

(2) on the COMMBUYS system administered by the operational services division, (3) in the central register published pursuant to section 20A of chapter 9 and (4) in a conspicuous place in or near the primary office of the public agency; provided, however, that if the public agency obtains a minimum of 2 written responses from a vendor list established through a blanket contract or a statewide contract procured through the operational services division, and the lowest of those written responses is deemed acceptable to the public agency, public notification is not required.

(C) Every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency estimated to cost more than \$50,000 but not more than \$150,000, except for a pumping station to be constructed as an integral part of a sewer construction or water construction project bid under the provisions of section 39M of chapter 30, shall be awarded to the lowest responsible and eligible bidder on the basis of competitive bids publicly opened and read in accordance with the procedure set forth in said section 39M of said chapter 30. The term "pumping station" as used in this section shall mean a building or other structure which houses solely pumps and appurtenant electrical and plumbing fixtures.

(D) Every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency estimated to cost more than \$150,000, except for a pumping station to be constructed as an integral part of a sewer construction or water construction project bid under the provisions of section 39M of chapter 30, shall be awarded to the lowest responsible and eligible general bidder on the basis of competitive bids in accordance with the procedure set forth in section 44A to 44H, inclusive.

(E) When the general court has approved the use of an alternative mode of procurement of construction for a project pursuant to section seven E of chapter twenty-nine, the awarding authority responsible for procuring construction services for the project shall follow the policies and procedures of this section and of section forty-four B to 44H, inclusive, to the extent compatible with the mode of construction procurement selected.

(F) Notwithstanding paragraph (E), a public agency may undertake the procurement of modular buildings, in accordance with section forty-four E. A public agency may procure site work for modular buildings, including but not limited to, construction of foundations, installations, and attachment to external utilities, or any portion of site work, either in combination with the procurement of modular buildings pursuant to section 44E or on the basis of competitive bids pursuant to the paragraph (E). Notwithstanding the paragraph (E), a public agency may procure energy management services in accordance with section eleven C of chapter twenty-five A and regulations promulgated thereunder.

(3) The award of every such contract in connection with which approval by an officer, board or agency of the federal government is required shall be made within thirty days, Saturdays, Sundays and legal holidays excluded, after such approval; and the award of every contract subject to this section in connection with which approval by an officer, board or agency of the federal government is not required shall be made within thirty days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids therefor. If the bidder selected as the general contractor fails to perform his agreement to execute a contract in accordance with the terms of his bid and furnish a performance bond and also a labor and materials or payment bond as stated in his bid in accordance with section forty-four E, an award shall be made to the next lowest responsible and eligible bidder, subject to the provisions of sections forty-four A to forty-four H, inclusive, of this chapter. The thirty-day time limit shall not be applicable to a second or subsequent award made after expiration of the time limit with the consent of said next lowest responsible

and eligible bidder, and made because the original award made within the time limit was invalid, or because the bidder failed to execute the contract or to provide a performance bond and labor and materials or payment bond.

(4) In cases of extreme emergency, the awarding authority may, with the prior approval of the commissioner, award a contract for that portion of the work necessary to preserve the health or safety of persons or property or to alleviate an imminent security threat on the basis of such competitive bids or proposals as it can obtain in time to care for the extreme emergency and without public opening of the bids or proposals. Where the nature of the emergency prevents the awarding authority from obtaining the prior approval of the commissioner, the awarding authority may contract for the necessary work without said prior approval; provided, however, that the approval of the commissioner shall still be sought at the earliest possible time; and provided, further, that if the commissioner at that time fails to approve the emergency determination the awarding authority shall promptly cease all work for which the emergency determination was denied. In such cases, the contractor shall be entitled to payment for the fair value of the labor and materials furnished prior to cessation of the work.

The commissioner shall maintain a record of all contracts awarded pursuant to this subsection, containing a description of the circumstances and the reasons for the commissioner's determination.

(5) (a) Notwithstanding the provisions of this section or any other general or special law to the contrary, a municipality may enter into a contract for proprietary environmental technology systems as defined in subsection (1) of this section without said contract being subject to the competitive bid process as set forth in sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven; this section and sections forty-four B to forty-four H, inclusive, of this chapter, and section thirty-nine M of chapter thirty; provided that the awarding authority meets the conditions set forth and receives the approvals required in paragraph (b) of this subsection.

(b) Prior to the issuance of any request for proposal with respect to the awarding of any contract pursuant to the provisions of paragraph (a) of this subsection, the awarding authority shall meet or obtain each of the following conditions or required approvals: (1) the municipality shall appoint qualified persons to conduct a thorough review of all available environmental technology, including both proprietary and non-proprietary environmental technology, and if the conclusion of this review is that a contract for proprietary environmental technology systems is in the public interest, such conclusion shall be supported by sound documented reasons in writing available for public inspection; (2) the city council, the board of selectmen, or the town meeting shall take a majority vote finding that it is in the public interest to enter into a contract for proprietary environmental technology systems, as defined in subsection (1) of this section, providing such vote is supported by the conclusion of the review conducted pursuant to condition (1); (3) both the attorney general and the commissioner of the department of environmental protection shall grant written approval; (4) said contract shall be subject to any limitation in the waiver of sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven, sections forty-four A to forty-four H of chapter one hundred and forty-nine, and section thirty-nine M of chapter thirty imposed by either the attorney general or the commissioner of the department of environmental protection as a condition for a grant of approval by said officers; and (5) every proprietary environmental technology systems contract shall be as compatible with sections thirty-eight A to thirty-eight O, inclusive, of chapter seven, sections forty-four A to forty-four H of chapter one hundred and forty-nine, and section thirty-nine M of chapter thirty as is feasible for the procurement of the proprietary environmental technology systems chosen.

