project. An award of this project is contingent upon additional process and funding.

Each Bidder shall furnish a bid security in the amount of ten percent (10%) of the bid. The Bid Security may be in the form of a certified check or a bid bond executed by a surety company authorized to do business in the State of New Hampshire, made payable to the City of Portsmouth, N.H.

INSTRUCTIONS TO BIDDERS

BIDDING REQUIREMENTS AND CONDITIONS

1. Special Notice to Bidders

Appended to these instructions is a complete set of bidding and general contract forms. These forms may be detached and executed for the submittal of bids. The plans, specifications, and other documents designated in the proposal form will be considered as part of the proposal, whether attached or not.

The bidders must submit a statement of bidder's qualifications, if requested, subsequent to bid opening but prior to award.

Addenda to this bid document, if any, including written answers to questions, will be posted by January 31, 2017 on the City of Portsmouth website at http://www.cityofportsmouth.com/finance/purchasing.htm under the project heading. Addenda and updates will NOT be sent directly to firms. Contractors submitting a bid should check the web site daily for addenda and updates after the release date. Firms should print out, sign and return addenda with the proposal. Failure to do so may result in disqualification.

2. Interpretation of Quantities in Bid Schedules

The quantities appearing in the bid schedule are approximate only and are prepared for the comparison of bids. Payment to the contractor will be made only for actual work performed and accepted in accordance with the contract. Any scheduled item of work to be done and materials to be furnished may be increased, decreased or omitted as hereinafter provided, and no claim for loss, anticipated profits or costs incurred in anticipation of work not ultimately performed will be allowed due to such increase or decrease.

3. Examination of Plans, Specifications and Site Work

The bidder is expected to examine carefully the site of the proposed work, the plans, standard specifications, supplemental specifications, special provisions and contract forms before submitting a proposal. The submission of a bid shall be considered conclusive evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the contract. It will be conclusive evidence that the bidder has also investigated and is satisfied with the sources of supply for all materials.

Plans, surveys, measurements, dimensions, calculations, estimates and statements as to the condition under which the work is to be performed are believed to be correct, but the contractors must examine for themselves, as no allowance will be made for any errors or inaccuracies that maybe found therein.

4. Familiarity with Laws

The bidder is assumed to have made himself or herself familiar with all federal and state laws and all local by-laws, ordinances and regulations which in any manner affect those engaged or employed on the work or affect the materials or equipment used in the work or affect the conduct of the work, and the bidder, if awarded the contract, shall be obligated to perform the work in conformity with said laws, by-laws, ordinances and regulations notwithstanding its ignorance thereof. If the bidder shall discover any provision in the plans or specifications which is in conflict with any such law, by-law, ordinance or regulation the bidder shall forthwith report it to the engineer in writing.

5. Preparation of Proposal

a) The bidder shall submit its proposal upon the forms furnished by the Owner. The bidder shall specify a lump sum price in figures, for each pay item for which a quantity is given and shall also show the products of the respective

prices and quantities written in figures in the column provided for that purpose and the total amount of the proposal obtained by adding the amount of the several items. All words and figures shall be in ink or typed.
If a unit price or a lump sum bid already entered by the bidder on the proposal form is to be altered it should be crossed out with ink, the new unit price or lump sum bid entered above or below it and initialed by the bidder, also with ink.

b) The bidder's proposal must be signed with ink by the individual, by one or more general partners of a partnership, by one or more members or officers of each firm representing a joint venture; by one or more officers of a corporation, by one or more members (if member-managed) or managers (if manager-managed) of a limited liability company, or by an agent of the contractor legally qualified and acceptable to the owner. If the proposal is made by an individual, his or her name and post office address must be shown, by a partnership the name and post office address of each general and limited partner must be shown; as a joint venture, the name and post office address of each venturer must be shown; by a corporation, the name of the corporation and its business address must be shown, together with the name of the state in which it is incorporated, and the names, titles and business addresses of the president, secretary and treasurer.

6. Nonconforming Proposals

Proposals will be considered nonconforming and may be rejected in the Owner's sole discretion for any of the following reasons:

- If the proposal is on a form other than that furnished by the Owner, or if the form is altered or any portion thereof is detached;
- If there are unauthorized additions, conditional or altered bids, or irregularities of any kind which may tend to make the proposal or any portion thereof incomplete, indefinite or ambiguous as to its meaning;
- If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award; or
- If the proposal does not contain a unit price for each pay item listed except in the case of authorized alter pay items.

7. Proposal Guaranty

No proposal will be considered unless accompanied by a bid bond, surety, or similar guaranty of the types and in an amount not less than the amount indicated in the Invitation to Bid. All sureties shall be made payable to the "City of Portsmouth". If a bid bond is used by the bidder it shall be:

- In a form satisfactory to the Owner;
- With a surety company licensed, authorized to do business in, and subject to the jurisdiction of the courts of the State of New Hampshire; and
- Conditioned upon the faithful performance by the principal of the agreements contained in the sub-bid or the general bid.

In the event any irregularities are contained in the proposal guaranty, the bidder will have four business days (not counting the day of opening) to correct any irregularities. The corrected guaranty must be received by 4:00 p.m. If irregularities are not corrected to the satisfaction of the Owner, the Owner, in its sole discretion, may rejected the bid.

8. Delivery of Proposals

When sent by mail, the sealed proposal shall be addressed to the Owner at the address and in the care of the official in whose office the bids are to be received. All proposals shall be filed prior to the time and at the place specified in the invitation for bids. Proposals received after the time for opening of the bids will be returned to the bidder, unopened.

9. Withdrawal of Proposals

A bidder will be permitted to withdraw his or her proposal unopened after it has been submitted if the Owner receives a request for withdrawal in writing prior to the time specified for opening the proposals.

10. Public Opening of Proposals

Proposals will be opened and read publicly at the time and place indicated in the invitation for bids. Bidders, their authorized agents, and other interested parties are invited to be present.

11. Disqualification of Bidders

Any or all of the following reasons may be deemed by Owner in its sole discretion as being sufficient for the disqualification of a bidder and the rejection of his proposal:

- More than one proposal for the same work from an individual, firm, or corporation under the same or different name;
- Evidence of collusion among bidders;
- Failure to submit all required information requested in the bid specifications;
- If the Contractor is not listed with the New Hampshire Department of Transportation as a pre-qualified contractor under the classification of Road Construction;
- Lack of competency or of adequate machinery, plant or other equipment, as revealed by the statement of bidders qualification or otherwise;
- Uncompleted work which, in the judgment of the owner, might hinder or prevent the prompt completion of additional work if awarded;
- Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts;
- Default or unsatisfactory performance on previous contracts; or
- Such disqualification would be in the best interests of the Owner.

12. Material Guaranty and Samples

Before any contract is awarded, the bidder may be required to furnish a complete statement of the origin, composition and manufacture of any or all materials to be used in the construction of the work, and the Owner may, in its sole discretion, reject the bid based on the contents of the statement or as a result of the failure of the bidder to submit the statement.

AWARD AND EXECUTION OF CONTRACT

1. Consideration of Proposals

After the proposals are opened and read, they will be compared on the basis of the total price for all sections of work and any such additional considerations as may be identified in the bid documents. The results of such comparisons will be immediately available to the public. In case of a discrepancy between the prices written in words and those written figures, the prices written in words shall govern. In case of a discrepancy between the total shown in the proposal and that obtained by adding the products of the quantities of items and unit bid prices, the latter shall govern.

2. Award of Contract

Within 30 calendar days after the opening of proposals, if a contract is to be awarded, the award will be made to the lowest responsible and qualified bidder whose proposal complies with all the requirements prescribed. The successful bidder will be notified, in writing, mailed to the address on his or her proposal, that his or her bid has been accepted and that the bidder has been awarded the contract.

3. Reservation of Rights

The Owner reserves the right to reject any or all proposals, to waive technicalities or to advertise for new proposals, if, in the sole discretion of the Owner, the best interest of the City of Portsmouth will be promoted thereby. The Owner further reserves the right to conduct such investigations of the contractor's history, financial resources, and other qualifications as it deems necessary to determine whether bidder is qualified to do the work. Bidder may be asked to execute releases. Failure to execute a release upon request may result in disqualification.

The Owner reserves the right to cancel the award of any contract at any time before the execution of such contract by all parties without any liability of the Owner.

The City reserves the right, after bid opening and prior to award of the contract, to modify the amount of the work in the event that bids exceed budgeted amounts. An award of this project is contingent upon additional process and funding.

4. Return of Proposal Guaranty

All proposal guaranties, except those of the three lowest bidders, will be returned upon request following the opening and checking of the proposals. The proposal guaranties of the three lowest bidders will be returned within ten days following the award of the contract if requested.

5. Contract Bonds

At the time of the execution of the contract, the successful bidder shall furnish:

- A performance bond in the amount of 100 percent of the contract amount.
- Labor and materials payment bond in the sum equal to 100 percent of the contract amount.

At the time of project completion, the Owner may, in its sole discretion, permit the Contractor to substitute a maintenance bond in lieu of holding retainage for the entire guaranty period. If a bond is furnished it shall meet the following criteria:

- The bond shall be in an amount equal to 20 percent of the contract amount. Such bond shall guarantee the repair of all damage due to faulty materials or workmanship provided or done by the contractor. The

guarantee shall remain in effect for a period of one year after the date of final acceptance of the job by the Owner.

Each bond shall be: (1) in a form satisfactory to the Owner; (2) with a surety company licensed and authorized to do business and with a resident agent designated for services of process in the State of New Hampshire; and (3) conditioned upon the faithful performance by the principal of the agreements contained in the original bid. All premiums for the contract bonds are to be paid by the contractor.

6. Execution and Approval of Contract

The successful bidder is required to present all contract bonds, to provide proof of insurance, and to execute the contract within 10 days following receipt of the City's notification of acceptance of the bid. No contract shall be considered as in effect until it has been fully executed by all parties.

7. Failure to Execute Contract

Failure to execute the contract and to provide acceptable bonds and proof of insurance within 10 days after notification of acceptance of bid shall be just cause for the cancellation of the award and the forfeiture of the proposal guarantee which shall become the property of the Owner, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder, or the City may exercise its reserved rights including the rejection of all bids or re-advertisement.

PROPOSAL FORM

Outer Islington Street Improvements

CITY OF PORTSMOUTH, N.H.

To the City of Portsmouth, New Hampshire, herein called the Owner.

The undersigned, as Bidder, herein referred to as singular and masculine declares as follows:

1. All interested in the Bid as Principals are named herein.

2. This bid is not made jointly, or in conjunction, cooperation or collusion with any other person, firm, corporation, or other legal entity;

3. No officer, agent or employee of the Owner is directly or indirectly interested in this Bid.

4. The bidder has carefully examined the sites of the proposed work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this Bid, and the bidder has carefully read and examined the Drawings, Agreement, Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;

5. The bidder understands that the quantities of work calculated in the Bid or indicated on the Drawings or in the Specifications or other Contract Documents are approximate and are subject to increase or decrease or deletion as deemed necessary by the Director of Public Works. Any such changes will not result in or be justification for any penalty or increase in contract prices; and agrees that, if the Bid is accepted the bidder will contract with the Owner, as provided in the Contract Documents, this Bid Form being part of said Contract Documents, and that the bidder will supply or perform all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other activities required by the Contract Documents in the manner and within the time therein set forth, and that the bidder will take in full payment therefore the following item prices, to wit:

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
201.1	1	LS	Clearing and Grubbing _____	$_____	$_____
201.2	1	EA	Removal of Tree & Stump _____	$_____	$_____
202.31	120	SY	Removal of Existing Sidewalk _____	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
202.32	1400	SY	Removal of Existing Driveways and Aprons	$_____	$_____
202.7	475	LF	Removal of Guardrail	$_____	$_____
202.8	10	CY	Removal of Masonry Steps as Directed	$_____	$_____
203.1	750	CY	Common Excavation	$_____	$_____
203.6	250	CY	Embankment in Place	$_____	$_____
206.19	20	HR	Common Structure Excavation - Exploratory	$_____	$_____
206.2	300	CY	Rock Structure Excavation	$_____	$_____
209.1	200	CY	Granular Backfill	$_____	$_____
214	8600	SY	Fine Grade	$_____	$_____
304.2	100	CY	Gravel in Place (Roadway Base)	$_____	$_____
304.3	50	CY	Crushed Gravel in Place (Roadway Base)	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
304.3	550	CY	Crushed Gravel in Place (Sidewalk & Driveway Base)	$_____	$_____
306.108a	7500	SY	8" Reclaimed Stabilized Base	$_____	$_____
306.108b	7500	SY	8" Reclaimed Stabilized Base (Blend in 1.5" Crushed Stone)	$_____	$_____
306.208	50	CY	Reclaim Stabilized Base (Rehandle for Base Material)	$_____	$_____
306.36	450	TN	1.5" Crushed Stone (Mixed with Reclaimer)	$_____	$_____
403.11A	1880	TN	Machine Method, Binder	$_____	$_____
403.11B	925	TN	Machine Method, Wearing	$_____	$_____
403.12	220	TN	Hand Method	$_____	$_____
417	2600	SY	Cold Plane Bituminous Surface (1.5")	$_____	$_____
520	170	CY	Class B Curb Backfill	$_____	$_____
585.3	100	CY	Stone Fill, Class C in Place	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
592.12	150	SF	Segmented Block Retaining Wall	$_____	$_____
603.3012	10	LF	18" Dia. RCP	$_____	$_____
603.8221	1000	LF	12" Dia. HDPE Drain Pipe	$_____	$_____
604.0007	9	EA	Poly Liner for CB	$_____	$_____
604.1	7	EA	Eliminator Oil/Water Separator	$_____	$_____
604.12	9	EA	New Catch Basin	$_____	$_____
604.324	9	EA	New Drain Manhole	$_____	$_____
604.54	4	EA	Adjust Existing Structures (Tele. MH)	$_____	$_____
604.62	9	EA	Provide and Install DMH Frame & Cover	$_____	$_____
604.72	9	EA	Provide and Install CB Frame & Grate	$_____	$_____
604.8	1	EA	Alter Existing Stone Culvert with Aluminum Restrictor Plate	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
605.512	550	LF	12" Corrugated Perforated HDPE Underdrain	$_____	$_____
606.12	620	LF	Beam Guardrail Standard Section (Steel Post)	$_____	$_____
606.1255	4	EA	Beam Guardrail Terminal Unit E-2	$_____	$_____
608.24	1250	SY	4" Concrete Sidewalk	$_____	$_____
608.26	50	SY	6" Concrete Sidewalk (for ADA Ramp areas)	$_____	$_____
608.52	12	EA	ADA Detectable Warning Tile, Cast Iron	$_____	$_____
609.1	3700	LF	New Straight Vertical Granite Curb, 5"	$_____	$_____
609.2	210	LF	New Curved Vertical Granite Curb, 5"	$_____	$_____
611	1	LS	Cut and Cap Existing Water Main	$_____	$_____
611.5001	2	EA	1" Copper Corporation and Curb Stop	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
611.5011	60	LF	1" Copper Water Service	$_____	$_____
611.8	1	EA	New Hydrant Assembly Complete (Incl. tapping saddle & valve & 6" lateral pipe)	$_____	$_____
611.9	25	EA	Adjust Existing Gate Valves	$_____	$_____
615	4	EA	Relocate Traffic Signs	$_____	$_____
618.6	2720	HR	Uniformed Flaggers Twenty dollars and fifty cents	$20.50	$55,760.00
618.7	100	HR	Portsmouth Police Officers	$60.00	$6,000.00
619.1	1	U	Maintenance of Traffic	$_____	$_____
619.11	1000	LB	Calcium Chloride for Dust Control	$_____	$_____
619.253	4	WK	Portable Message Boards	$_____	$_____
628.2	1000	LF	Sawcut Bituminous Pavement	$_____	$_____

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
632.0104A	10500	LF	4" Paint Striping (Chlorinated Rubber Paint)	$_____	$_____
632.3112	425	LF	12" Thermoplastic Crosswalk & Stop Bars	$_____	$_____
645	4	EA	Catch Basin Silt Sack	$_____	$_____
645.631	3400	LF	Silt Fence or Silt Log	$_____	$_____
645.7	1	LS	SWPPP	$_____	$_____
645.71	85	HR	SWPPP Inspections	$_____	$_____
646.51	3500	SY	Turf Establishment w/ Mulch and Tackifier	$_____	$_____
692	1	U	Mobilization	$_____	$_____
1010.2	1	U	Asphalt Cement Adjustment Two Thousand dollars	$2,000.00	$2,000.00

TOTAL FOR PROJECT BASE BID

In Figures $_____

In Words $_____

PROPOSAL FORM FOR ADDITIONAL/ALTERNATIVE #1 BID CONSTRUCTION ITEMS

It is mandatory to fill out this section as well.