(G) Every contract by a state agency or state assisted contract for design, construction, reconstruction, installation, demolition, maintenance or repair shall set forth the participation goals of

minority and women workers to be employed on each such contract and the processes and procedures to ensure compliance with those workforce participation goals, including reporting and enforcement provisions.

1.1.15 CHAP.149 MGL SECTION 44G(D)

(D) Every contract subject to section forty-four A shall include specifications for the installation of weather protection and shall require that the contractor shall install the same and that he shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the commissioner or his designee.

INSURANCE CERTIFICATION FORM

This form is to be completed by an authorized representative of each insurance company providing coverages, to verify that contract insurance requirements are provided.

CONTRACT PARAGRAPH NUMBER	DESCRIPTION OF COVERAGE	COMPANY LETTER	POLICY NUMBER	LIMITS	LIMIT EXTENDED BY UMBRELLA
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WORKMAN'S COMPENSATION (Contractor as Insured)

SC 5.4	Workman's Compensation	_____	# _____	\$ _____	_____
SC 5.4	Employer's Liability	_____	# _____		
	a. Each Accident			\$ _____	_____
	b. Disease Policy Limit			\$ _____	_____
	c. Disease Each Employee			\$ _____	_____

COMMERCIAL GENERAL LIABILITY (Contractor as Insured, Owner and Engineer as Additional Insured)

SC 5.4	General Liability	_____	# _____		
	a. General Aggregate			\$ _____	_____
	b. Each Occurrence			\$ _____	_____
	1. Premises/Operations			\$ _____	_____
	2. Products/Completed Operation			\$ _____	_____
	3. Contractual			\$ _____	_____
	4. Independent Contractors			\$ _____	_____
	5. Broad Form Property Damage			\$ _____	_____
	6. Personal Injury			\$ _____	_____
	7. Medical Expense			\$ _____	_____
	8. XCU			\$ _____	_____

AUTOMOTIVE LIABILITY (Contractor as Named Insured)

a.	Combined Single Limit	_____	# _____	\$ _____	_____
	1. Scheduled Autos			\$ _____	_____
	2. Hired Autos			\$ _____	_____
	3. Non Owned Autos			\$ _____	_____

INSURANCE CERTIFICATION FORM (Continued)

CONTRACT PARAGRAPH NUMBER	DESCRIPTION OF COVERAGE	COMPANY LETTER	POLICY NUMBER	LIMITS	LIMIT EXTENDED BY UMBRELLA
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EXCESS UMBRELLA LIABILITY

(Contractor as Named Insured, Owner and Engineer as Additional Insured)

a.	General Aggregate	_____	# _____	\$ _____	_____
b.	Each Occurrence	_____	# _____	\$ _____	_____

INSTALLATION FLOATER

(Contractor as Named Insured, Owner and Engineer as Additional Insured)

a.	General Aggregate	_____	# _____	\$ _____	_____
b.	Each Occurrence	_____	# _____	\$ _____	_____
c.	Installation Floater	_____	# _____	\$ _____	_____

BUILDER'S ALL RISK

(Contractor as Named Insured, Owner and Engineer as Additional Insured)

a.	General Aggregate	_____	# _____	\$ _____	_____
b.	Each Occurrence	_____	# _____	\$ _____	_____
c.	All Risk	_____	# _____	\$ _____	_____

OWNER'S PROTECTIVE LIABILITY

(Owner and Engineer as Named Insured)

a.	General Aggregate	_____	# _____	\$ _____	_____
b.	Each Occurrence	_____	# _____	\$ _____	_____

I hereby certify that the information contain herein is accurate to the best of knowledge.

SIGNATURE

PRINTED NAME

DATE

PRINTED TITLE

TOWN OF NATICK, MASSACHUSETTS
BOARD OF SELECTMEN

CONTRACT NO. W-144

WATER TREATMENT PLANT
BACKWASH TANK

CHANGE ORDER FORM

Original Contract Price \$ _____
Previous Change Orders # \$ _____
Present Contract Price \$ _____
This Change Order # Increase/Decrease \$ _____

Total Adjusted Contract Price \$ _____

This Change Order changes the time of completion by ____ calendar Days.

The extended completion date is _____

This Change Order checked by _____
Engineer Date

This Change Order requested by _____

This Change Order prepared by _____
Engineer

The undersigned agree to the terms of the Change Order.