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
206.2	100	CY	Rock Structure Excavation	$_____	$_____
618.6	160	HR	Uniformed Flaggers Twenty dollars and fifty cents	$20.50	$3,280.00
645.71	5	HR	SWPPP Inspections	$_____	$_____
660.1A	1	EA	New 4’ Dia. Sewer Manhole	$_____	$_____
660.1B	1	EA	New 6’ Dia. Sewer Manhole	$_____	$_____
660.2	$1,700.00	$	Allowance to purchase manhole frame and grates from City.	$_____	$_____
660.3	120	LF	8" Dia. SDR 35 Sewer Pipe	$_____	$_____
660.3A	200	LF	1.5" Dia. SDR 21 Forced Sewer Pipe	$_____	$_____
660.3B	1600	LF	2.0" Dia. SDR 21 Forced Sewer Pipe	$_____	$_____

660.4A	24	EA	Service Lateral Assembly	$_____	$_____
660.4B	1	EA	Terminal Cleanout Assembly	$_____	$_____
660.5	1	EA	Core Existing SMH	$_____	$_____
660.6	1	EA	Construct Invert & Drop into Existing SMH	$_____	$_____

The contractor will be provided an extra 10 working days if this add-alt is selected for approval.

TOTAL FOR PROJECT ADDITIONAL/ALTERNATIVE BID #1

In Figures $_____

In Words $_____

PROPOSAL FORM FOR ADDITIONAL/ALTERNATIVE #2 BID CONSTRUCTION ITEMS

It is mandatory to fill out this section as well.

ITEM #	EST. QTY	UNITS	ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
202.31	220	SY	Removal of Existing Sidewalk	$_____	$_____
202.32	100	SY	Removal of Existing Driveways and Aprons	$_____	$_____
203.1	75	CY	Common Excavation	$_____	$_____

214	100	SY	Fine Grade (Driveways)	$_____	$_____
304.3	75	CY	Crushed Gravel in Place (Sidewalk & Driveway Base)	$_____	$_____
403.12	10	TN	Hand Method Paving	$_____	$_____
520	5	CY	Class B Curb Backfill	$_____	$_____
608.24	220	SY	4" Concrete Sidewalk	$_____	$_____
609.1	10	LF	New Straight Vertical Granite Curb, 5"	$_____	$_____
609.5	375	LF	Reset Existing Curb	$_____	$_____
618.6	100	HR	Uniformed Flaggers Twenty dollars and fifty cents	$20.50	$2,050.00
628.2	525	LF	Sawcut Bituminous Pavement	$_____	$_____
632.0104A	460	LF	4" Paint Striping (Chlorinated Rubber Paint)	$_____	$_____
645	2	EA	Catch Basin Silt Sack	$_____	$_____
646.51	225	SY	Turf Establishment w/ Mulch and Tackifier	$_____	$_____

The contractor will be provided an extra 5 working days if this add-alt is selected for approval.

TOTAL FOR PROJECT ADDITIONAL/ALTERNATIVE BID #2

In Figures $_____

In Words $_____

_____
To Bidder:

The City reserves the right, after bid opening and prior to award of the contract, to modify the amount of the work in the event that bids exceed budgeted amounts and/or easements and agreements from one or more impacted property owners are not received.

It is the intention of this contract that the items listed above describe completely and thoroughly the entirety of the work as shown on the plans and as described in the specifications. All other items required to accomplish the above items are considered to be subsidiary work, unless shown as a pay item.

TOTAL FOR PROJECT (BASE BID + ADD ALTERNATIVE BID #1 + ADD ALTERNATIVE BID #2) AND **BASIS OF AWARD**

In Figures $_____

In Words **$**_____

The undersigned agrees that for extra work, if any, performed in accordance with the terms and provisions of the Contract Documents, the bidder will accept compensation as stipulated therein.

Date:

_____ By:_____
Company Signature

_____ Title:_____
Business Address

_____
City, State, Zip Code Telephone:_____

We certify that the Company is currently pre-qualified with the State of New Hampshire for Road Construction.

By: _____ _____
Signature & Title Date

The Bidder has received and acknowledged Addenda No._____through _____.

All Bids are to be submitted on this form and in a sealed envelope, plainly marked on the outside with the Bidder's name and address and the Project name as it appears at the top of the Proposal Form.

In order to follow the City's sustainability practices, future bid invitations/specifications may be sent electronically. Please provide an email address as to where I could email future bid invitations/specifications of this type. Thank you in advance for your cooperation.

Email Address:_____

BID SECURITY BOND

(This format provided for convenience, actual Bid Bond is acceptable in lieu of, if compatible.)

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned

_____, as Principal, and

_____, as Surety, are hereby

held and firmly bound unto _____

IN THE SUM OF _____

as liquidated damages for payment of which, well and truly to be made we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of this obligation is such that whereas the Principal has submitted to the

_____ _____

A CERTAIN Bid attached hereto and hereby made a part hereof to enter into a contract in writing, hereinafter referred to as the "AGREEMENT" and or "CONTRACT", for

_____

_____

_____

NOW THEREFORE,

(a) If said Bid shall be rejected or withdrawn as provided in the INFORMATION FOR BIDDERS attached hereto or, in the alternative,

(b) If said Bid shall be accepted and the Principal shall duly execute and deliver the form of AGREEMENT attached hereto and shall furnish the specified bonds for the faithful performance of the AGREEMENT and/or CONTRACT and for the payment for labor and materials furnished for the performance of the AGREEMENT and or CONTRACT,

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

BID SECURITY BOND (continued)

The Surety, for value received, hereby agrees that the obligation of said surety and its bond shall be in no way impaired or affected by any extensions of the time within such BID may be accepted, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the parties hereto have duly executed

this bond on the _____ day of _____, 20__.

_____L.S.
(Name of Principal)

(SEAL)

BY _____

_____
(Name of Surety)

BY _____

STATEMENT OF BIDDER'S QUALIFICATIONS

Supply with Bid

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. Add separate sheets if necessary

1. Name of Bidder

2. Permanent Main Office Address

3. Form of Entity

4. When Organized

5. Where Organized

6. How many years have you been engaged in the contracting business under your present name; also state names and dates of previous firm names, if any.

7. Contracts on hand; (schedule these, showing gross amount of each contract and the approximate anticipated dates of completion).

8. General character of work performed by your company.

9. Have you ever failed to complete any work awarded to you? _____(no)____(yes). If so, where and why?

10. Have you ever defaulted on a contract?
_____(no)_____(yes). If so, where and why?

11. Have you ever failed to complete a project in the time allotment according to the Contract Documents?
_____(no)_____(yes). If so, where and why?

12. List the most important contracts recently executed by your company, stating approximate cost for each, and the month and year completed.

13. List your major equipment available for this contract.

14. List your key personnel such as project superintendent and foremen available for this contract.

15. List subcontractors for the following categories whom you will use for the following (unless this work is to be done by your own organization, in which case please state).

a. Concrete Flatwork _____

b. Curbing _____

c. Paving _____

STATEMENT OF BIDDERS QUALIFICATIONS (continued)

d. Paint Striping _____

e. Guardrail _____

The City reserves the right to disallow <u>any</u> subcontractor including work proposed to be completed by the General Contractor.

16. With what banks do you do business?

a. Do you grant the Owner permission to contact this/these institutions?
____(yes) ___(no).

b. Latest Financial Statements, certified audited if available, prepared by an independent certified public accountant, may be requested by Owner. If requested, such statements must be provided within five (5) business days or the bid proposal will be rejected. Certified Audited Statements are preferred. Internal statements may be attached only if independent statements were not prepared.

Dated at _____ this _____ day of _____, 20___.

_____
Name of Bidder

BY_____

TITLE_____

State of_____

County of_____

_____being duly sworn, deposes and

says that the bidder is _____of_____
(Name of Organization)

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

Sworn to before me this ____day of _____, 20__.

_____
Notary of Public
My Commission expires_____

CONTRACT AGREEMENT

Outer Islington Street Improvements

THIS AGREEMENT made as of the xxx day of xxxx in the year **2017,** by and between the City of Portsmouth, New Hampshire (hereinafter call the Owner) and _____ (hereinafter called the Contractor),

WITNESSETH; that the Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I- Work - The Contractor shall perform all work as specified or indicated in the Contract Documents for the completion of the Project. The Contractor shall provide, at his expense, all labor, materials, equipment and incidentals as may be necessary for the expeditious and proper execution of the Project.

ARTICLE II - ENGINEER - The Director of Public Works or his authorized representative will act as engineer in connection with completion of the Project in accordance with the Contract Documents.

ARTICLE III - CONTRACT TIME - The work will commence in accordance with the Notice to Proceed. **All work shall be substantially completed no later than September 1, 2017 and the contractor will have no more than eighty (80) working days to complete the project.**

ARTICLE IV - CONTRACT PRICE - Owner shall pay Contractor for performance of the work in accordance with the Contract Documents as shown under item prices in the base bid and the add alternate bids if selected for approval as shown in the Bid Proposal. The ADD ALTERNATIVE #1 portion of the bid(is/is not selected) _____to be part of this contract. The ADD ALTERNATIVE #2 portion of the bid(is/is not selected) _____to be part of this contract.

ARTICLE V - PAYMENT - Partial payments will be made in accordance with the Contract Documents. Upon final acceptance of the work and settlement of all claims, Owner shall pay the Contractor the unpaid balance of the Contract Price, subject to additions and deductions provided for in the Contract Documents.

ARTICLE VI - RETAINAGE – To insure the proper performance of this Contract, the Owner shall retain **ten percent** of the Contract Price as specified in the Contract Documents.

ARTICLE VII - LIQUIDATED DAMAGES - In event the Contractor fails to successfully execute the work within the specified contract time the Owner shall assess the Contractor liquidated damages in the amount of **two hundred dollars ($200)** for each calendar day beyond the specified completion date for each section of work. Liquidated damages shall be deducted from the Contract Price prior to final payment of the Contractor.

CONTRACT AGREEMENT (continued)

ARTICLE VIII – CONTRACT DOCUMENTS – The Contract Documents which comprise the contract between Owner and Contractor are attached hereto and made a part hereof and consist of the following:

8.1 This Agreement
8.2 Contractor's Bid and Bonds
8.3 Notice of Award, Notice to Proceed
8.4 Instruction to Bidders
General Requirements, Control of Work, Temporary Facilities, Measurement and Payment, Standard Specifications
8.5 Insurance Requirements
8.6 Special Conditions
8.7 Standard and Technical Specifications
8.8 Drawings
8.9 Special Provisions
8.10 Any modifications, including change orders, duly delivered after execution of this Agreement.

ARTICLE IX – TERMINATION FOR DEFAULT – Should contractor at any time refuse, neglect, or otherwise fail to supply a sufficient number or amount of properly skilled workers, materials, or equipment, or fail in any respect to prosecute the work with promptness and diligence, or fail to perform any of its obligations set forth in the Contract, Owner may, at its election, terminate the employment of Contractor, giving notice to Contractor in writing of such election, and enter on the premises and take possession, for the purpose of completing the work included under this Agreement, of all the materials, tools and appliances belonging to Contractor, and to employ any other persons to finish the work and to provide the materials therefore at the expense of the Contractor.

ARTICLE X – INDEMNIFICATION OF OWNER – Contractor will indemnify Owner against all suits, claims, judgments, awards, loss, cost or expense (including without limitation attorneys' fees) arising in any way out of the Contractor's negligent performance of its obligations under this Contract. Contractor will defend all such actions with counsel satisfactory to Owner at its own expense, including attorney's fees, and will satisfy any judgment rendered against Owner in such action.

ARTICLE XI – PERMITS –The Contractor will secure at its own expense, all other permits and consents required by law as necessary to perform the work and will give all notices and pay all fees and otherwise comply with all applicable City, State, and Federal laws, ordinances, rules and regulations.

ARTICLE XII – INSURANCE – The Contractor shall secure and maintain, until acceptance of the work, insurance with limits not less than those specified in the Contract.

ARTICLE XIII – MISCELLANEOUS –

A. Neither Owner nor Contractor shall, without the prior written consent of the other, assign, sublet or delegate, in whole or in part, any of its rights or obligations under any of the Contract Documents; and, specifically not assign any monies due, or to become due, without the prior written consent of Owner.

B. Owner and Contractor each binds himself, his partners, successors, assigns and legal representatives, to the other party hereto in respect to all covenants, agreements and obligations contained in the Contract Documents.

C. The Contract Documents constitute the entire Agreement between Owner and Contractor and may only be altered amended or repealed by a duly executed written instrument.

D. The laws of the State of New Hampshire shall govern this Contract without reference to the conflict of law principles thereof.

E. Venue for any dispute shall be the Rockingham County Superior Court unless the parties otherwise agree.

IN WITNESS WHEREOF, the parties hereunto executed this

AGREEMENT the day and year first above written.

BIDDER:

BY:_____

TITLE:_____

CITY OF PORTSMOUTH, N.H.

BY:_____
John P. Bohenko

TITLE: City Manager

NOTICE OF INTENT TO AWARD

Date:

TO:

IN AS MUCH as you were the low responsible bidder for work entitled:

Outer Islington Street Improvements
Bid #33-17

You are hereby notified that the City intends to award the aforesaid project to you.

Immediately take the necessary steps to execute the Contract and to provide required bonds and proof of insurance within ten (10) calendar days from the date of this Notice.

The City reserves the right to revoke this Notice if you fail to take the necessary steps to execute this Contract.

City of Portsmouth
Portsmouth, New Hampshire

Judie Belanger,
Finance Director

NOTICE TO PROCEED

DATE:

Outer Islington Street Improvements
Bid #33-17

TO:

YOU ARE HEREBY NOTIFIED TO COMMENCE WORK IN ACCORDANCE

WITH THE AGREEMENT DATED AND ALL

WORK SHALL BE COMPLETED BY _____.

CITY OF PORTSMOUTH, N.H.

_____
BY: Peter H. Rice, PE

TITLE: Public Works Director

ACCEPTANCE OF NOTICE

RECEIPT OF THE ABOVE NOTICE TO
PROCEED IS HEREBY ACKNOWLEDGED BY

_____

This the _____day of_____ 20__

By:_____

Title:_____

CHANGE ORDER

Change Order Number Date of Issuance

Owner: CITY OF PORTSMOUTH, N.H

Contractor:

You are directed to make the following changes in the Contract Documents:

Description:

Purpose of Change Order:

Attachments:

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIME
Original Contract Price: $	Original Completion Date:
Contract Price prior to this Change Order: $	Contract date prior to this Change Order:
Net Increase or Decrease of this Change Order: $	Net Increase or Decrease of this Change Order:
Contract Price with all approved Change Orders: $	Contract Due date with all approved Change Orders:

RECOMMENDED:	APPROVED:		APPROVED:
by_____	by_____	by_____	by_____
PW Director	City Finance	City Manager	Contractor

PERFORMANCE BOND

(This format provided for convenience, actual Performance Bond is acceptable in lieu, if compatible)

Bond Number _____

KNOW ALL MEN BY THESE PRESENTS

that _____as Principal, hereinafter called Contractor, and _____ (Surety Company) a corporation organized and existing under the laws of the State of_____ and authorized to do business in the State of New Hampshire as surety, hereinafter called Surety, are held and firmly bound unto the City of Portsmouth, N.H. Obligee, hereinafter called Owner, in the amount of _____ Dollars ($_____), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Owner for _____in accordance with drawings and specifications prepared by the Public Works Department, 680 Peverly Hill Road, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall well and faithfully do and perform the things agreed by him to be done and performed, according to the terms of said Contract and such alterations as may be made in said Contract during progress work, and shall further indemnify and save harmless the said Owner in accordance with the Contract and shall remedy without cost to the Owner any defect which may develop within one year from the time of completion and acceptance of the work.

The Surety hereby waives notice of any alteration in work or extension of time made by the Owner or any of its agents or representatives.

Whenever Contractor shall be, and declared by Owner to be, in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions, or

PERFORMANCE BOND (continued)

(2) Obtain a bid or bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by Owner and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Owner and make available as work progresses (even though there should be a default or a succession of defaults under the contract of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by the Owner to Contractor under the Contract and any amendments thereto, less the amount paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of (2) years from the date on which final payment under the contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of Owner.

Signed and sealed this _____ day of _____

A.D., 20___ .

In the presence of:

_____ BY: _____

(Witness) (Principal) (Seal)

_____

(Surety Company)

_____ BY: _____

(Witness) (Title) (Seal)

Note:
If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized Officer or Officers.

If this bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his Power of Attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Agreement.

LABOR AND MATERIAL PAYMENT BOND

(This format provided for convenience, actual Labor and Material Bond is acceptable in lieu, if compatible)

Bond Number _____

KNOW ALL MEN BY THESE PRESENTS:

that _____

as Principal, hereinafter called Contractor, and _____ (Surety Company) a corporation organized and existing under the laws of the State of

_____ and authorized to do business in the State of New Hampshire hereinafter called Surety, are held and firmly bound unto the City of Portsmouth, N.H. Obligee, hereinafter called Owner, for the use and benefit of claimants as herein below defined, in the

amount of _____ Dollars ($_____), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____ entered into a

contract with Owner for _____ in accordance with drawings and specifications prepared by the Public Works Department, 680 Peverly Hill Road, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract and for the hire of all equipment, tools, and all other things contracted for or used in connection therewith, then this obligation shall be void, otherwise it shall remain in full force and effect, subject however, to the following conditions:

(1) A claimant is defined as one having a direct contract with the Principal or, with a subcontractor of the Principal for labor, material, equipment, or other things used or reasonably required for use in the performance of the Contract. "Labor and material" shall include but not be limited to that part of water, gas, power, light, heat, oil and gasoline, telephone service or rental of equipment applicable to the Contract.

(2) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such a claimant, may sue on this bond for the use of such claimant, prosecute the suit by final judgment for such sum or sums as may be

LABOR AND MATERIAL PAYMENT BOND (continued)

justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any such suit or any costs or expenses of any such suit, and principal and surety shall jointly and severally indemnify, defend and hold the Owner harmless for any such suit, costs or expenses.

(3) No suit or action shall be commenced hereunder by any claimant:

(a) Unless Claimant, other than one having a direct contract with the Principal, shall have given notice to all the following:

The Principal, the Owner and the Surety above named, within six (6) calendar months after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the State of New Hampshire save that such service need not be made by a public officer.

(b) After the expiration of one (1) year following the date on which Principal ceased all work on said contract, it being understood , however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

(c) Other than in a State court of competent jurisdiction in and for the county or other political subdivision of the State in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere. (4) The amount of this bond may be reduced by and to the extent of any payment of payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed on record against said improvement, whether or not claim for the amount of such lien by presented under and against this bond.

Signed and sealed this _____ day of _____, 20____. In the presence of:

_____ BY: _____
(Witness) (Principal) (Seal)

_____
(Surety Company)

_____ BY: _____
(Witness) (Title) (Seal)

LABOR AND MATERIAL PAYMENT BOND (continued)

Note:
If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized Officer or Officers.

If this bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his Power of Attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Agreement.

MAINTENANCE BOND

At the Owner's election, a maintenance bond may be substituted for retainage at the completion of the project. If the Owner permits a maintenance bond, it shall be in the amount of **Twenty Percent (20%)** of the contract price with a corporate surety approved by the Owner. Such bond shall be provided at the time of Contract completion and shall guarantee the repair of all damage due to faulty materials or workmanship provided or done by the Contractor. This guarantee shall remain in effect for a period of one year after the date of final acceptance of the job by the Owner.

CONTRACTOR'S AFFIDAVIT

STATE OF _____:

COUNTY OF _____:

Before me, the undersigned, a _____
(Notary Public, Justice of the Peace)

in and for said County and State personally appeared, _____
(Individual, Partner, or duly authorized representative of Corporate)

who, being duly sworn, according to law deposes and says that the cost of labor, material, and equipment and outstanding claims and indebtedness of whatever nature arising out of the performance of the Contract between

CITY OF PORTSMOUTH, NEW HAMPSHIRE

and _____
(Contractor)

of _____

Dated: _____

has been paid in full for Construction of: **Outer Islington Street Improvements**

_____

(Individual, Partner, or duly authorized representative of Corporate Contractor)

Sworn to and subscribed
before me this _____day
of _____ 20____

_____

CONTRACTOR'S RELEASE

KNOW ALL MEN BY THESE PRESENTS that _____

(Contractor) of _____, County of _____and State of

_____ does hereby acknowledge

that_____(Contractor)

has on this day had, and received from the CITY OF PORTSMOUTH NEW HAMPSHIRE, final and completed

payment for the Construction of:

Outer Islington Street Improvements

NOW THEREFORE, the said _____

(Contractor)

for myself, my heirs, executors, and administrators) (for itself, its successors and assigns) do/does by these presents remise, release, quit-claim and forever discharge the City of Portsmouth, New Hampshire, its successors and assigns, of and from all claims and demands arising from or in connection with the said Contract dated _____, and of and from all, and all manners of action and actions, cause and causes of action and actions, suits, debts, dues, duties, sum and sums of money, accounts, reckonings, bonds, bills, specifications, covenants, contracts, agreements, promises, variances, damages, judgments, extents, executions, claims and demand, whatsoever in law of equity, or otherwise, against the City of Portsmouth, New Hampshire, its successors and assigns, which (I, my heirs, executors, or administrators) (it, its successors and assigns) ever had, now have or which (I, my heirs, executors, or administrators) (it, its successors and assigns) hereafter can shall or may have, for, upon or by reason of any matter, cause, or thing whatsoever; from the beginning of record time to the date of these presents.

IN WITNESS WHEREOF,

Contractor:

_____ By:_____

print name of witness:_____ Its Duly Authorized _____

Dated: _____

GENERAL REQUIREMENTS

SCOPE OF WORK

1. INTENT OF CONTRACT

The intent of the Contract is to provide for the construction and completion in every detail of the work described. The Contractor shall furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the terms of the Contract. The Contractor shall be required to conform to the intent of the plans and specifications. No extra claims shall be allowed for portions of the work not specifically addressed in the plans and specifications but required to produce a whole and complete project, such work will be considered subsidiary to the bid items.

2. INCIDENTAL WORK

Incidental work items for which separate payment is not measured includes, but is not limited to, the following items:

a. Clearing, grubbing and stripping (unless otherwise paid for)
b. Clean up
c. Plugging existing sewers and manholes
d. Signs
e. Mobilization/Demobilization (unless otherwise paid for)
f. Restoration of property
g. Cooperation with other contractors, abutters and utilities.
h. Utility crossings, (unless otherwise paid for)
i. Minor items - such as replacement of fences, guardrails, rock wall, etc.
j. Steel and/or wood sheeting as required.
k. Accessories and fasteners or components required to make items paid for under unit prices or lump sum items complete and functional.

3. ALTERATION OF PLANS OR OF CHARACTER OF WORK

The Owner reserves the right, without notice to Surety, to make such alterations of the plans or of the character of the work as may be necessary or desirable to complete fully and acceptably the proposed construction; provided that such alterations do not increase or decrease the contract cost. Within these cost limits, the alterations authorized in writing by the Owner shall not impair or affect any provisions of the Contract or bond and such increases or decreases of the quantities as a result from these alterations or deletions of certain items, shall not be the basis of claim for loss or for anticipated profits by the contractor. The contractor shall perform the work as altered at the contract unit price or prices.

4. EXTRA WORK ITEMS

Extra work shall be performed by the Contractor in accordance with the specifications and as directed, and will be paid for at a price as provided in the Contract documents or if such pay items are not applicable than at a price negotiated between the contractor and the Owner or at the unit bid price. If the Owner determines that extra work is to be performed, a change order will be issued.

5. CHANGE ORDERS

The Owner reserves the right to issue a formal change order for any increase, decrease, deletion, or addition of work or any increase in contract time or price. The contractor shall be required to sign the change order and it shall be considered as part of the Contract documents.

6. FINAL CLEANING UP

Before acceptance of the work, the contractor shall remove from the site all machinery, equipment, surplus materials, rubbish, temporary buildings, barricades and signs. All parts of the work shall be left in a neat and presentable condition. On all areas used or occupied by the contractor, regardless of the contract limits, the bidder shall clean-up all sites and storage grounds.

The items prescribed herein will not be paid for separately, but shall be paid for as part of the total contract price.

7. ERRORS AND INCONSISTENCY IN CONTRACT DOCUMENTS

Any provisions in any of the Contract Documents that may be in conflict with the paragraphs in these General Requirements shall be subject to the following order of precedence for interpretation.

1. Standard Specifications for Road & Bridge Construction will govern General Requirements.
2. Technical Specifications will govern Standard Specifications.
3. Plans will govern Technical Specifications, and General Requirements.
4. Special Provisions written for this contract will govern the plans.

CONTROL OF WORK

1. AUTHORITY OF ENGINEER

(a) All work shall be done under supervision of the Engineer and to his satisfaction. The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed and as to the rate of progress of the work; all questions that may arise as to the interpretation of the plans and specifications; and all questions as to the acceptable fulfillment of the Contract by the Contractor.

(b) The Engineer will have the authority to suspend the work wholly or in part for such periods as he may deem necessary due to the failure of the Contractor to correct conditions unsafe for workers or the general public; for failure to carry out provisions of the Contract; for failure to carry out orders; for conditions considered unsuitable for the prosecution of the work, including unfit weather; or for any other condition or reason deemed to be in the public interest. The Contractor shall not be entitled any additional payments arising out of any such suspensions.

(c) The Owner reserves the right to demand a certificate of compliance for a material or product used on the project. When the certificate of compliance is determined to be unacceptable to the Engineer the Contractor may be required to provide engineering and testing services to guarantee that the material or product is suitable for use in the project, at its expense (see Sample of Certificate of Compliance).

2. PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPES

(a) The Contractor shall use every precaution to prevent injury or damage to wires, poles, or other property of public utilities; trees, shrubbery, crops, and fences along and adjacent to the right-of-way, all underground structures such as pipes and conduits, within or outside of the right-of-way; and the Contractor shall protect and carefully preserve all property marks until an authorized agent has witnessed or otherwise referenced their location.

(b) The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

(c) When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or as a result of the failure to perform work by the Contractor, the Contractor shall restore, at its own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing rebuilding, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

(d) The Contractor shall paint with tree paint all scars made on fruit or ornamental trees by equipment, construction operations, or the removal of limbs larger than one inch in diameter. Damaged trees must be replaced if so determined by the City Arborist, in his or her sole discretion.

(e) If the Contractor fails to repair, rebuild or otherwise restore such property as may be deemed necessary, the Owner, after 48 hours notice, may proceed to do so, and the cost thereof may be deducted from any money due or which may become due the Contractor under the contract.

(f) It is the intent of the Parties that the Contractor preserve, to as great an extent as possible, the natural features of the site.

CONTROL OF WORK (continued)

3. MAINTENANCE DURING CONSTRUCTION

The Contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and workers to ensure that the structure is kept in satisfactory conditions at all times.

4. SAFETY PRECAUTIONS

Upon commencement of work, the Contractor shall be responsible for initiating, maintaining and supervising all safety precautions necessary to ensure the safety of employees on the site, other persons who may be affected thereby, including the public, and other property at the site or adjacent thereto.

5. PERMITS

It will be the responsibility of the Contractor to obtain all permits required for the operation of equipment in, or on, all city streets and public ways.

6. BARRICADES, WARNING SIGNS AND TRAFFIC OFFICERS

(a) The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices, and shall take all necessary precautions for the protection of the work and safety of the public. Roadway closed to traffic shall be protected by effective barricades. Obstructions shall be illuminated during hours of darkness. Suitable warning signs shall be provided to control and direct traffic in a proper manner, as approved by the engineer.

(b) The Contractor will be held responsible for all damage to the work from traffic, pedestrians, animals or any other cause due to lack of adequate controlling devices.

(c) The Contractor shall provide such police officers or flaggers as the Engineer deems necessary for the direction and control of traffic within the site of project.

The work prescribed herein will not be paid for separately but will be paid for as part of the Contract Price unless specifically appearing as a bid item.

TEMPORARY FACILITIES

1. STORAGE FACILITIES

(a) The Contractor shall not store materials or equipment in a public right-of-way beyond the needs of one working day. Equipment and materials shall be stored in an approved location.

(b) The Contractor shall protect all stored materials from damage by weather or accident and shall insure adequate drainage at and about the storage location.

(c) Prior to final acceptance of the work all temporary storage facilities and surplus stored materials shall be removed from the site.

2. SANITARY FACILITIES

(a) The Contractor shall provide for toilet facilities for the use of the workers employed on the work.

(b) Temporary toilet facilities may be installed provided that the installation and maintenance conform with all State and local laws, codes, regulations and ordinances governing such work. They shall be properly lit and ventilated, and shall be kept clean at all times.

(c) Prior to final acceptance of the work all temporary toilet facilities shall be removed from the site.

3. TEMPORARY WATER

The Contractor shall make all arrangements with the local water department for obtaining water connections to provide the water necessary for construction operations and shall pay all costs.

4. TEMPORARY ELECTRICITY

The Contractor shall make all arrangements with the Public Service Company for obtaining electrical connections to provide the electrical power necessary for construction operations and security lighting and shall pay all electrical connection and power costs.

The Contractor shall be responsible with obtaining an electrical permit from the City Electrical Inspector.

INSURANCE REQUIREMENTS

Insurance shall be in such form as will protect the Contractor from all claims and liabilities for damages for bodily injury, including accidental death, and for property damage, which may arise from operations under this contract whether such operation by himself or by anyone directly or indirectly employed by him.

AMOUNT OF INSURANCE

A) Comprehensive General Liability:
Bodily injury or Property Damage - $2,000,000
Per occurrence and general aggregate

B) Automobile and Truck Liability:
Bodily Injury or Property Damage - $2,000,000
Per occurrence and general aggregate

Coverage amounts may be met with excess policies

Additionally, the Contractor shall purchase and maintain the following types of insurance:

A) Full Workers Comprehensive Insurance coverage for all people employed by the Contractor to perform work on this project. This insurance shall at a minimum meet the requirements of the most current laws of the State of New Hampshire.

B) Contractual Liability Insurance coverage in the amounts specified above under Comprehensive General Liability.

C) Product and Completed Operations coverage to be included in the amounts specified above under Comprehensive General Liability.

ADDITIONAL INSURED

All liability policies (including any excess policies used to meet coverage requirements) shall include the City of Portsmouth, New Hampshire as named Additional Insureds.

1) The contractor's insurance shall be primary in the event of a loss.
2) City of Portsmouth shall be listed as a Certificate Holder. The City shall be identified as follows:

City of Portsmouth
Attn: Legal Department
1 Junkins Avenue
Portsmouth, NH 03801

MEASUREMENT AND PAYMENT

1. MEASUREMENT OF QUANTITIES

(a) All work completed under the contract will be measured according to the United States standard measure.

(b) The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice. Unless otherwise stated all quantities measured for payment shall be computed or adjusted for "in place" conditions.

(c) Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the dimensions shown on the plans or ordered in writing.

(d) Structures will be measured according to lines shown on the plans or as ordered unless otherwise provided for elsewhere in the specifications.

(e) In computing volumes of excavation, embankment, and borrow, the average end area method will be used. Where it is impracticable to measure by the cross-section method, acceptable methods involving three-dimensional measurement may be used. When measurement of borrow in vehicles is permitted, the quantity will be determined as 80 percent of the loose volume.

(f) In computing volumes of concrete, stone and masonry, the prismoidal method will be used. The term "ton" will mean the short ton consisting of 2,000 pounds avoirdupois.

(g) Except as specified below, all materials that are measured or proportioned by weight shall be weighed on scales which the Contractor has had sealed by the State or by a repairman registered by the Commissioner of Agriculture. All weighing shall be performed in a manner prescribed under the Rules and Regulations of the Bureau of Weights and Measures of the New Hampshire Department of Agriculture.

(h) Weighing of materials on scales located outside New Hampshire will be permitted for materials produced or stored outside the state, when requested by the Contractor and approved. Out-of-state weighing in order to be approved, must be performed by a licensed public weigh master or a person of equal authority in the state concerned on scales accepted in the concerned state.

(i) Each truck used to haul material being paid for by weight shall bear a plainly legible identification mark, and if required, shall be weighed empty daily at such times as directed.