Contractor Date

Owner Date

Certification of Appropriation under M.G.L. c.44, §31C: Adequate funding in the amount sufficient to cover the total cost of this Change Order is available.

Town Accountant Date

Change Order Form (continued)

Public Entity _____

Project Number _____

Contract Number: _____

Change Order Number: _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

Reason for Change

Example Calculation Sheet

(1)	Labor		
	Foreman	10 hrs @ \$45.00/hr.	\$ 450.00
	Engineer	10 hrs @ 35.00/hr.	350.00
	Operator	10 hrs @ 40.00/hr.	400.00
	Laborers	24 hrs @ 28.00/hr.	672.00
			\$ 1,872.00
(2)	Direct Labor Cost (use the agreed upon Direct Labor Cost) *(30) % of \$1,872 *(used for example purposes only)		561.60
(3)	Materials & Freight		
	150 l.f. of 12" pipe @ \$15.00/l.f.	\$2,250.00	
	15 v.f. precast SMH	2,500.00	
	Freight (slip # Enclosed)	110.00	
			4,860.00
(4)	Equipment		
	1 Backhoe 10 hrs @ \$140.00/hr.	\$1,400.00	
	1 Truck crane 10 hrs @ \$180.00/hr.	1,800.00	
			- 3,200.00
	Total items 1 through 4)		\$ 10,493.60
(5)	15% markup for Overhead, Profit		
	15% of \$10,493.60		\$ 1,574.04
(6)	5% markup for General Contractor (if Subcontractor is involved)		
	5% of \$10,493.60		524.68
(7)	Credits deductible		- 323.00
		Total Cost	\$ 12,269.32

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, calculations, Blue Book equipment rental rate printouts, photographs, reports, etc.



CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

**As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H**

ROSALIN ACOSTA
Secretary
WILLIAM D MCKINNEY
Director

Awarding Authority: Town Of Natick
Contract Number: NAT-423 **City/Town:** NATICK
Description of Work: The Work consists of the installation of 31'-0" diameter, 27'-6" height to overflow steel backwash tank to connect the tank to existing backwash system.
Job Location: 1080 Worcester Street (Route 9) Natick, MA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2016	\$32.15	\$10.91	\$10.89	\$0.00	\$53.95
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2016	\$32.22	\$10.91	\$10.89	\$0.00	\$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2016	\$32.34	\$10.91	\$10.89	\$0.00	\$54.14
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$88.29	\$9.80	\$19.23	\$0.00	\$117.32
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR LABORERS - ZONE 2	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	06/01/2017	\$34.90	\$11.50	\$7.10	\$0.00	\$53.50
	12/01/2017	\$35.90	\$11.50	\$7.10	\$0.00	\$54.50
	06/01/2018	\$36.90	\$11.50	\$7.10	\$0.00	\$55.50
	12/01/2018	\$37.90	\$11.50	\$7.10	\$0.00	\$56.50
	06/01/2019	\$38.90	\$11.50	\$7.10	\$0.00	\$57.50
	12/01/2019	\$39.90	\$11.50	\$7.10	\$0.00	\$58.50
	06/01/2020	\$40.90	\$11.50	\$7.10	\$0.00	\$59.50
	12/01/2020	\$41.90	\$11.50	\$7.10	\$0.00	\$60.50
ASPHALT RAKER LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
2	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
3	70	\$30.04	\$6.97	\$11.35	\$0.00	\$48.36
4	75	\$32.19	\$6.97	\$12.16	\$0.00	\$51.32
5	80	\$34.34	\$6.97	\$12.97	\$0.00	\$54.28
6	85	\$36.48	\$6.97	\$13.78	\$0.00	\$57.23
7	90	\$38.63	\$6.97	\$14.59	\$0.00	\$60.19
8	95	\$40.77	\$6.97	\$15.40	\$0.00	\$63.14

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) <i>BRICKLAYERS LOCAL 3 (LOWELL)</i>	03/01/2017	\$48.66	\$10.75	\$18.62	\$0.00	\$78.03
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Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Lowell

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.33	\$10.75	\$18.62	\$0.00	\$53.70
2	60	\$29.20	\$10.75	\$18.62	\$0.00	\$58.57
3	70	\$34.06	\$10.75	\$18.62	\$0.00	\$63.43
4	80	\$38.93	\$10.75	\$18.62	\$0.00	\$68.30
5	90	\$43.79	\$10.75	\$18.62	\$0.00	\$73.16

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$37.45	\$7.60	\$14.35	\$0.00	\$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2017	\$38.77	\$9.90	\$17.00	\$0.00	\$65.67
	09/01/2017	\$39.78	\$9.90	\$17.00	\$0.00	\$66.68
	03/01/2018	\$40.78	\$9.90	\$17.00	\$0.00	\$67.68
	09/01/2018	\$41.82	\$9.90	\$17.00	\$0.00	\$68.72
	03/01/2019	\$42.85	\$9.90	\$17.00	\$0.00	\$69.75