(j) When material is weighed, the individual weight slips, which shall be furnished by the Contractor, for trucks, trailers, or distributors, shall show the following information: the date; the project; the material or commodity; the dealer or vendor; the Contractor or Subcontractor; the location of the scales; the vehicle registration number or other approved legible identification mark; the tare and net weights, with gross weights when applicable; and the weigher's signature or his signed initials.

MEASUREMENT AND PAYMENT (continued)

(k) The right is reserved to weight any truck, trailer, or distributor, at locations designated, before and after making deliveries to the project.

(l) Bituminous materials will be measured by the gallon or ton.

(m) When material is specified to be measured by the cubic yard but measurement by weight is approved, such material may be weighed and the weight converted to cubic yards for payment purposes. Necessary conversion factors will be determined by the Owner.

(n) The term "lump sum" when used as an item of payment will mean complete payment for the work described in the item.

(o) When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories, so as to provide the item complete and functional. Except as may be otherwise provided, partial payments for lump sum items will be made approximately in proportion to the amount of the work completed on those items.

(p) Material wasted without authority will not be included in the final estimate.

2. SCOPE OF PAYMENT

(a) The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials and for performing all work under the contract in a complete and acceptable manner and for all risk, loss, damage or expense of whatever character arising out of the nature of the work or the prosecution thereof.

(b) The Contractor shall be liable to the Owner for failure to repair, correct, renew or replace, at his own expense, all damage due or attributable to defects or imperfections in the construction which defects or imperfections may be discovered before or at the time of the final inspection and acceptance of the work.

(c) No monies, payable under the contract or any part thereof, except the first estimate, shall become due or payable if the Owner so elects, until the Contractor shall satisfy the Owner that the Contractor has fully settled or paid all labor performed or furnished for all equipment hired, including trucks, for all materials used, and for fuels, lubricants, power tools, hardware and supplies purchased by the Contractor and used in carrying out said contract and for labor and parts furnished upon the order of said Contractor for the repair of equipment used in carrying out said contract; and the Owner, if he so elects, may pay any and all such bills, in whole or in part, and deduct the amount of amounts so paid from any partial or final estimate, excepting the first estimate.

MEASUREMENT AND PAYMENT (continued)

3. COMPENSATION FOR ALTERED QUANTITIES

(a) Except as provided for under the particular contract item, when the accepted quantities of work vary from the quantities in the bid schedule the Contractor shall accept as payment in full, so far as contract items are concerned, at the original contract unit prices for the accepted quantities of work done. No allowance will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations or indirectly from unbalanced allocation among the contract items of overhead expense on the part of the Bidder and subsequent loss of expected reimbursements therefore or from any other cause.

(b) Extra work performed will be paid for at the contract bid prices or at the price negotiated between the Owner and the Contractor if the item was not bid upon. If no agreement can be negotiated, the Contractor will accept as payment for extra work, cost plus 15% (overhead and profit). Costs shall be substantiated by invoices and certified payroll.

4. PARTIAL PAYMENTS

Partial payments will be made on a monthly basis during the contract period. From the total amount ascertained as payable, an amount equivalent to ten percent (10 %) of the whole will be deducted and retained by the Owner until such time as the work receives final acceptance.

5. FINAL ACCEPTANCE

Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer will make an inspection. If all construction provided for and contemplated by the contract is found complete to his satisfaction, this inspection shall constitute the final inspection and the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of the final inspection.

If, however, the inspection discloses any work in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of such work, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

MEASUREMENT AND PAYMENT (continued)

6. ACCEPTANCE AND FINAL PAYMENT

(a) When the project has been accepted and upon submission by the Contractor of all required reports, completed forms and certifications, the Owner will review the final estimate of the quantities of the various classes of work performed. The Contractor may be required to certify that all bills for labor and material used under this contract have been paid.

(b) The Contractor shall file with the Owner any claim that the Contractor may have regarding the final estimate at the same time the Contractor submits the final estimate. Failure to do so shall be a waiver of all such claims and shall be considered as acceptance of the final estimate. From the total amount ascertained as payable, an amount equal to ten percent (10%) of the whole will be deducted and retained by the Owner for the guaranty period. This retainage may be waived, at the discretion of the City, provided the required Maintenance Bond has been posted. After approval of the final estimate by the Owner, the Contractor will be paid the entire sum found to be due after deducting all previous payments and all amounts to be retained or deducted under the provisions of the contract.

(c) All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

7. GENERAL GUARANTY AND WARRANTY OF TITLE

(a) Neither the final certification of payment nor any provision in the contract nor partial or entire use of the improvements embraced in this Contract by the Owner or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express or implied warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within a period of twelve (12) months from the date of final acceptance of the work. The Owner will give notice of defective materials and work with reasonable promptness.

(b) No material, supplies or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease purchase or other agreement by which an interest therein or in any part thereof is retained by the Seller or supplier. The Contractor shall warrant good title to all materials, supplies and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by him to the Owner free from any claims, liens or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have the right to a lien upon any improvements or appurtenances thereon.

Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontractors and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

MEASUREMENT AND PAYMENT (continued)

8. NO WAIVER OF LEGAL RIGHTS

(a) Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or be stopped from recovering from the Contractor or his Surety, or both, such overpayment as it may sustain by failure on the part of the Contractor to fulfill his obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

(b) The Contractor, without prejudice to the Contract shall be liable to the terms of the Contract, shall be liable to the Owner for latent defects, fraud or such gross mistakes as may amount to fraud, and as regards the Owner's right under any warranty or guaranty.

9. TERMINATION OF CONTRACTOR'S RESPONSIBILITY

Whenever the improvement provided for by the Contract shall have been completely performed on the part of the Contractor and all parts of the work have been released from further obligations except as set forth in his bond and as provided in Section 8 above.

STANDARD SPECIFICATIONS

The Standard Specifications for Road and Bridge Construction of the State of New Hampshire Department of Transportation and any Addenda shall apply but without regard to Section 100 "General Conditions" of those Standard Specifications and without regard to any of those NHDOT provisions that allow for an adjustment for changing fuel and asphalt prices.

Special Provisions

Amendments to Standard Specifications:

202.1	Clearing and Grubbing
206.19	Excavation and Embankment
304	Aggregate Base Courses
306	Reclaimed Stabilized Base
604	Catch basin and Manhole Frames and Covers
608.2	Sidewalks
609	Curbing
618	Uniformed Officers and Flaggers
619	Maintenance of Traffic

Supplemental Specifications:

202.8	Removal of Masonry Steps
401	Asphalt Pavement
608.52	ADA Detectable Warning Tiles
611	Water Main Installation
660	Sewer Installation

SECTION 201.1

CLEARING AND GRUBBING

Amend Section 201 to include:

Method of Measure
Amend 4.1: Clearing and Grubbing will be measured by the Lump Sum.

Basis of Payment
Amend 5.1: Clearing and Grubbing will be measured and paid for by the Lump Sum.

SECTION 202.8

REMOVAL OF MASONRY STEPS

Description

1.1 This work shall consist of the demolition, removal and satisfactory disposal of concrete, masonry block and/or brick steps to the extent directed by the Engineer. Work may include removal of a single step or an entire set of steps.

Material Requirements

2.1 When the removal is not replaced with new steps, depressions shall be backfilled with common fill and 4" of loam.

Construction Requirements

3.1 Contractor shall remove steps to the extent directed by the engineer. Contractor is responsible for removal from the site and disposal complying to all Federal, State and Local requirements. Debris will not be allowed to be buried on site.

Method of Measure

4.1 Removal of Masonry Steps will be measured, by the cubic yard to the nearest 0.1 cubic yard.

Basis of Payment

5.1 The excepted quantities will be paid for at the Item Bid Price per unit of measure for the pay item.
5.2 Backfill material will be subsidiary.
5.3 Sawcutting of steps will be subsidiary.
5.4 Loam and seed will be paid under Pay Item 646.51

SECTION 206.19

COMMON STRUCTURE EXCAVATION - EXPLORATORY

Amend Section 206 to include:

Method of Measure

Amend 4.1: Structure Excavation - Exploratory will be measured, by the Hour to the nearest 0.25 hour.

Basis of Payment

Amend 5.1: Structure Excavation – Exploratory will be measured and paid for by the Contract unit price, by the Hour.

SECTION 304

AGGREGATE BASE COURSES

Amend Section 304 to include:

Material Requirements

Add 2.12: Sources of Aggregate and preliminary test results shall be submitted ten working days prior to any placement of material on the job. Failure of these preliminary tests will be grounds for rejection of material from that source. Aggregates will be tested on the job and shall meet these specifications as the material is incorporated into the work. All Measurements shall be in-place compacted quantities in accordance with the plans and specifications.

Method of Measurement

Amend 4.1: Roadbed base course materials of sand, gravel, crushed gravel, crushed aggregate for shoulders, crushed stone (fine and course gradation) shall be measured by the cubic yard using average lengths, widths and depths of the areas to be filled to the nearest 0.1 cubic yard, or as determined by the engineer. Measurement shall be compacted, complete in place.

Basis of Payment

Amend 5.1: Roadbed base course materials of sand, gravel, crushed gravel, crushed aggregate for shoulders, crushed stone (fine and course gradation) shall be measured and paid for by the Contract unit price, by the cubic yard.

Add 5.4: The cost of the all laboratory testing including compaction testing at 1 test per 50’ in areas to be designated by the Engineer, shall be the responsibility of the Contractor and subsidiary to the pay item.

SECTION 306

RECLAIMED STABILIZED BASE

Amend Section 306 to include:

Material Requirements
Amend 2.1.1: to the following gradation:

Sieve Designation	% Passing by Weight
2”	100
1 ½”	70-100
¾”	55-90
#4	40-75
#40	10-30
#200	3-10

Construction Requirements
Amend 3.12: The Owner shall test the reclaimed base to determine if additional stone must be added. If additional stone is used it shall be blended with the reclaimed material using an approved reclaimer to the depth specified after the removal of the extraneous reclaimed material has taken place. This may require two separate mobilizations of the reclaimer.

Method of Measurement
Amend 4.1: Reclaimed Stabilized Base, of the depth specified will be measured by the square yard to the nearest 1.0 square yard.
Add 4.4: Reclaimed Stabilized Base Rehandled for Base Materials will be measured by the cubic yard in place and compacted to the nearest 0.1 cubic yard. Rehandled Stabilized Base is limited to quantities moved for use to widen roadway base, raise roadway grades; use at driveways, parking aprons and/or sidewalks.

Basis of Payment
Amend 5.1: Reclaimed Stabilized Base, of the depth specified will be paid for at the Contract unit price, complete in place.
Amend 5.1.1: Removal and rehandling or removal of excess material to obtain specified finish grades shall be subsidiary to the Pay Item.
Add 5.4: Reclaimed Stabilized Base Rehandling for Base Materials will be paid for at the Contract unit price, complete in place. When used at the locations specified in Section 4.4 and on the drawings, the contractor will not be paid under ‘Common Excavation’ and Embankment in Place’ pay items.

Pay item		Pay unit
306.108a	8” Reclaimed Stabilized Base	Square Yard
306.108b	8” Reclaimed Stabilized Base (Blend Crushed Stone)	Square Yard
306.208	8” Reclaimed Stabilized Base Rehandled for Base Materials	Cubic Yard
306.36	1 ½” Crushed Stone Material	Ton

SECTION 401

ASPHALT PAVEMENT

Description

1.1 This work shall consist of furnishing and installing bituminous pavement courses in accordance with Sections 401 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition) and as specified in this section.

1.2 All references to NHDOT, NHDOT Personnel or the Department may be construed as the Engineer, the City of Portsmouth, their agents and representatives.

1.3 Work shall conform to NHDOT Section 401, Tier 2 except as noted herein:

1.3.1 Ride Smoothness: Section 401.3.17.3.4.1 shall apply except variations exceeding 3/8 inch in profile or cross slope shall be eliminated.

1.3.2 Ride smoothness: Section 401.3.17.3.4.4 shall apply except high points 0.5 inches in 25 shall be corrected.

Materials:

2.1 **Materials:** Materials shall conform to NHDOT 401 except the following:

2.1.1 The maximum amount of Total Reused Binder (TRB) in the pavement mix shall be 0.5% and the mix shall meet all volumetric mix design criteria.

2.1.2 Asphalt Cement shall not contain any form of used, recycled or refined oil. Suppliers of PG Binder shall certify that the PG Binder does not contain any used, recycled or refined oil.

2.1.3 All ¾" (19mm) and 1 inch (25mm) pavement mixes shall be designed using the 50 gyration N design, unless otherwise specified.

2.1.4 Liquid asphalt cement binder shall have Performance Grade (PG) of PG64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements. NHDOT QC/QA Specifications shall be followed for high strength mixes.

2.1.5 All high strength asphalt, when specified, shall be 50 gyration unless otherwise specified.

2.2 **Pavement Mix Designs:** Pavement mix designs shall meet NHDOT Section 401.2.5.1 except the following:

2.2.1 Minimum asphalt binder content shall be as follows:

Minimum Asphalt Binder Content		
Mix Type	50 Gyration	75 Gyration*
3/8-in (9.5mm)		5.9%
1/2-in (12.5mm)	5.9%	*
3/4-in (19.0mm)	5.3%	*

The required minimum asphalt content is based on the use of aggregate with a specific gravity of 2.65 to 2.70. The minimum asphalt content requirement may be adjusted when aggregate with higher specific gravity is used, or the minimum may be adjusted at the Engineer's discretion if it is believed to be in the best interest of the Owner. All mix designs shall be submitted to the Engineer for verification and approval. *75 Gyration mix with stone size above 3/8" not allowed without expressed written permission of the Engineer.

2.2.2 Method requirements NHDOT Section 401.2.6 shall include the following:

2.2.2.1 Coarse Aggregate: Stockpiled coarse aggregate shall meet the requirements of 2.6.1, Table 2.

2.2.2.2 Tolerances: All mixtures shall conform within range of tolerances provided in NHDOT Section 401.2.6.2.

2.2.2.3 When Non-Compliant test result, it shall be the Contractor's responsibility to correct non-compliant pavement. The Contractor may be required to remove non-compliant material that is poorly graded or material exhibiting cracks, open joints or other imperfections. No payment will be made for this material or its removal.

Construction Requirements: Construction requirements shall be in accordance with Section 401 of the NHDOT Standard Specifications **and** as specified in this section.

3.1 Prior to placing any mix, a pre-paving conference shall be held with the Owner, Contractor, and Engineer to discuss the proposed paving schedule, source mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, traffic control, and general continuity of the operation. Special attention shall be made to the paving pattern sequence to minimize cold joints.

3.2 The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.

3.3 Any pavement course four inches (compacted depth) or greater shall be placed and compacted in two lifts.

3.4 Existing pavement or previously laid courses shall be thoroughly dry and free from all dust, dirt, and loose material. Sweeping with a power broom, supplemented by hand brooming, may be necessary.

3.5 Surfaces of any pavement course shall have a tack coat of emulsified asphalt applied in accordance with NHDOT Specifications. Application of emulsified asphalt shall be between 0.02 and 0.05 gal/yd^2.

3.6 Utility covers, frames and grates, valves and other castings shall be set and raised. Contact surfaces of the drainage and utility castings shall be painted with a thin coating of suitable bituminous material. Surface pavement shall be removed from covers and casting immediately following pavement operations. Open grates shall be covered to ensure pavement material does not fall into structure.

3.7 Method requirements NHDOT Section 401.3.1.2 shall apply.

3.8 In addition to 3.7 above, refer to Section 1.3 for additional QC/QA requirements.

SECTION 604

CATCH BASINS, DROP INLETS, AND MANHOLES FRAMES, GRATES AND COVERS

Amend Section 604 to include:

Materials

Add 2.11: Catch basin frames and grates either new or to be replaced shall NHDOT Type B and be fabricated in the USA.

Add 2.12: Drain manhole frames and covers shall dual hinged, Ergo XL from EJIW – 41421025L01. 32" Hinged and gasketed with locking cam and be fabricated in the USA.

Add 2.13: Sewer manhole frames and covers shall dual hinged Ergo XL from EJIW – 32" Hinged and gasketed with locking cam and be fabricated in the USA. Covers shall have the City Logo and will be purchased from the City at cost then installed normally.

Method of Measurement

Amend 4.3: Frames with grates or manhole covers will be measured by the number of units installed except when they are a part of a structure measured under 4.1. A cover and frame will be a unit; and a grate and frame will be a unit. Installation of sewer manhole frames and covers will not be measured for payment, they will be considered subsidiary to the sewer manhole structure pay item.

Basis of Payment

Amend 5.3: The accepted quantities of frames and grates of manhole covers will be paid for at the Contract unit price per each unit, complete in place, including setting to final grade. Installation of the sewer manhole frames and covers will be considered subsidiary to the sewer manhole structure pay item.

SECTION 608.2

SIDEWALKS

Amend Section 608 to include:

Description
Amend 1.1: This work shall consist of constructing sidewalks of Portland cement concrete, reinforced when specified. Portland cement concrete sidewalks shall receive a protective coating unless otherwise directed.

Materials
Amend 2.3: Reinforcement shall conform to 544.7. (Synthetic Fibers)

Method of Measurement
Amend 4.1: Sidewalks will be measured by the square yard to the nearest 0.1 square yard. The area occupied by the curb will not be included in the final pay quantity.

Basis of Payment
Amend 5.1: Sidewalks will be paid for at the Contract unit price per square yard complete in place.

Pay item		Pay unit
608.24	4" Concrete Sidewalks	Square Yard
608.26	6" Concrete Sidewalks (Accessible Ramps)	Square Yard

SECTION 608.52

ADA DETECTABLE WARNING TILES

Description

1.1 This work shall consist of furnishing and installing a detectable warning surface and accessories on sidewalk ramps at locations shown on the plans, as specified herein, or as ordered including any and all required surface preparation. Detectable warnings shall be installed at sidewalk ramps where a sidewalk crosses a vehicular way, excluding unsignalized driveway crossings. The edge nearest the curbline shall be located 6 to 8 in from the face of curbline. The panel shall be centered on the ramp and extend the entire width of the ramp to the nearest whole panel dimension.

Materials

2.1 Material. The detectable warning surface shall consist of units from Neenah Foundry, East Jordan Iron Works, or approved equal. The units shall be cast into Portland cement or other owner approved material, as recommended by the manufacturer. The paver units shall be of cast iron.

2.2 Color. The color of the tile used shall be natural rust, and will be installed in a concrete ramp as described in 608.26.

2.3 Paver Dimensions. Nominal paver dimensions shall be 2’ deep x 2’ wide. The panels shall be combined to span the width of the walk to the nearest whole panel dimension.

2.4 Detectable Warning Truncated Dome Geometry:

2.4.1 Detectable warnings shall be in full compliance with ADAAG guidelines (Title 49 DFR Transportation, Part 37.9 Standard for Accessible Transportation Facilities, Appendix A, Section 4.29.2- Detectable Warning on Walking Surfaces).

2.4.2 Size and spacing for truncated domes shall be as follows: base diameter of nominal 0.9 inch, top diameter of nominal 0.4 inch, height of nominal 0.2 inch, with a center to center spacing of nominal 2.35 inches.

2.4.3 The truncated dome pattern shall align properly from paver to paver if more than 1 paver is required.

Construction Requirements

3.1 The Contractor shall submit manufacturer’s installation instructions and descriptive literature for materials specified herein.

3.2 Pavers shall be set into fresh concrete before it sets. Concrete pad for setting bed to be 6” in both directions larger than the tactile panel so that no more than 3” of concrete is showing around the panels. See manufacturer instructions.

3.3 Transport, storage, and handling of products shall be in accordance with manufacturer’s instructions. All sealants/adhesives shall be protected from freezing conditions.

3.4 The air and surface temperatures during construction shall be in accordance with manufacturer's recommendations.

3.5 Concrete foundation shall be installed in accordance with the specifications included within Section 608 to depths indicated in the section shown on the plans.

3.6 Install detectable warning pavers in accordance with manufacturer's instructions directly in the setting bed and the allowing the top surface of the paver units to be at or just below the required finish grade.

3.7 Care shall be taken to ensure the safety of pedestrians when sidewalks must remain in service during construction.

Method of Measurement

4.1 ADA Detectable warning tiles will be measured by each panel installed.

Basis of Payment

5.1 ADA Detectable warning tiles will paid for at the Contract unit price per each panel installed.

Pay Item		**Pay Unit**
608.54	ADA Detectable Warning Tiles, Cast Iron	Each

SECTION 609

CURBING

Amend Section 609 to include:

Materials
Add to 2.1: Curbing shall be manufactured by Swenson Granite Works, Concord, NH.

Basis of Payment
Amend 5.3: Class A Concrete backfill will be used for curb installation and will be paid for under item 520.

SECTION 611

POTABLE WATERMAIN AND SERVICES

PIPE & PIPE FITTINGS -GENERAL

PART 1 -GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish, install, support and test pipe and pipe fittings of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
B. If requested by the Engineer, submit manufacturer's "Certification of Conformance" that pipe and pipe fittings meet or exceed the requirements of these Specifications.
C. Submit other documents as specified in the appropriate Sections of this Division.

1.3 DELIVERY. STORAGE AND HANDLING

A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.
B. Do not drop pipe and fittings.
C. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as directed by the Engineer.
D. Assure that materials are kept clean and dry.
E. Do not store materials directly on the ground.
F. Follow manufacturer's specific instructions, recommendations and requirements.

PART2 -PRODUCTS

2.1 MATERIALS

A. Marking Tape
    l. Shall be coded in accordance with the NPWA Standards.
    2. Shall be indelibly marked indicating the type of utility it is placed over.
    3. Shall be three (3) inches wide Terra Tape Sentry Line 1350 (Detachable) by Reef Industries, Houston, TX, or approved equal.
B. Pipe Lubricant or glue
    1. Use only lubricants or glues suitable for the type of pipe and application.

2. For potable water pipe use only lubricants or glues clearly marked "For Use with Potable Water".

PART 3 -EXECUTION

3.1 EXAMINATION

A. Provide all labor and equipment necessary to assist the Engineer to observe pipe, fittings, gaskets, and other materials.
    1. This shall include all air quality testing equipment, harnesses and man lifts necessary to comply with the appropriate OSHA regulation.
    2. The Engineer shall comply with the Contractor's regulations and policies regarding below grade or confined space entry.
B. Carefully inspect all materials at the time of delivery and just prior to installation.
C. Carefully inspect all pipe and fittings for:
    l. Defects and damage.
    2. Deviations beyond allowable tolerances for joint dimensions.
    3. Removal of debris and foreign matter.
D. Examine areas and structures to receive piping for:
    l. Defects, such as weak structural components that adversely affect the execution and quality of work.
    2. Deviations beyond allowable tolerances for pipe clearances.
E. All materials and methods not meeting the requirements of these Specifications shall be rejected.
F. Immediately remove all rejected materials from the project site.
G. Start work only when conditions are corrected to the satisfaction of the Engineer.

3.2 INSTALLATION

A. General:
    l. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as instructed by the Engineer.
    2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
    3. Install adapters, approved by the Engineer, when connecting pipes constructed from different materials.
    4. When applicable, support all piping not being installed in trenches in accordance with the Pipe Hangers & Supports" Section of these Specifications.
B. Installation and Trenches:
    l. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.

a. Where, in the opinion of the Engineers, the subgrade material is unsuitable to support the pipe, over-excavate the unsuitable material and replace the same with suitable gravel or granular borrow.
b. If the subgrade material encountered consists of saturated clays or silts, the Engineer may direct the installation of the bedding material and pipe inside a construction fabric wrap as shown on the Drawings.

2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
5. Lay each pipe length so it forms a close joint with the adjoining length and bring inverts to the required grade.
6. Set the pipe true to line and grade. Use a transit for line. Use a laser beam aligner for grade.
7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer or any other unyielding object.
8. Make all pipe joints watertight and no sand, silt, clay or soil of any description entering the pipeline at the joints.
9. Immediately after making a joint, fill the holes for the joint with bedding material, and compact.
l0. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
11. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
12. Take all necessary precautions to prevent flotation of the pipe in the trench.
13. Where there is evidence of water or soil entering the pipeline, repair the defects to the satisfaction of the Engineer.

C. Temporary Plugs:
   l. When pipe installation work in trenches is not in progress, close open ends of the pipe with temporary watertight plugs.
   2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
   3. Do not use the pipe lines as conductors for trench drainage during construction.

D. Protection of Water Supplies:
   l. There shall be no physical connection between a public or private potable water supply system and a sewer.

2. Sewer shall be a minimum of ten feet horizontally unless shown otherwise on the drawings.
3. Whenever sewers must cross water mains, the sewer shall be constructed as follows (unless shown otherwise on the Drawings):
    a. Sewer pipe shall be class 52 ductile iron or PVC pressure rated pipe (DR-25 min. or SDR-32.5 min.) for a minimum distance of 9 feet each side of the crossing.
    b. Joints shall be mechanical type water pressure rated with zero leakage when tested at 25 pounds per square inch for gravity sewers and, l-l/2 times working pressure for force mains, and joints shall not be located within 9 feet of the crossings.
    c. Vertical separation of sewer and water main shall not be less than 18".

3.3 CLEANING AND TESTING

A. Cleaning and Testing piping -General:
    1. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
    2. When the installation is complete, test all pipelines, including service laterals, in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner.
    3. Equipment: Supply all labor, equipment, materials, gages, and pumps required to conduct the tests.
    4. Retesting: Perform all retesting required due to failure at no additional cost to the Owner and to the complete satisfaction of the Engineer.

B. Outside Potable Water Piping:
    1. Pressure Test:
        a. Perform testing in accordance with Section 5 of AWWA Standard C600.
        b. Pressure and leakage tests are required.
    2. Chlorination of pipelines:
        a. Chlorinate all new potable water lines in accordance with the procedure outlined in AWWA C600, latest revision.
        b. Locate chlorination and sampling points as approved by the Engineer.
        c. Use a dosage which will produce not less than 10.0 ppm chlorine residual after a contact period of not less than 24 hours.
        d. During the chlorination period, exercise care to prevent the contamination of water in existing water mains.
        e. After chlorination, flush the piping with clean potable water until there is only background chlorine residual.

f. Chlorinated effluent shall be dechlorinated prior to release to surface waters.

3. Bacteriological Testing:
    a. Test all new potable water lines for total Coliform bacteria at no additional cost to the owner. The contractor shall coordinate all testing with the city. Bacteriological testing services of new water mains will be provided by the City of Portsmouth Water Department, at no cost to the Contractor. However, the Contractor will remain responsible for coordination and sampling in advance.
    b. The length of pipe to be tested and the time of the test shall be as approved by the Engineer.
    c. The Engineer will observe the taking of samples.
    d. Have all samples tested by a laboratory approved by the State and submit test results to the Engineer.
    e. Any segment of a potable water line shall be considered unsuitable for service if a Coliform bacteria count is obtained from that sample.
    f. Re-disinfect all segments of piping considered unsuitable and retest. Continue to disinfect and test until no Coliform bacteria are present.
    g. Place piping into service when it has been successfully tested for pressure, leakage and total Coliform bacteria.
4. Services:
    a. After a new main has been energized and the new service has been completed, it shall be the responsibility of the Contractor to confirm with the property owner that all water systems in the building are working properly. This will include removing any air from the water service and confirmation with the property owner that interior plumbing is functioning properly.

C. Building Interior Water Lines (When Applicable):
    1. Clean and test in accordance with the "Plumbing General" Section in these Specifications.

D. Sewer Lines:
    l. Outside Sewer Lines: Test with a low pressure air test, a visual inspection, and for PVC or other flexible piping, test with a deflectometer after suitable settling time has elapsed.
    2. Building Interior Sewer System: Clean and test in accordance with the "Plumbing General" Section in these Specifications.

E. All Other Piping Systems:
    1. Pressure Test:
        a. Perform a pressure test for all other piping systems at l-l/2 times maximum system pressure, or at the maximum working pressure of the piping system, or at a pressure indicated in the appropriate Sections of this Specification.

b. Tests shall be hydrostatic water, or air pressure as specified or as approved by the Engineer.

2. Cleaning: Perform all specialized cleaning as specified or required by system.

DUCTILE IRON PIPE & FITTINGS

PART I -GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install ductile iron pipe and ductile iron fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.

1.2 OUALITYASSURANCE

A. Standards:
   l. Cement-mortar lining for water: ANSI A21.4/AWWA C104.
   2. Rubber gasket joints: ANSI A2l.l I/AWWA Cl11.
   3. Ductile iron pipe thickness: ANSI A21.50/AWWA C150.
   4. Ductile iron pipe, centrifugally cast: ANSI 42l.5lIAWWA Cl5l.
   5. Threaded flanges: ANSI A21.l5/AWWA Cl15.
   6. Ductile iron fittings: ANSI21.53/AWWA C153.
   7. Pipe flanges and fittings: ANSI Bl6-1, ANSI A-21.12.
   8. Bolts: COR-TEN ASTM A588.
   9. Polyethylene encasement: ANSI/A2 1.5/AWWA C I 05

I.3 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
B. If requested by the Engineer, submit manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these Specifications.
C. If joint restraints are to be used in place of thrust blocks, submit restraint calculations for review by the Engineer. Restraint calculation shall be in accordance with DIPRA and AWWA standards.

1.4 DELIVERY. STORAGE AND HANDLING

A. Exercise extra care when handling pipe and fittings.
B. Exercise extra care when handling cement lined pipe and fittings because damage to the lining will render it unfit for use.

C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by wood lagging securely fastened in place.

1.5 OBSERVATION

A. Provide all labor necessary for the Engineer to observe pipe, fittings, gaskets, and other materials.
B. Carefully observe all materials at the time of delivery and just prior to installation.
C. Carefully observe all pipe and fittings for:
    l. Defects and damage.
    2. Deviations beyond allowable tolerances for joint dimensions.
    3. Removal of debris and foreign matter.
D. Examine areas and structures to receive piping for:
    l. Defects, such as weak structural components that adversely affect the execution and quality of work.
    2. Deviations beyond allowable tolerances for pipe clearances.
E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
F. Immediately remove all rejected materials from the project site.
G. Start work only when conditions are corrected to the satisfaction of the Engineer.

PART2 -PRODUCTS

2.1 MATERIALS

A. Pipe:
    l. All pipes shall conform to the latest AWWA specification Cl5l. Unless otherwise shown on the Drawings, the minimum thickness of ductile iron pipe shall be:
        a. All ductile iron pipe shall be Class 52, double cement lined.
        b. Pipe with flanges: Class 53 (formerly Class 3).
        c. All ductile iron pipe shall have cement lining of double thickness.
    2. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
    3. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.
    4. Factory applied bituminous coatings, as approved by the Engineer, shall be furnished for all underground piping.
    5. Each ductile iron pipe shall have conspicuously marked on the exterior the pressure, class, and weight of the pipe.
    6. All ductile iron pipe furnished to the project shall be one uniform length, either 18 feet or 20 feet.

B. Joints (as shown on the Drawings, specified and applicable):
    1. General: All joints shall be the same pressure class as the pipe unless otherwise shown on the Drawings.
    2. Flanged:
        a. Provide specially drilled flanges when required for connection to existing piping or special equipment.
        b. Flanges shall be long-hub screwed tightly on pipe by machine at the foundry priorto facing and drilling.
        c. Gaskets:
            (l) Ring type of rubber with cloth insertion.
            (2) Thickness of gaskets 12 inches in diameter and smaller: l/16 inch.
            (3) Thickness of gaskets larger than 12 inches in diameter: 3132 inch.
        d. Fasteners:
            (1) Make joints with bolt, stubs with a nut on each end, or one tapped flanged with a stud and nut.
            (2) The number and size of bolts shall meet the requirements of the same American National Standard as the flanges.
            (3) Nuts, bolts and studs shall be Grade B meeting the requirements of ASTM A307.
            (4) After jointing, coat entire joint with bituminous material compatible with pipe coating.
        e. When applicable, provide and install flange clamps as shown on the Drawings.
        f. Uniflange type connection shall be positively restrained by use of threaded rods (2) or other approved restraint device.
    3. Push-on and Mechanical Joint:
        a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
        b. Provide gaskets manufactured from a composition material suitable for exposure to the liquid to be contained within the pipe.
    4. Grooved split ring couplings, sleeve couplings, flexible joints and couplings: As specified and shown on the Drawings.
    5. Joint Bracing:
        a. Provide joint bracing to prevent the piping from pulling apart under pressure as required.
        b. Types of bracing:
            (l) Field Lok 350rM Gasket by US Pipe for Ductile Iron pipe.
            (2) Thrust blocks of sufficient size in accordance with DIPRA and AWWA standards for thrust restraint.