Classification

Effective Date Base Wage Health Pension Supplemental
Unemployment Total Rate

Apprentice - CARPENTER - Zone 2 Eastern MA
Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.39	\$9.90	\$1.63	\$0.00	\$30.92
2	60	\$23.26	\$9.90	\$1.63	\$0.00	\$34.79
3	70	\$27.14	\$9.90	\$12.11	\$0.00	\$49.15
4	75	\$29.08	\$9.90	\$12.11	\$0.00	\$51.09
5	80	\$31.02	\$9.90	\$13.74	\$0.00	\$54.66
6	80	\$31.02	\$9.90	\$13.74	\$0.00	\$54.66
7	90	\$34.89	\$9.90	\$15.37	\$0.00	\$60.16
8	90	\$34.89	\$9.90	\$15.37	\$0.00	\$60.16

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.89	\$9.90	\$1.63	\$0.00	\$31.42
2	60	\$23.87	\$9.90	\$1.63	\$0.00	\$35.40
3	70	\$27.85	\$9.90	\$12.11	\$0.00	\$49.86
4	75	\$29.84	\$9.90	\$12.11	\$0.00	\$51.85
5	80	\$31.82	\$9.90	\$13.74	\$0.00	\$55.46
6	80	\$31.82	\$9.90	\$13.74	\$0.00	\$55.46
7	90	\$35.80	\$9.90	\$15.37	\$0.00	\$61.07
8	90	\$35.80	\$9.90	\$15.37	\$0.00	\$61.07

Notes:
Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING	07/01/2017	\$42.61	\$12.20	\$19.41	\$1.30	\$75.52
BRICKLAYERS LOCAL 3 (LOWELL)	01/01/2018	\$43.28	\$12.20	\$19.41	\$1.30	\$76.19
	07/01/2018	\$43.94	\$12.20	\$19.41	\$1.30	\$76.85
	01/01/2019	\$44.61	\$12.20	\$19.41	\$1.30	\$77.52
	07/01/2019	\$45.27	\$12.20	\$19.41	\$1.30	\$78.18
	01/01/2020	\$45.94	\$12.20	\$19.41	\$1.30	\$78.85

Classification

Effective Date Base Wage Health Pension Supplemental
Unemployment Total Rate

Apprentice - CEMENT MASONRY/PLASTERING - Lowell
Effective Date - 07/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.31	\$12.20	\$12.41	\$0.00	\$45.92
2	60	\$25.57	\$12.20	\$14.41	\$1.30	\$53.48
3	65	\$27.70	\$12.20	\$15.41	\$1.30	\$56.61
4	70	\$29.83	\$12.20	\$16.41	\$1.30	\$59.74
5	75	\$31.96	\$12.20	\$17.41	\$1.30	\$62.87
6	80	\$34.09	\$12.20	\$18.41	\$1.30	\$66.00
7	90	\$38.35	\$12.20	\$19.41	\$1.30	\$71.26

Effective Date - 01/01/2018

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.64	\$12.20	\$12.41	\$0.00	\$46.25
2	60	\$25.97	\$12.20	\$14.41	\$1.30	\$53.88
3	65	\$28.13	\$12.20	\$15.41	\$1.30	\$57.04
4	70	\$30.30	\$12.20	\$16.41	\$1.30	\$60.21
5	75	\$32.46	\$12.20	\$17.41	\$1.30	\$63.37
6	80	\$34.62	\$12.20	\$18.41	\$1.30	\$66.53
7	90	\$38.95	\$12.20	\$19.41	\$1.30	\$71.86

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
LABORERS - ZONE 2	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	06/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
OPERATING ENGINEERS LOCAL 4	12/01/2017	\$48.38	\$10.00	\$15.25	\$0.00	\$73.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
OPERATING ENGINEERS LOCAL 4	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE)	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36
PAINTERS LOCAL 35 - ZONE 2						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN	06/01/2017	\$37.00	\$7.60	\$14.65	\$0.00	\$59.25
LABORERS - ZONE 2	12/01/2017	\$37.85	\$7.60	\$14.65	\$0.00	\$60.10
	06/01/2018	\$38.80	\$7.60	\$14.65	\$0.00	\$61.05
	12/01/2018	\$39.75	\$7.60	\$14.65	\$0.00	\$62.00
	06/01/2019	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	12/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR	06/01/2017	\$38.00	\$7.60	\$14.65	\$0.00	\$60.25
LABORERS - ZONE 2	12/01/2017	\$38.85	\$7.60	\$14.65	\$0.00	\$61.10
	06/01/2018	\$39.80	\$7.60	\$14.65	\$0.00	\$62.05
	12/01/2018	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	06/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
	12/01/2019	\$42.75	\$7.60	\$14.65	\$0.00	\$65.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS	06/01/2017	\$37.75	\$7.60	\$14.65	\$0.00	\$60.00
LABORERS - ZONE 2	12/01/2017	\$38.60	\$7.60	\$14.65	\$0.00	\$60.85
	06/01/2018	\$39.55	\$7.60	\$14.65	\$0.00	\$61.80
	12/01/2018	\$40.50	\$7.60	\$14.65	\$0.00	\$62.75
	06/01/2019	\$41.50	\$7.60	\$14.65	\$0.00	\$63.75
	12/01/2019	\$42.50	\$7.60	\$14.65	\$0.00	\$64.75