(3) Mechanical joint ductile iron pipe shall have "Mega-lug Type" restrained ductile iron glands.
(4) Pipe and fittings with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with an approved bituminous paint after assembly or, if necessary, prior to assembly.
(5) Other types of bracing as shown on the Drawings.

C. Standard Fittings:
   l. All joints shall conform to the latest AWWA specification c-153.
   2. Class 350, Ductile Iron, Cement Lined except as shown on the Drawings or as specified.
   3. Joints the same as the pipe with which they are used or as shown on the Drawings.
   4. Provide fittings with standard bases where shown on the Drawings.
   5. Provide retainer glands on all fittings.
   6. Outside surface coated to specifications applicable to pipe.

D. Non-Standard Fittings:
   l. Fittings having non-standard dimensions shall be subject to the Engineer's approval.
   2. Non-standard fittings shall have the same diameter and thickness as standard fittings and shall meet the specification requirements for standard fittings.
   3. The laying lengths and types of joints shall be determined by the particular piping to which they connect.
   4. Flanged fittings not meeting the requirements of ANSI A21.10 (i.e., laterals or reducing elbows) shall meet the requirements of ANSI 816.l in Class 125.

E. Polyethylene encasement shall be 8 mil thick.

PART 3 -EXECUTION

3.1 INSTALLATION

A. General:
   l. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations.
   2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
   3. Install adapters, approved by the Engineer, when connecting pipes constructed from different materials.

B. Installation in Trenches:

l. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts up to the required grade.
6. Set the pipe true to line and grade. Use a transit and level or a laser beam aligner as appropriate to the pipe application.
7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
8. Make all pipe joints watertight with no visible leakage and no sand, silt, clay or soil of any description entering the pipeline at the joints.
9. Immediately after making a joint, fill the holes for the joints with bedding material and compact.
10. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
11. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
12. Take all necessary precautions to prevent flotation of the pipe in the trench.
13. Where there is evidence of water or soil entering the pipeline, repair the defects.

C. Temporary Plugs:

1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
3. Do not use the pipelines as conductors for trench drainage during construction.

D. Assembling Joints:

1. Push-on Joints;
    a. Insert the gasket into the groove of the bell.
    b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
    c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.

d. Where electromagnetic type pipe locators are used or as directed, insert serrated brass wedges at all joints to assure continuity. Use two wedges per joint for 2" through 12" diameter pipe and four wedges for pipes greater than 12" diameter. Each wedge shall be driven into the opening between the plain end and the bell end. Wedges may be omitted with use of Field Lok 350 ™ gaskets.

2. Bolted Joints:
    a. Remove rust preventive coatings from machined surfaces prior to assembly.
    b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
3. Flanged Joints:
    a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
    b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.
4. Mechanical Joints:
    a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
    b. Lubricate the gasket, bell, and spigot.
    c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
    d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.
    e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
    f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
        (l) Range of Torque: 60-90 Ft.-lbs.
        (2) Length of Wrench: l0 inches.
    g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.
5. Bell and Spigot Joints:
    a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
    b. Apply a liberal coat of manufacturer supplied lubricant to both the gasket and the spigot end. Lubricant shall be appropriate for the pipe application.

c. Insert the spigot firmly into place and hold securely until the joint has been properly completed.

E. Fabrication:
   1. Tapped Connections:
      a. Make all tapped connections where shown on the Drawings or where directed by the Engineer.
      b. Make all connections watertight and of adequate strength to prevent pullout.
      c. Drill and tap normal to the longitudinal axis of the pipe.
      d. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANSI A2l.5l based on 3 full threads for cast iron and 2 full threads for ductile iron.
   2. Cutting:
      a. Perform all cutting with machines having rolling wheel cutters or knives designed to cut cast or ductile iron. Do not use a hammer and chisel to cut pipe.
      b. After cutting, examine all cut ends for possible cracks.
      c. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.

F. Polyethylene encasement shall be installed in agreement with ANSI/AWWA Cl05lL2l.5 and per manufacturer's recommendations. Tube end shall be overlapped and secured with adhesive tape or plastic string. Repair any rips or deflects prior to backfilling.

G. Pipe Deflection:
   l. Push-on and Mechanical Joints:
      a. The maximum permissible deflection of alignment at joints, in inches for 18 foot lengths:

Size of Pipe	Push-On	Mechanical
6	19	27
8	19	20
10	19	20
12	11	20
14	11	13.5
16	11	13.5
18	11	11
20	11	11
24	11	9

      b. The maximum permissible deflection for other lengths shall be in proportion of such lengths to 18 feet.

2. Flexible Joints: The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.

H. Testing to be performed in accordance with the appropriate section of Section 02610 - Pipe and Pipe Fittings - General.

COPPER SERVICE PIPE

PART 1 -GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install copper service pipe of the type and size and in the locations shown on the Drawings and as specified herein.

1.2 OUALITYASSURANCE

A. Seamless copper water tube, ASTM B88.

PART 2 -PRODUCTS

2.1 MATERTALS

A. Type K, soft annealed, 3/4" (minimum) through 1".
B. Type K, hard tempered, l-l/4 inches and larger.

PART 3 -EXECUTION

A. Jointing:
    l. Compression Joints
        a. Ream or file the pipe to remove burrs.
        b. Slip compression nut over pipe and slide pipe into corporation.
        c. Tighten compression nut.
        d. Inspect for cracks, splits or other damages and replace if necessary.
    2. Adapters: Use as required to connect to existing services.
B. Bending Pipe:
    1. Bend pipe with suitable tools and provide smooth bend free of any cracks or buckles.

COUPLINGS. CONNECTORS. CAPS & PLUGS

PART I.GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install couplings and connectors of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
B. Related Work Specified Elsewhere: "Pipe & Pipe Fittings -General" is specified in this Division.

1.2 QUALITYASSURANCE

A. Minimum pressure rating equal to that of the pipeline in which they are to be installed.
B. Couplings and connectors, other than those specified herein, are subject to the Engineer's approval.
C. Cap and plug shop drawing submissions must be accompanied by a manufacturer's written certification that the cap or plug will effectively and permanently seal the inactivated or abandoned utility.

PART 2 -PRODUCTS

2.1 MATERIALS

A. All couplings and Connectors:
    l. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
    2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.
B. Sleeve Type Couplings (When Applicable):
    1. Exposed Couplings (When Applicable):
        a. Steel middle ring,
        b. Two steel follower rings,
        c. Two wedge-section gaskets,
        d. Sufficient steel bolts to properly compress the gaskets,
        e. Acceptable Manufacturers:
            (l) Dresser Manufacturing Co. -Style 38,
            (2) Smith-Blair Inc. -Style 4l l,
            (3) Or approved equal.
    2. Buried Couplings (When Applicable):
        a. Cast or ductile iron middle rings with pipe stops removed,
        b. Two malleable iron follower rings with ribbed construction,
        c. Two wedge-section gaskets,
        d. Sufficient galvanized steel bolts to properly compress the gaskets,
        e. Acceptable Manufacturers:
            (1) Dresser Manufacturing Co.
            (2) Smith-Blair Inc. -Style 4l l,

(3) Or approved equal.

C. Split Type Couplings (When Applicable):
   l. Constructed from malleable or ductile iron.
   2. For use with grooved or shouldered end pipe with minimum wall thickness as required so as not to weaken pipe.
   3. Cast in two sections for 314 inch through 14 inch pipe sizes, four segments for 15 inch through24 inch pipe sizes, and six segments for pipe sizes over 24 inch.
   4. Coating: Enamel.
   5. Bolts: Carbon steel.
   6. Acceptable Manufacturers:
      a. Victaulic Company of America, Style 77,
      b. Gustin-Bacon Co.,
      c. Or approved equal.

D. Flanged Adapters (When Applicable):
   l. For joining plain end or grooved end pipe to flanged pipes and fittings.
   2. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections.
   3. Exposed Sleeve Type:
      a. Constructed from steel.
      b. Coating: Enamel.
      c. Bolts: Carbon steel.
      d. Acceptable Manufacturers:
         (1) Dresser Manufacturing Co. -Style 128 for cast iron, ductile iron and steel pipes with diameters of 2 inches through 96 inches.
         (2) Or approved equal.
   4. Buried Sleeve Type:
      a. Constructed from cast iron.
      b. Bolts: Galvanized steel.
      c. Acceptable Manufacturers:
         (l) Dresser Manufacturing Co. -Style 127 locking type for cast iron, ductile iron, asbestos cement and steel pipes with diameters of 3 inches through 12 inches.
         (2) Or approved equal.
   5. Split Type:
      a. Constructed from malleable or ductile iron.
      b. For use with grooved or shouldered end pipe.
      c. Coating: Enamel.
      d. Acceptable Manufacturers:

(1) Victaulic company of America -Style 741 for pipe diameters of 2 inches through 12 inches,
(2) Victaulic company of America -Style 742 for pipe diameters of 14 inches through 16 inches,
(3) Or approved equal.

E. Flexible Joints:
   l. Expansion Joints:
      a. Materials shall be capable of withstanding the temperature, pressure and type of material in the pipeline.
      b. Shall be the filled arch type that will prevent sediment build up for all sludge, sewage, and other lines with similar service.
      c. Supplied with control rods to restrict elongation and compression.
      d. Metal retaining rings shall be split and beveled galvanized steel for placement against the flange of the expansion joint.
   2. Deflection Joints:
      a. Joints designed to permit a nominal maximum deflection of 15 degrees in all directions from the axis of the adjacent pipe length, will prevent pulling apart, and will remain watertight at any angle of deflection under l5 degrees.
      b. Material to be manufactured from a composition material suitable for exposure to the liquid, pressure and temperature to be contained within the pipe.
      c. Supplied with control rods as required.

F. Caps and Plugs
   l. Cap and plug material shall be as indicated on the Drawings and shall be adaptable to the inactive or abandoned utility to be capped or plugged.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Sleeve Type Couplings (When Applicable):
   1. Thoroughly clean pipe ends for a distance of 8 inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
   2. Slip a follower ring and gasket (in that order) over each pipe and place the middle ring centered over the joint.
   3. Insert the other pipe length into the middle ring the proper distance.
   4. Press the gaskets and followers evenly and firmly into the middle ring flares.
   5. Insert the bolts, finger tighten and progressively tighten diametrically opposite bolts uniformly around the flange to the torque recommended by the manufacturer.

B. Split Type Flange Adapters (When Applicable): Install in the same manner as Split Type Couplings.
C. Buried Couplings, Adapters and Connectors (When Applicable): Thoroughly coat all exterior surfaces, including nuts and bolts, after assembly and inspection by the Engineer with a heavy-bodied bituminous mastic as approved by the Engineer.
D. Install thrust rods, supports and other provisions to properly support pipe weight and axial equipment loads.
E. Install caps and plugs in accordance with manufacturer's recommendations to ensure a permanent seal of the inactive or abandoned utility.

RESILIENT-SEATED GATE VALVES & TAPPING SLEEVE AND VALVES

PART I -GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 OUALITYASSURANCE

A. All gate valves of the same type and style shall be manufactured by one manufacturer.
B. Meet or exceed AWWA 509 Resilient-Seated Gate Valves for Water and Sewerage Systems.
C. Acceptable Manufacturers shall be specified by the local authority in their standards. If local standards do not exist, the following manufacturers shall be acceptable:
    l. Mueller
    2. Dresser
    3. Darling
    4. Clow
    5. Smith
    6. Or Equivalent

1.3 VALVE LOCATION AND USE

A. As shown on the Drawings.
B. Accessories: As shown and required for proper operation.

PART 2 PRODUCTS

2.1 RESILIENT-SEATED GATE VALVES

A. Waterworks type NRS valves (AWWA C509, with mechanical joints and all accessories including retainer gland.
    1. Iron body bronze mounted (IBBM), coated inside and out with fusion bonded epoxy (AWWA C550).
    2. Non rising stem (NRS).
    3. Resilient seat gate.
    4. End Connections: As shown on the Drawings and as required for pipe.
    5. Working Pressure:
        a. All sizes: 200 psi water
        b. Unless otherwise shown on the Drawings.
    6. Stem Sealing:
        a. Rust-proofed bolting.
        b. "O" ring design.
        c. Capable of replacing under pressure with valve open.
    7. Buried Valves:
        a. Gate box required.
        b. Sufficient quantity of tee-handle valve wrenches for operating valves of various depths.
        c. 2 inch square operating nu! securely fastened to shaft.
    8. Valve operation: Open by turning right-clockwise.
    9. Arrow showing direction of opening plainly cast on valve bonnet.

2.2 TAPPING SLEEVE AND VALVE ASSEMBLY

A. Tapping Sleeve
    1. Body and Outlet: Type 304 or better stainless steel fully passivated welds to restore stainless characteristics.
    2. Flange: Type 304 or better stainless steel with recess to accept standard tapping valves. Flange shall conform to AWWA c207 class D ANSI 150 lb. drilling.
    3. Bolts and Nuts: Type 304 stainless steel or better, coated to prevent galling.
    4. Lifter Bar: Type 304 or better stainless steel to provide a heavy bearing surface for nuts.
    5. Gaskets: Gridded virgin SBR or Buna-N compounded for water service ASTM D2000. Full gasket to give 360^{o} pipe coverage.
    6. Rating: Tapping sleeve shall be rated for pressures equal to or greater than the pipe to which it is connected.
B. Tapping Valve
    l. Tapping valves shall be resilient seated gate valves meeting the requirements of Paragraph 2. I above and shall have the following additional features.

2. The valve shall be furnished with a flange-end connection on one end and a mechanical joint end on the opposite end. The flange shall be furnished with an alignment ring to help ensure true alignment of the valve and tapping sleeve. The mechanical joint end shall be furnished in accordance with ANSI/AWWA C153/ A21.53.
3. All tapping valves shall include a minimum 3/8" NPT pipe plug on the bonnet of the valve body to aid in the field testing of the valve.

PART 3 EXECUTION

3.1 INSTALLATION

A. Buried Valves:
   l. Stem vertical
   2. Box vertical and centered over operating nut.
   3. Thrust blocks installed as shown on the Drawings.
   4. Gate box supported during backfilling and maintained.
   5. Gate box shall not transmit shock load or stress to valve.
B. Tapping Sleeves and Valves:
   l. Tapping sleeves and valves shall be installed by an experienced crew trained to safely and properly install a tapping sleeve and valve on a live main.

CORPORATION STOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work shall include the furnishing and installation of corporation stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
B. Work Specified Elsewhere. This Section is not a stand-alone Section. Other requirements which relate to this Section are noted elsewhere in these documents. The Contractor and all Subcontractors are required to review this entire document along with the Drawings in an effort to identify all requirements.
C. Reference standards: ANSI / AWWA C8OO.
D. Submittals: Submit manufacturer's literature, test reports, and certificates in accordance with the General Conditions and submittals.
E. Delivery, Storage and Handling: Store to prevent damage and in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Ball valve-type corporation with 300 psi rating.
   1. Shall conform to ANSVAWWA C800, latest revision.
   2. Constructed of brass. Brass alloys not listed in ANSI/AWWA C800 Paragraph 4.1.2 are not approved.
   3. Shall be "lead free" as defined in the Safe Drinking Water Act, amended January 4, 2011. Specifically, fittings shall contain not more than a weighted average of 0.25% lead when used with respect to their wetted surfaces.
   4. Outlet shall have a compression pack joint (CPPJ) for copper Tubing Size (CTS) O.D.
   5. Stainless steel insert stiffeners shall be used where CTS plastic tubing is specified
   6. Inlet shall have AWWA (cc) Tapered pipe Threads.
   7. Acceptable Manufacturers:
      a. Mueller
      b. A. Y. McDonald
      c. Or equivalent
   8. Substitutions: Products of equal or better quality, function and performance may be proposed for substitution by following the procedures in Section 01630 - Substitution and Product Options.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.
B. Service saddles shall be required as noted on the drawings, on all PVC and AC mains, as required below, and as specified by the pipe and saddle manufacturers.

Pipe Size	Class 50 Ductile Iron Pipe	Class 51 Ductile Iron Pipe	Class 52 Ductile Iron Pipe
6"	All Taps	All Taps	Taps > 3/4"
8"	All Taps	Taps > 3/4"	Taps > 3/4"
10"	Taps > 3/4"	Taps > 3/4"	Taps > 1"
12"	Taps > 3/4"	Taps > 1"	Taps > 1-1/4"
16"	Taps > 1-1/4"	Taps > 1-1/2"	Taps > 2"

C. Spiral-wrap completely the thread area with Teflon tape prior to insertion.
D. Install corporation stops atthe2 and l0 o'clock positions on the pipe.