For apprentice rates see "Apprentice- LABORER"

DEMO: CONCRETE CUTTER/SAWYER	06/01/2017	\$38.00	\$7.60	\$14.65	\$0.00	\$60.25
LABORERS - ZONE 2	12/01/2017	\$38.85	\$7.60	\$14.65	\$0.00	\$61.10
	06/01/2018	\$39.80	\$7.60	\$14.65	\$0.00	\$62.05
	12/01/2018	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	06/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
	12/01/2019	\$42.75	\$7.60	\$14.65	\$0.00	\$65.00

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$37.75	\$7.60	\$14.65	\$0.00	\$60.00
	12/01/2017	\$38.60	\$7.60	\$14.65	\$0.00	\$60.85
	06/01/2018	\$39.55	\$7.60	\$14.65	\$0.00	\$61.80
	12/01/2018	\$40.50	\$7.60	\$14.65	\$0.00	\$62.75
	06/01/2019	\$41.50	\$7.60	\$14.65	\$0.00	\$63.75
	12/01/2019	\$42.50	\$7.60	\$14.65	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	06/01/2017	\$37.00	\$7.60	\$14.65	\$0.00	\$59.25
	12/01/2017	\$37.85	\$7.60	\$14.65	\$0.00	\$60.10
	06/01/2018	\$38.80	\$7.60	\$14.65	\$0.00	\$61.05
	12/01/2018	\$39.75	\$7.60	\$14.65	\$0.00	\$62.00
	06/01/2019	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	12/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$58.86	\$9.80	\$19.23	\$0.00	\$87.89
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$63.06	\$9.80	\$19.23	\$0.00	\$92.09
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$88.23	\$9.80	\$19.23	\$0.00	\$117.26
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 103
Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
2	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
3	45	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
4	45	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
5	50	\$24.17	\$13.00	\$13.75	\$0.00	\$50.92
6	55	\$26.58	\$13.00	\$14.11	\$0.00	\$53.69
7	60	\$29.00	\$13.00	\$14.48	\$0.00	\$56.48
8	65	\$31.41	\$13.00	\$14.85	\$0.00	\$59.26
9	70	\$33.83	\$13.00	\$15.22	\$0.00	\$62.05
10	75	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
2	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
3	45	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
4	45	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
5	50	\$24.64	\$13.00	\$13.76	\$0.00	\$51.40
6	55	\$27.10	\$13.00	\$14.12	\$0.00	\$54.22
7	60	\$29.57	\$13.00	\$14.50	\$0.00	\$57.07
8	65	\$32.03	\$13.00	\$14.87	\$0.00	\$59.90
9	70	\$34.50	\$13.00	\$15.25	\$0.00	\$62.75
10	75	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58

Notes :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR
ELEVATOR CONSTRUCTORS LOCAL 4

01/01/2017 \$55.86 \$15.28 \$15.71 \$0.00 \$86.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - ELEVATOR CONSTRUCTOR - Local 4						
Effective Date - 01/01/2017						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.93	\$15.28	\$0.00	\$0.00	\$43.21
2	55	\$30.72	\$15.28	\$15.71	\$0.00	\$61.71
3	65	\$36.31	\$15.28	\$15.71	\$0.00	\$67.30
4	70	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
5	80	\$44.69	\$15.28	\$15.71	\$0.00	\$75.68
Notes:						
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year						
Apprentice to Journeyworker Ratio:1:1						
ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2017	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$42.15	\$10.00	\$15.25	\$0.00	\$67.40
	11/01/2017	\$42.88	\$10.00	\$15.25	\$0.00	\$68.13
	05/01/2018	\$43.59	\$10.00	\$15.25	\$0.00	\$68.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$43.61	\$10.00	\$15.25	\$0.00	\$68.86
	11/01/2017	\$44.34	\$10.00	\$15.25	\$0.00	\$69.59
	05/01/2018	\$45.06	\$10.00	\$15.25	\$0.00	\$70.31
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$22.41	\$10.00	\$15.25	\$0.00	\$47.66
	11/01/2017	\$22.83	\$10.00	\$15.25	\$0.00	\$48.08
	05/01/2018	\$23.26	\$10.00	\$15.25	\$0.00	\$48.51
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE <i>LOCAL 103</i> / COMMISSIONING <i>ELECTRICIANS</i>	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$38.49	\$10.00	\$15.25	\$0.00	\$63.74
	12/01/2017	\$39.32	\$10.00	\$15.25	\$0.00	\$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER <i>LABORERS - ZONE 2</i>	06/01/2017	\$20.50	\$7.60	\$13.50	\$0.00	\$41.60
	12/01/2017	\$21.50	\$7.60	\$13.50	\$0.00	\$42.60
	06/01/2018	\$21.50	\$7.60	\$13.50	\$0.00	\$42.60
	12/01/2018	\$22.50	\$7.60	\$13.50	\$0.00	\$43.60
	06/01/2019	\$22.50	\$7.60	\$13.50	\$0.00	\$43.60
	12/01/2019	\$23.50	\$7.60	\$13.50	\$0.00	\$44.60
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	03/01/2016	\$42.13	\$9.80	\$17.62	\$0.00	\$69.55

Apprentice - FLOORCOVERER - Local 2168 Zone 1

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.07	\$9.80	\$1.79	\$0.00	\$32.66
2	55	\$23.17	\$9.80	\$1.79	\$0.00	\$34.76
3	60	\$25.28	\$9.80	\$12.25	\$0.00	\$47.33
4	65	\$27.38	\$9.80	\$12.25	\$0.00	\$49.43
5	70	\$29.49	\$9.80	\$14.04	\$0.00	\$53.33
6	75	\$31.60	\$9.80	\$14.04	\$0.00	\$55.44
7	80	\$33.70	\$9.80	\$15.83	\$0.00	\$59.33
8	85	\$35.81	\$9.80	\$15.83	\$0.00	\$61.44

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - GLAZIER - Local 35 Zone 2
Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$14.11	\$0.00	\$50.60
6	75	\$30.68	\$7.85	\$14.44	\$0.00	\$52.97
7	80	\$32.73	\$7.85	\$14.77	\$0.00	\$55.35
8	90	\$36.82	\$7.85	\$15.44	\$0.00	\$60.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS

06/01/2017

\$46.38

\$10.00

\$15.25

\$0.00

\$71.63

OPERATING ENGINEERS LOCAL 4

12/01/2017

\$47.38

\$10.00

\$15.25

\$0.00

\$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 06/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$25.51	\$10.00	\$0.00	\$0.00	\$35.51
2	60	\$27.83	\$10.00	\$15.25	\$0.00	\$53.08
3	65	\$30.15	\$10.00	\$15.25	\$0.00	\$55.40
4	70	\$32.47	\$10.00	\$15.25	\$0.00	\$57.72
5	75	\$34.79	\$10.00	\$15.25	\$0.00	\$60.04
6	80	\$37.10	\$10.00	\$15.25	\$0.00	\$62.35
7	85	\$39.42	\$10.00	\$15.25	\$0.00	\$64.67
8	90	\$41.74	\$10.00	\$15.25	\$0.00	\$66.99

Effective Date - 12/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$26.06	\$10.00	\$0.00	\$0.00	\$36.06
2	60	\$28.43	\$10.00	\$15.25	\$0.00	\$53.68
3	65	\$30.80	\$10.00	\$15.25	\$0.00	\$56.05
4	70	\$33.17	\$10.00	\$15.25	\$0.00	\$58.42
5	75	\$35.54	\$10.00	\$15.25	\$0.00	\$60.79
6	80	\$37.90	\$10.00	\$15.25	\$0.00	\$63.15
7	85	\$40.27	\$10.00	\$15.25	\$0.00	\$65.52
8	90	\$42.64	\$10.00	\$15.25	\$0.00	\$67.89

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - A	08/01/2017	\$43.83	\$11.45	\$24.03	\$2.38	\$81.69
	02/01/2018	\$44.98	\$11.45	\$24.03	\$2.38	\$82.84
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 103	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 - A	08/01/2017	\$43.83	\$11.45	\$24.03	\$2.38	\$81.69
	02/01/2018	\$44.98	\$11.45	\$24.03	\$2.38	\$82.84
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING - WATER) PIPEFITTERS LOCAL 537	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC PIPEFITTERS LOCAL 537	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
LABORERS - ZONE 2	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29

For apprentice rates see "Apprentice- LABORER"

INSULATOR (PIPES & TANKS)	09/01/2016	\$45.09	\$11.75	\$14.20	\$0.00	\$71.04
HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	09/01/2017	\$47.09	\$11.75	\$14.20	\$0.00	\$73.04
	09/01/2018	\$49.34	\$11.75	\$14.20	\$0.00	\$75.29
	09/01/2019	\$51.84	\$11.75	\$14.20	\$0.00	\$77.79

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.55	\$11.75	\$10.45	\$0.00	\$44.75
2	60	\$27.05	\$11.75	\$11.20	\$0.00	\$50.00
3	70	\$31.56	\$11.75	\$11.95	\$0.00	\$55.26
4	80	\$36.07	\$11.75	\$12.70	\$0.00	\$60.52

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.55	\$11.75	\$10.45	\$0.00	\$45.75
2	60	\$28.25	\$11.75	\$11.20	\$0.00	\$51.20
3	70	\$32.96	\$11.75	\$11.95	\$0.00	\$56.66
4	80	\$37.67	\$11.75	\$12.70	\$0.00	\$62.12

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER	03/16/2017	\$44.65	\$7.80	\$20.85	\$0.00	\$73.30
IRONWORKERS LOCAL 7 (BOSTON AREA)						