E. A minimum of one and a maximum of three threads of the installed corporation stop must be showing outside the water main. Care shall be taken not to over-tighten the stops.
F. Check and adjust all corporation stops for smooth operation.

3.2 TESTING

A. All corporation stops must be installed prior to leakage testing of the water main.

CURB STOPS ASSEMBLY

PART I - GENERAL

1.1 DESCRIPTION

A. Work shall include the furnishing and installation of curb stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITYASSURANCE

A. All curb stops shall be manufactured by one manufacturer.
B. All curb boxes shall be from one manufacturer.
C. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.
D. Meet or exceed ANSVAWWA Cg00.
E. Acceptable Curb Stop Manufacturers:
    1. A.Y. McDonald Mfg. Co.
    2. Mueller Co.
    3. or equivalent.

PART 2 -PRODUCTS

A. Curb Stop
    l. Curb ball valve, quarter tum check.
    2. Construction shall be in accordance with AWWA C800 latest revision.
    3. Shall be "lead free" as defined in the Safe Drinking Water Act, amended January 4, 2011. Specifically, fittings shall contain not more than a weighted average of 0.25% lead when used with respect to their wetted surfaces.
    4. Inlet and outlet shall have compression type connections (CPPJ).
    5. Working pressure shall be 300 psi.
    6. Stainless steel insert stiffeners shall be used where plastic tubing (CTS) is specified.
    7. Inverted key and plug type curb stops are not acceptable.

B. Service Boxes
    l. Erie style
    2. 5-1/2’ – 6-1/2' bury (unless shown otherwise)
    3. Plug cover with rope thread
    4. 36" x ½”, stainless steel Box Rod
    5. For services over l”, provide heavy duty foot piece.

PART 3 -EXECUTION

3.1 INSTALLATION
A. Install at locations shown on the Drawings and in accordance with manufacturer's instructions.
B. Install 2" x 8" x 8" concrete tile under curb stop.

3.2 ADJUSTMENTS
A. Check and adjust all curb stops for smooth operation.
B. The curb box shall be adjusted to final grade.
    l. In paved areas or in sidewalks, the adjustment shall be approximately l/8" below finish grade.
    2. In lawn or grass area, the adjustment shall be approximately 1/2" below finish grade or it such a level as not to interfere with lawn maintenance.

HYDRANT ASSEMBLIES

PART 1 - GENERAL

1.1. DESCRIPTION
A. Work shall include the furnishing and installation of hydrant assemblies of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
B. Hydrant Assemblies consist of:
    1. Hydrant tee.
    2. 6 inch gate valve and valve box.
    3. 6 inch hydrant branch piping.
    4. Hydrant.
    5. Thrust blocking and retainer glands.

1.2 QUALTTYASSURANCE
A. Hydrants shall conform to AWWA C502 and all hydrants shall be from one manufacturer.
B. Hydrants shall comply with Factory Mutual Research Corporation and Underwriters' Laboratories UL246 Standard.

C. Gate valves shall conform to AWWA C500.
D. Acceptable Manufacturer:
    1. Kennedy Model K-8lA or as approved by the City of Portsmouth Water Department.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fire Hydrants:
    l. Dry barrel type with a 5-1/4 inch minimum valve opening.
    2. Two (2) 2-1/2 inch hose connections and one (l) 4-1/2 inch pumper connection.
        a. 2-l/2 inch outlets: 60 degree V threads, 7-l/2 threads to the inch, external threads 3-1/16 inches, O.D. National Standard threads.
        b. 4-1/2 inch outlet: 4 threads to the inch, external threads 5-314 inches, O.D. National Standard threads.
    3. 200 pounds working pressure and 400 pounds hydrostatic test pressure.
    4. Working parts shall be bronze and **OPEN RIGHT** (clockwise). Operating nut shall open by turning to the RIGHT and be five-sided, 1-1/2 inch point to flat.
    5. Designed with standpipe breaking ring or breakable sections.
    6. Supply one (l) collision repair kit for every twenty-five (25) hydrants installed.
    7. Caps shall be attached to hydrant body by chains.
B. Gate Valves: Waterworks type non-rising stem AWWA valve as specified in Section “Gate Valves”.
C. Valve Boxes:
    l. Cast or ductile iron, with the word "WATER" cast in covers.
    2. Be of such length as required without full extensions, Minimum lap l2 inches.

PART3 - EXECUTION

3.1 INSTALLATION

A. Install hydrants as shown in the details and using manufacturer's written instructions.
B. No hydrant assembly shall be backfilled until approved by the Engineer.
C. Provide thrust blocks as shown.
D. Provide barrel extensions as required for hydrant to be installed at proper grade at no additional cost to the Owner.
E. Plug all drain openings with brass plugs.
F. Provide finish paint on all exposed surfaces. Color must meet Owner's requirements.

3.2. CLEANING

A. Clean all hydrants of concrete, etc. and repaint as necessary to the satisfaction of the Engineer and Owner.

VALVE BOXES

PART I - GENERAL

1.1 DESCRIPTION

A. Work shall include the furnishing and installation of valve boxes of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 OUALITYASSURANCE

A. All valve boxes shall be manufactured by one manufacturer.
B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.

PART 2 -PRODUCTS

2.1 MATERIALS

A. For valves l0 inches and smaller the valve box shall be cast iron, slip type two-piece integral base, with a top flange, 5-l/4 inch shaft.
B. For valves 12 inches and larger the valve box shall be cast iron, slip type, three piece (separate base), with a top flange, 5-l/4 inch shaft.
C. Cast or ductile iron, with the word "WATER" cast in covers.
D. Acceptable Manufacturers:
    1. Mueller Co.
    2. Central Foundry Co.
    3. Clow.
    4. Or equivalent.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Installation as shown on the Drawings and./or as specified herein:
    l. When installation is complete, no pressure shall be exerted by valve box on the water main or on the valve.
    2. Be of such length as required without full extension. Minimum lap 12 inches.
    3. Install so cover is exactly level to l/4 inch lower than pavement.

SERVICE SADDLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work shall include furnishing and installation of service saddles of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITYASSURANCE

A. All service saddles shall be manufactured by one manufacturer.
B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.

1.3 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings in accordance with the General conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. For cast iron, ductile iron, and C900 PVC pipe
    1. Body -ductile iron. Fusion bonded epoxy coated (10 mils min.)
    2. Gasket -NBR compound.
    3. Bolts, Washers and nuts -heavy hex constructed of type 304 (18-8) stainless steel.
    4. Threads-American Tapered Pipe Threads.
B. Straps:
    l. 304 Stainless Steel single or double strap for 6" or smaller.
    2. 304 Stainless Steel double strap for g" and larger.
C. Acceptable Manufacturers:
    l. Smith-Blair
    2. Dresser
    3. Or equivalent

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation as shown on the Drawings and/or as specified herein:
    l. Install at locations with 1-1/2 inch or larger services on ductile iron pipe, or at any size service on A.C. pipe, or as specified by the pipe and saddle manufacturers.
    2. Check for leaks prior to backfilling as appropriate.
    3. Tap pipe with tools and methods specifically furnished by pipe manufacturer.

Method of Measurement

4.1 Cut and Cap Existing Water Main will not be measured.

4.2 1" Copper Corporation and Curb Stop will be counted for each installation competed.

4.3 1" Copper Water Service will be measured by the foot to the nearest 0.1 foot.

4.4 New Hydrant Assembly Complete will be counted for each installation competed.

4.5 Adjust Existing Gate Valves will be counted for each gate valve adjusted to finished grade. Temporary adjustments will be considered subsidiary.

Basis of Payment

5.1 Pay items will be paid for at the Contract unit price for each item as listed below.

Pay Item		**Pay Unit**
611	Cut and Cap Existing Water Main	Lump Sum
611.5001	1" Copper Corporation and Curb Stop	Each
611.5011	1" Copper Water Service	Foot
611.5012	New Hydrant Assembly, Complete	Each
611.5013	Adjust Existing Gate Valves	Each

END OF SECTION

SECTION 618

UNIFORMED OFFICERS AND FLAGGERS

Amend Section 618 to include:

Description

Add 1.2: Daily traffic control personnel will be required to facilitate traffic through the work zone quickly and safely. The use of, type of, and number of personnel will be reviewed and approved with the Engineer.

Method of Measurement

Amend 4.1: Uniformed Officers and Flaggers shall be measured by the actual hour worked in the field.

Basis of Payment

Amend 5.1: Uniformed Officers and Flaggers will be paid for at the Contract unit price, by the actual hour worked. The City will reimburse the exact cost for this item, no cost markup is allowed. The item cost on the bid form is reflective of the cost of these items to the City at the time of the bid and will be adjusted as necessary as costs increase.

SECTION 619

MAINTENANCE OF TRAFFIC

Amend Section 619 to include:

Construction Requirements

Add 3.4: All work shall be prosecuted so pedestrian and traffic flow can be maintained. No travel lane or sidewalk closures will be allowed without prior approval from the Engineer. If lane closures are required, a traffic flagging and/or detour plan will be generated and will need to be approved by the Department prior to its implementation. It should be expected that detours will not be typically allowed for day to day work except for non-preventable road closures caused by the installation of certain structures or systems that would make one-way reversible traffic impossible or unsafe.

Add 3.5: The Contractor will develop a construction staging plan for the project. The plan shall be submitted to be approved by the Engineer.

Add 3.6: Access shall be maintained to the abutting driveways and entrances at all times during construction. Open lanes of the road shall be graded safely for traffic at all times. A 24 hour contact will be required in case of emergency or safety concerns or in case the road surface needs attention.

Add 3.7: Dust control may be ordered by the Engineer. The Contractor shall have methods of dust control readily available for use at all times.

Add 3.8: Portable Message Boards shall be 54" x 92" (+/-) and readily available within 48 hours.

Basis of Payment

Amend 5.1.3: The material cost of calcium chloride will be paid for by the LB.

Amend 5.1.4: The material cost of permanent construction signs is subsidiary to the Pay Item.

Add 5.1.10: The following items are subsidiary to the 619.1 Pay Item: Traffic control, construction signs (permanent and temporary), temporary message boards, temporary traffic loops, traffic control plans, traffic cones and barrels and other methods of dust control as ordered by the Engineer.

Pay item		Pay unit
619.1	Maintenance of Traffic	Unit
619.11	Calcium Chloride for Dust Control	LB
619.253	Portable Message Boards	Week

SECTION 660

SEWER INSTALLATION

Description

1.1 Work Included:

- **1.1.1** Furnishing polyvinyl chloride (PVC) and high density polyethylene (HDPE) pipe for collecting and transporting sewage.
- **1.1.2** Furnishing miscellaneous appurtenances.
- **1.1.3** Installation.
- **1.1.4** Testing.

1.2 Reference Standards:

- **1.2.1** New Hampshire Department of Environmental Services - Standards of Design and Construction for Sewerage and Wastewater Treatment Facilities.
- **1.2.2** New Hampshire Department of Transportation – Standard Specification for Road and Bridge Construction, 2010 or most recent Edition
- **1.2.3** ASTM D3034: - Type PSM Poly(Vinyl Chloride)(PVC) Sewer Pipe and Fittings
- **1.2.4** ASTM D3212: - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- **1.2.5** UNI-B-6 : - For Low Pressure Air Testing Of Installed Sewer Pipe
- **1.2.6** ASTM D638: Standard Test Method for Tensile Properties of Plastics
- **1.2.7** ASTM D790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- **1.2.8** ASTM D1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
- **1.2.9** ASTM D1248: Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable
- **1.2.10** ASTM D1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique
- **1.2.11** ASTM D1599: Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
- **1.2.12** ASTM D1693: Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
- **1.2.13** ASTM D2321 : Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- **1.2.14** ASTM D2837: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
- **1.2.15** ASTM D-3035: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

1.2.16 ASTM D3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

1.2.17 ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

1.2.18 ASTM F714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

1.2.19 AWWA C600: Installation of Ductile Iron Water Mains and Their Appurtenances - (for pressure testing requirements).

1.3 Submittals

1.3.1 Submit shop drawings and product data in accordance with Specifications.

1.3.2 Submit manufacturer's recommendations for pipe jointing and laying.

1.3.3 No later than two weeks prior to commencing operations, submit to the ENGINEER for approval a detailed plan of operations. Include equipment to be used, qualification of personnel, traffic control, and methods of protecting existing utilities.

1.3.4 Provide records of utility locations (As-Built Plans) to ENGINEER prior to substantial completion.

1.4 Product Delivery, Storage and Handling

1.4.1 Pipe shall be unloaded and inspected in accordance with the manufacturer's instructions.

1.4.2 Pipe and fillings stored on the site shall be stored in the protective unit packages provide by the manufacturer. If packages need to be opened, the pipe shall be stored above ground and on a flat surface and not in direct contact with the ground. Do not stack higher than four feet. Keep inside of pipe and fillings free from dirt and debris. Care shall be exercised to avoid compression damage or deformation to the pipe.

1.4.3 All pipe and fillings that are stored shall be covered to provide protection from the sunlight.

1.4.4 Handle all materials with care. Any pipe or filling having a crack or which has received a severe blow shall be marked rejected and immediately be removed from the work.

Materials

2.1 General:

2.1.1 All products included in this section shall conform to the requirements of the standards specifications referenced herein.

2.1.2 Pipe size and material shall be as shown on the Drawings.

2.2 Acceptable Manufacturers:

2.2.1 Specifications: Products specified in this section are based on those manufactured by the following firms:

2.2.1.1 Polyvinyl chloride pipe and fittings - J-M Manufacturing, Ipex Inc., or Certain Teed.

2.2.1.2 HDPE pipe and fittings - Phillips Driscopipe, Lamson Vylon, or J-M Manufacturing.

2.2.1.3 Flexible or transition couplings for non-pressure sewer pipe - Fernco, Inc.

2.2.1.4 Flexible or transition couplings for pressure pipe - not applicable. All joints shall be butt fused or compression fittings and rated at 150 psi.

2.2.2 Products of equal quality, detail, function and performance may be proposed for substitution.

2.3 Sanitary Sewer:

2.3.1 Polyvinyl Chloride Pipe: Shall be SDR-35, push-on joint conforming with ASTM D3034. Fittings shall comply with ASTM D3034. Joints shall comply with ASTM D3212.

2.3.1.1 Each length of pipe shall have an integral bell and shall be supplied in 12.5 foot lengths, or lengths approved by the engineer.

2.3.1.2 Joint shall be push-on type using elastomeric gasket designed to prevent slipping during jointing. The gaskets shall be factory installed and secured in place prior to delivery to the job site.

2.3.1.3 All pipe, fittings, gasket material and lubricant shall be supplied by the same manufacturer. Petroleum base lubricants shall not be used.

2.3.1.4 Physical and chemical properties of pipe couplings shall be equal to those properties of the pipe.

2.3.2 Flexible Couplings and Transition Couplings: Couplings for non-pressure sewer pipe shall be resilient elastomeric plastic with recessed stainless steel bands at each end for fastening

2.4 HDPE Low-Pressure Main:

2.4.1 Pipe shall be high performance; high molecular weight, high density polyethylene pipe. The pipe material shall be a Type III, Class C, Category 5, P34 material as described in ASTM D 1248. Minimum cell classification values of the pipe material shall be 345434 C as referenced in ASTM D 3350 - 84. The density shall be 0.941 - 0.957 gms/cm3 when tested in accordance with ASTM D 1505.

2.4.2 Melt Flow shall be no greater than 0.15 gms/l0 min. when tested in accordance with ASTM D 1238 - Condition E. (Melt Flow shall be no greater than 4.0 gms/l0 min. when tested in accordance with ASTM D 1238 - Condition F.)l Flexural Modulus shall be 110,000 psi to less than 160,000 psi when tested in accordance with ASTM D 790. Tensile strength at yield shall be 3,200 psi to less than 3,500 psi when tested in accordance with ASTM D 638. Environmental Stress Crack Resistance shall be in excess of 5,000 hours with zero failures when tested in accordance with ASTM D 1693 – Condition C.

2.4.3 Hydrostatic Design Basis shall be 1,600 psi at 23°C when tested in accordance with ASTM D 2837.

2.4.4 Certification: The owner or the specifying engineer may request certified lab data to verify the physical properties of the pipe materials supplied under this specification or may take random samples and have them tested by an independent laboratory.

2.4.5 Rejection: Polyethylene pipe may be rejected for failure to meet any of the requirements of this specification.

2.4.6 Pipe Dimensions: The SDR (Standard Dimension Ratio) of the pipe supplied shall be SDR 11 for all pipe 4 inches in diameter or less.

2.5 Service Lateral Assembly:

2.5.1 The Contractor shall furnish complete service lateral fitting kits (exclusive of piping) each consisting of one (1) male adapter for attachment to the station and one (1) combination curb stop/check valve assembly with curb box. All plastic valves and fittings are to be molded from engineered thermoplastic resins. All polypropylene and nylon fittings shall be tested for resistance to aging, pressure rating, tensile strength and flexural· strength. All components shall incorporate compression fitting connections for easy, reliable installation of piping. All fittings and valves shall be rated for 150 psi service. Completed assembly shall be as provided by Environment One Corporation, Niskayuna, New York, or approved equal.

2.5.2 Factory Test: All service lateral assemblies are to be 100% hydrostatically tested to 150 psi in the factory.

2.6 Valves and Fittings:

2.6.1 All plastic valve and fitting components are to be tested for compliance with ASTM D1599 (Categories 7.1.1,7.2.2, and 7.2.3). Components shall be tested against the requirements of ASTM D2513 (Categories 6.10.1 and 6.10.2). Valves and fittings shall be designed for a working pressure rating (WPR) of 150 psi.

2.6.2 All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

2.6.3 Glass filled nylon valves shall be pressure tight in both directions. The tee-head shall include a ratcheting feature to prevent breaking from over-torquing the valve handle. Buna-N O- rings shall be used to provide a redundant, watertight seal on the stem. A spherical, Teflon filled polypropylene ball shall be supported in molded, Teflon seats to provide watertight seals in direction, as well as maximum flow capacity and ease of operation. Valves shall be designed to withstand a working pressure of 150 psi minimum. Maximum width shall be 3" to accommodate arch style curb box. Provide stem extension to place operating nut 6" below cover.

2.7 Check Valves:

2.7.1 Check Valves shall be injection molded from non-corroding, glass fiber reinforced PVC for durability. The check valve flapper shall include a non-fouling, integral hinge made from fabric reinforced synthetic elastomer to assure corrosion resistance,

dimensional stability, fatigue strength and trouble free operation. The check valve will provide a full-ported passageway and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating at low back pressure. Valves shall be designed to withstand a working pressure rating of 150 psi minimum

2.8 Curb Boxes

2.8.1 Box: Service Box shall be constructed of cast iron and Erie Style. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.

2.8.2 Cover: Box covers shall be cast iron with brass pentagon plug with the word "SEWER' cast in the cover.

2.8.3 Rod: Box rod shall be ductile iron and the appropriate length based on the depth of box.

2.9 Identification

2.9.1 Each pipe length and fitting shall be clearly marked with Manufacturer's name and trademark, nominal pipe size, and material designation.

2.10 Sewage Combination Air and Vacuum Release Valve:

2.10.1 Sewage Combination Air Valve shall be a single body that will allow large volumes of air to escape or enter thru the larger diameter air and vacuum orifice when filling or draining a pipeline.

2.10.2 Valve shall be furnished with a backflush hose/valve (blow-off valve), drain valve, and an inlet shut-off valve.

2.10.3 The internal linkage shall be fitted with a stainless steel stem having a polypropylene float. The operating mechanism shall be non-metallic and corrosion resistant.

2.10.4 The valve body and float shall withstand 150 psi working pressure. The valve inlet shall be threaded and shall be 2-inch. Valve shall be AR.1. Model 0-025, Apco Model 443 WA, or approved equal.

2.10.5 Provide separate independent supports for valve. Do not use piping to support weight of valve.

2.11 Rigid Expanded Polystyrene (EPS) Insulation

2.11.1 Rigid expanded polystyrene (EPS) foam insulation shall be a width of 4 feet x 2-inch minimum thickness (blue board) as manufactured by Dow Chemical. or U.S. Gypsum, or approved equal.

<u>Construction Requirements</u>

3.1 General:

3.1.1 Pipe and fittings shall be handled with care to insure that the pipe and fittings are in sound, undamaged condition. Particular care shall be taken to prevent damage to pipe coating and lining (if any).

3.1.2 The Contractor shall furnish slings, straps and/or other approved devices to support the pipe when it is lifted. Pipe and fittings shall not be dropped from trucks onto the

ground or into the trench. Transporting pipe and fittings from storage areas shall be restricted to operations which will not cause damage to the pipe or lining (if any).

3.1.3 All pipe and fittings shall be examined before laying and no pipe or fittings shall be installed which are found to be defective. Damaged pipe coatings and/or lining (if any), shall be repaired as approved or directed by the Engineer.

3.1.4 Any pipe showing a visible crack will not be incorporated into the work.

3.1.5 If any defective pipe is discovered after it has been laid, the Contractor shall remove the defective pipe and replace it with sound pipe at no additional cost to the Owner.

3.1.6 In general, gravity pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow.

3.1.7 Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lifting fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Spreader bars should be used when lifting long, fused sections. Care should be exercised to avoid cutting or gouging the pipe.

3.1.8 Butt-Fusion Joining: Butt-fusion of pipes and fittings shall be performed in accordance with the pipe manufacturer's recommendations as to equipment and technique. Depending on site conditions, butt-fusion joining shall be performed in or outside of the excavation at the Contractor's option.

3.2 Control of Alignment and Grade:

3.2.1 Approximate easement and property and other control lines necessary for locating the Work as well as elevations and bench marks used in the design of the Work are shown on the Drawings. The Contractor shall use this information to set line and use a level or transit to set grade.

3.2.2 The Contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.

3.2.3 The use of string levels, hand levels, carpenter's levels or other similar devices for transferring grade or setting pipe are not to be permitted.

3.2.4 During construction provide the Engineer, at his request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two rodmen as needed at intermittent times.

3.2.5 Contractor shall not proceed until he has made a timely request of the Engineer for, and has received from him, such controls and instructions as may be necessary as Work progresses. The Work shall be done in strict conformity with such controls and instructions.

3.2.6 The Contractor shall carefully preserve bench marks, reference points and stakes, and in case of willful, careless, or accidental destruction by his own men, he will be responsible for the resulting expense to re-establish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the loss or disturbance of such control data.

3.2.7 Maintain good alignment in laying pipe. The deflection at joints shall not exceed the manufacturer's recommended limit. Provide fittings, if required, in addition to those shown on the Drawings when pipe crosses utilities encountered when excavating the trench. Use solid sleeves only where approved by Engineer.

3.3 Installing Pipe and Fittings:

3.3.1 The Contractor shall have on the job site with each pipe laying crew, all the proper tools to handle and cut the pipe.

3.3.2 All pipe and fittings shall be thoroughly cleaned before laying and shall be kept clean until installed.

3.3.3 Pipe shall be laid in the dry trench conditions. At no time shall water in the trench be permitted to flow into the pipe. At any time that Work is not in progress, or the trench is unattended, the end of the pipe shall be suitably closed to prevent the entry of animals, earth, water etc. using watertight expandable plugs.

3.3.4 Lay pipe and fittings in accordance with the requirements of ASTM D2321, except as provided herein. PVC pipe shall not be installed when temperatures are below 32°F unless approved by Engineer.

3.3.5 As soon as excavation has been completed to the proper depth the pipe bed shall be prepared as follows:
Pipe Laid on Bedding Material: Place and compact bedding materials, as specified in Section 3.03, to the elevation necessary to bring the pipe to grade. The compacted material shall be shaped so that the bottom quadrant of the pipe rests firmly on the bedding for the entire length of pipe barrels. Suitable holes shall be dug for bells or couplings to provide ample space for jointing pipe.

3.3.6 When ledge is encountered in the bottom of the trench, pipe shall be bedded on a layer of bedding having a minimum thickness of 12 inches. Blocking is not permitted.

3.3.7 Each pipe section shall be placed into position on the pipe bed in such a manner and by such means required to avoid injury to persons, any property or the pipe.

3.3.8 Permanent blocking under the pipe is not permitted except where a concrete cradle is required, in which case precast concrete blocks shall be used.

3.3.9 Jointing shall conform to the manufacturer's instructions and appropriate ASTM Standards.

3.3.10 Any debris, tools etc. shall be removed from the pipe.

3.3.11 After placing the pipe on the bedding, the bedding material shall be placed and compacted to the spring line (horizontal centerline) of the pipe.

3.3.12 Following placement of the bedding material, the blanket material shall be placed and compacted from the spring line to 12 inches above the crown of the pipe.

3.3.13 After placement of the blanket material the pipe shall be checked for alignment and grade. If the pipe has been properly installed, the Contractor may backfill the remainder of the trench.

3.3.14 At the end of each day's work or at other intervals, the Engineer, with the Contractor will inspect the pipe installation. Unsatisfactory work shall be dug up and reinstalled to meet the requirements of the Contract Documents with no additional time allowed for completion of the Work and at no additional cost to the Owner.

3.3.15 When cutting of pipe is required, the cutting shall be done by machine (power cutter) without damage to the pipe or cement lining (if any). Cut ends shall be smooth and at right angles to the axis of the pipe. Pipe ends to be used with a rubber gasket joint shall be beveled and filed or ground smoothly to conform to a manufactured spigot end.

3.4 Service Connections:

3.4.1 House service lines shall be laid from the connection on the main line sewer to the edge of pavement or property line as directed by the Engineer.

3.4.2 All new service connections shall be 1-1/4 Inch or 1-1/2 Inch SDR 11 HDPE pipe, as shown on the plans, consistent with the main line sewer material.

3.4.3 New services shall terminate as shown on the Drawings, be capped with a watertight cap, and the end shall be marked with a ferrous metal rod or pipe terminating at finish grade.

3.5 Testing:

3.5.1 General

3.5.1.1 Leakage tests under the direction of the Engineer shall be conducted on all pipes installed under this section of the Work. Deflection tests shall be conducted on PVC pipe as ordered by Engineer. The City of Portsmouth Sewer Department shall witness all tests. The Contractor shall contact the City at least 48 hours in advance of testing. All test records shall be provided to the City. The Contractor shall supply all plugs, pumps, weirs, gauges, water, water trucks, mandrels, etc., necessary to conduct the tests. Should the Work fail the leakage or deflection tests, corrective action shall be taken by the Contractor in a manner approved by the Engineer and, if directed by the Engineer, the Contractor shall dig up and relay the failed section with no additional time allowed for completion of the Work and at no additional cost to the Owner.

3.5.1.2 The use of sealants, applied from the inside of the pipe, is not acceptable.

3.5.1.3 Flush all piping systems with water prior to testing.

3.5.1.4 Testing forms which indicate all testing information and results shall be submitted to Engineer.

3.5.2 Sanitary Sewer Pipe Testing With All Service Connections Capped Using the Following Infiltration or Exfiltration Test Methods:

3.5.2.1 Infiltration: When the groundwater is two feet or more above the crown of the pipe at the upper end of the section to be tested, an infiltration test shall be made. The upper end of the section to be tested shall be plugged and a V-notch weir of appropriate size shall be fitted into the lower end so as to prevent

leakage around the weir plate. Commercially manufactured weir plates made and calibrated for the purpose may be used.

3.5.2.2 Air Test –

3.5.2.2.1 Test pressure shall be calculated using the following equation:

P = 3.5 + H/2.31 (psig)
P = Test pressure, maximum of 9 psi.
H = Height of groundwater above invert

3.5.2.2.2 The following chart:

Pipe Dia. (in.)	Min. Time (min: sec)	Length For Min. Time (ft)	Time For Longer Length (sec)	Time (min:sec)for Length (L) Shown					
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft
4	3:46	597	.380L	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854L	5:40	5:40	5:40	5:40	5:40	5:40
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	97:46
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43
36	34:00	66	30.768	51:17	76:55	102:34	128:12	153:50	179:29

3.5.2.2.3 Allowable Leakage: The infiltration or exfiltration leakage shall not exceed 100 gallons per inch of pipe diameter per mile of pipe per day.

3.5.2.2.4 Deflection Test Optional devices for testing include calibrated television, photography, properly sized "GO-NO-GO" mandrel, sewer ball or deflectometer. Maximum allowable pipe deflection shall be 5%. The deflection test shall be performed no sooner than 30 days after installation.

3.5.3 Force Main Testing: Force mains and low pressure sewers shall be tested in accordance with section 4 of AWWA C600-05 “Installation of Cast Iron Water Mains and their Appurtenances”, at a pressure equal to the greater of 150 percent of the design operating total dynamic head or at least 100 psi, except as amended or added below:

3.5.3.1 Water to be furnished by Contractor.

3.5.3.2 Test Duration: 3 hours.

3.5.3.3 Test Pressure: One hundred and fifty percent (150%) of maximum operating pressure as determined by the Engineer, or 150 psi minimum; whichever is greater.

3.5.3.4 Allowable Leakage: Allowable leakage shall be determined by the following formula:

$$L = \frac{SD/- P}{133200}$$

L = allowable leakage, in gallons per hour.
S = length of pipe tested, in feet.
D = nominal pipe diameter, in inches.
P = average test pressure, in psi (gauge

3.5.3.5 Allowable leakage, in gallons per hour, per 1000 feet of pipe line can be determined from the following chart.

Avg. Test Pressure psi	Nominal Pipe Diameter - Inches										
	3	4	6	8	10	12	14	16	18	20	24
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80

3.5.4 Installed finished piping, fittings and valve system shall be pressure tested by the Contractor at 150 psi for a minimum of three hours and witnessed by the Engineer.

3.6 Protecting Water Supplies:

3.6.1 There shall be no physical connection between a public or private potable water supply system and a sewer, or sewer appurtenance which would permit the passage of any sewage or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

3.6.2 Sewers shall be located outside a 400 feet radius centered at a municipal well; 200 feet radius centered a small public well, and 75 feet radius centered at a private well.

3.7 Proximity to Water Mains:

3.7.1 Whenever possible, sewers shall be laid with a minimum of 10 feet horizontal separation between the sewer and potable water lines. Should a lateral separation of 10 feet not be possible, the following methods of protection shall be employed:

3.7.1.1 Lay sewer main in separate trench a minimum of 18 inches below the water main.

3.7.1.2 Lay the sewer and water main in same trench with the water main at one side and concrete encase the sewer main.

3.7.2 Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint cement lined ductile iron pipe for a distance of 10 -feet on each side of tie sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

3.8 Installation of Insulation:

3.8.1 Install where indicated on Drawings and as directed by the Engineer.

3.8.2 Backfill and compact the total width of the trench to crown of pipe; place center of insulation over centerline of pipe. Complete installation of compacted backfill material.

3.8.3 Take special care when backfilling so as not to damage insulating materials.

Method of Measurement

4.1 New Sewer Manhole will be counted for each installation completed.

4.2 Sewer Manhole Frame and Cover will not be counted. Setting SMH frame and cover is subsidiary to the New Sewer Manhole pay item.

4.3 8" Diameter SDR35 Sewer Pipe will be measured by the foot to the nearest 0.1 foot.

4.4 1.5" Diameter SDR21 Forced Sewer Main will be measured by the foot to the nearest 0.1 foot.

4.5 2.0" Diameter SDR21 Forced Sewer Main will be measured by the foot to the nearest 0.1 foot.

4.6 Service Lateral Assembly will be counted for each installation competed. Material for a Service Lateral Assembly includes tee at mainline, 1-1/4" diameter pipe, compression fittings, combination curb stop/check valve assembly and curb box.

4.7 Core Existing SMH will be counted for each core completed. Boot for pipe connection is subsidiary to the pay item.

4.8 Construct Invert at Existing SMH will be counted for each invert completed.

Basis of Payment

5.1 Pay items will be paid for at the Contract unit price for each item as listed below.

Pay item		**Pay unit**
660.1A	New 4' Dia. Sewer Manhole without F&G	Each
660.1B	New 6' Dia. Sewer Manhole without F&G	Each
660.2	Manhole frame and grates to be purchased from City	Dollar
660.3	8" Dia. SDR35 Sewer Pipe	Foot
660.3A	1.5" Dia. SDR11 Low-Pressure Sewer Pipe	Foot

660.3B	2.0” Dia. SDR11 Low-Pressure Sewer Pipe	Foot
660.4A	Service Lateral Assembly	Each
660.4B	Terminal Cleanout Assembly	Each
660.5	Core Existing SMH	Each
660.6	Construct Invert & Drop into Existing SMH	Each