Classification

Effective Date Base Wage Health Pension Supplemental
Unemployment Total Rate

Apprentice - IRONWORKER - Local 7 Boston
Effective Date - 03/16/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.79	\$7.80	\$20.85	\$0.00	\$55.44
2	70	\$31.26	\$7.80	\$20.85	\$0.00	\$59.91
3	75	\$33.49	\$7.80	\$20.85	\$0.00	\$62.14
4	80	\$35.72	\$7.80	\$20.85	\$0.00	\$64.37
5	85	\$37.95	\$7.80	\$20.85	\$0.00	\$66.60
6	90	\$40.19	\$7.80	\$20.85	\$0.00	\$68.84

Notes:

**** Structural 1:6; Ornamental 1:4**

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
LABORERS - ZONE 2	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
LABORER	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
LABORERS - ZONE 2	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2
Effective Date - 06/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.44	\$7.60	\$13.50	\$0.00	\$40.54
2	70	\$22.68	\$7.60	\$13.50	\$0.00	\$43.78
3	80	\$25.92	\$7.60	\$13.50	\$0.00	\$47.02
4	90	\$29.16	\$7.60	\$13.50	\$0.00	\$50.26

Effective Date - 12/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.82	\$7.60	\$13.50	\$0.00	\$40.92
2	70	\$23.12	\$7.60	\$13.50	\$0.00	\$44.22
3	80	\$26.42	\$7.60	\$13.50	\$0.00	\$47.52
4	90	\$29.73	\$7.60	\$13.50	\$0.00	\$50.83

Notes:
Apprentice to Journeyworker Ratio:1:5
LABORER: CARPENTER TENDER
LABORERS - ZONE 2

06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER
LABORERS - ZONE 2

06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER
LABORERS - ZONE 2

06/01/2017	\$32.60	\$7.60	\$13.45	\$0.00	\$53.65
12/01/2017	\$33.23	\$7.60	\$13.45	\$0.00	\$54.28
06/01/2018	\$34.07	\$7.60	\$13.45	\$0.00	\$55.12
12/01/2018	\$34.91	\$7.60	\$13.45	\$0.00	\$55.96
06/01/2019	\$35.78	\$7.60	\$13.45	\$0.00	\$56.83
12/01/2019	\$36.64	\$7.60	\$13.45	\$0.00	\$57.69

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2017	\$38.78	\$10.75	\$17.67	\$0.00	\$67.20

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.39	\$10.75	\$17.67	\$0.00	\$47.81
2	60	\$23.27	\$10.75	\$17.67	\$0.00	\$51.69
3	70	\$27.15	\$10.75	\$17.67	\$0.00	\$55.57
4	80	\$31.02	\$10.75	\$17.67	\$0.00	\$59.44
5	90	\$34.90	\$10.75	\$17.67	\$0.00	\$63.32

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2017	\$50.80	\$10.75	\$19.22	\$0.00	\$80.77
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.40	\$10.75	\$19.22	\$0.00	\$55.37
2	60	\$30.48	\$10.75	\$19.22	\$0.00	\$60.45
3	70	\$35.56	\$10.75	\$19.22	\$0.00	\$65.53
4	80	\$40.64	\$10.75	\$19.22	\$0.00	\$70.61
5	90	\$45.72	\$10.75	\$19.22	\$0.00	\$75.69

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
OPERATING ENGINEERS LOCAL 4	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
OPERATING ENGINEERS LOCAL 4	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2)	04/01/2017	\$35.47	\$9.90	\$18.50	\$0.00	\$63.87
MILLWRIGHTS LOCAL 1121 - Zone 2	10/01/2017	\$36.32	\$9.90	\$18.50	\$0.00	\$64.72
	04/01/2018	\$37.17	\$9.90	\$18.50	\$0.00	\$65.57
	10/01/2018	\$38.02	\$9.90	\$18.50	\$0.00	\$66.42
	04/01/2019	\$38.87	\$9.90	\$18.50	\$0.00	\$67.27

Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$19.51	\$9.90	\$5.31	\$0.00	\$34.72
2	65	\$23.06	\$9.90	\$15.13	\$0.00	\$48.09
3	75	\$26.60	\$9.90	\$16.10	\$0.00	\$52.60
4	85	\$30.15	\$9.90	\$17.06	\$0.00	\$57.11

Effective Date - 10/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$19.98	\$9.90	\$5.31	\$0.00	\$35.19
2	65	\$23.61	\$9.90	\$15.13	\$0.00	\$48.64
3	75	\$27.24	\$9.90	\$16.10	\$0.00	\$53.24
4	85	\$30.87	\$9.90	\$15.06	\$0.00	\$55.83

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$23.47	\$10.00	\$15.25	\$0.00	\$48.72
	12/01/2017	\$23.99	\$10.00	\$15.25	\$0.00	\$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$27.54	\$10.00	\$15.25	\$0.00	\$52.79
	12/01/2017	\$28.15	\$10.00	\$15.25	\$0.00	\$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2017	\$42.31	\$7.85	\$16.10	\$0.00	\$66.26
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* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.16	\$7.85	\$0.00	\$0.00	\$29.01
2	55	\$23.27	\$7.85	\$3.66	\$0.00	\$34.78
3	60	\$25.39	\$7.85	\$3.99	\$0.00	\$37.23
4	65	\$27.50	\$7.85	\$4.32	\$0.00	\$39.67
5	70	\$29.62	\$7.85	\$14.11	\$0.00	\$51.58
6	75	\$31.73	\$7.85	\$14.44	\$0.00	\$54.02
7	80	\$33.85	\$7.85	\$14.77	\$0.00	\$56.47
8	90	\$38.08	\$7.85	\$15.44	\$0.00	\$61.37

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2017	\$40.37	\$7.85	\$16.10	\$0.00	\$64.32
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PAINTERS LOCAL 35 - ZONE 2

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.19	\$7.85	\$0.00	\$0.00	\$28.04
2	55	\$22.20	\$7.85	\$3.66	\$0.00	\$33.71
3	60	\$24.22	\$7.85	\$3.99	\$0.00	\$36.06
4	65	\$26.24	\$7.85	\$4.32	\$0.00	\$38.41
5	70	\$28.26	\$7.85	\$14.11	\$0.00	\$50.22
6	75	\$30.28	\$7.85	\$14.44	\$0.00	\$52.57
7	80	\$32.30	\$7.85	\$14.77	\$0.00	\$54.92
8	90	\$36.33	\$7.85	\$15.44	\$0.00	\$59.62

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS)	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For Apprentice rates see "Apprentice- LABORER"

PAINTER / TAPER (BRUSH, NEW) *	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86
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* If 30% or more of surfaces to be painted are new construction,

NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$14.11	\$0.00	\$50.60
6	75	\$30.68	\$7.85	\$14.44	\$0.00	\$52.97
7	80	\$32.73	\$7.85	\$14.77	\$0.00	\$55.35
8	90	\$36.82	\$7.85	\$15.44	\$0.00	\$60.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2017	\$38.97	\$7.85	\$16.10	\$0.00	\$62.92
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PAINTERS LOCAL 35 - ZONE 2

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.49	\$7.85	\$0.00	\$0.00	\$27.34
2	55	\$21.43	\$7.85	\$3.66	\$0.00	\$32.94
3	60	\$23.38	\$7.85	\$3.99	\$0.00	\$35.22
4	65	\$25.33	\$7.85	\$4.32	\$0.00	\$37.50
5	70	\$27.28	\$7.85	\$14.11	\$0.00	\$49.24
6	75	\$29.23	\$7.85	\$14.44	\$0.00	\$51.52
7	80	\$31.18	\$7.85	\$14.77	\$0.00	\$53.80
8	90	\$35.07	\$7.85	\$15.44	\$0.00	\$58.36

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER	12/01/2012	\$30.28	\$9.07	\$8.00	\$0.00	\$47.35
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TEAMSTERS JOINT COUNCIL NO. 10 ZONE B

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
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PILE DRIVER LOCAL 56 (ZONE 1)

For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
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PILE DRIVER LOCAL 56 (ZONE 1)

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1**Effective Date - 08/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.02	\$9.80	\$19.23	\$0.00	\$50.05
2	60	\$25.22	\$9.80	\$19.23	\$0.00	\$54.25
3	70	\$29.43	\$9.80	\$19.23	\$0.00	\$58.46
4	75	\$31.53	\$9.80	\$19.23	\$0.00	\$60.56
5	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
6	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
7	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87
8	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87

Notes:**Apprentice to Journeyworker Ratio:1:3****PIPEFITTER & STEAMFITTER***PIPEFITTERS LOCAL 537*

03/01/2017 \$51.19 \$9.70 \$18.14 \$0.00 \$79.03

Apprentice - PIPEFITTER - Local 537**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$20.48	\$9.70	\$7.50	\$0.00	\$37.68
2	45	\$23.04	\$9.70	\$18.14	\$0.00	\$50.88
3	60	\$30.71	\$9.70	\$18.14	\$0.00	\$58.55
4	70	\$35.83	\$9.70	\$18.14	\$0.00	\$63.67
5	80	\$40.95	\$9.70	\$18.14	\$0.00	\$68.79

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:****PIPELAYER***LABORERS - ZONE 2*

06/01/2017 \$32.65 \$7.60 \$13.50 \$0.00 \$53.75
12/01/2017 \$33.28 \$7.60 \$13.50 \$0.00 \$54.38
06/01/2018 \$34.12 \$7.60 \$13.50 \$0.00 \$55.22
12/01/2018 \$34.96 \$7.60 \$13.50 \$0.00 \$56.06
06/01/2019 \$35.83 \$7.60 \$13.50 \$0.00 \$56.93
12/01/2019 \$36.69 \$7.60 \$13.50 \$0.00 \$57.79

For apprentice rates see "Apprentice- LABORER"

PLUMBERS & GASFITTERS*PLUMBERS & GASFITTERS LOCAL 12*

03/01/2017 \$52.69 \$11.32 \$15.46 \$0.00 \$79.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - PLUMBER/GASFITTER - Local 12						
Effective Date - 03/01/2017						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$18.44	\$11.32	\$5.74	\$0.00	\$35.50
2	40	\$21.08	\$11.32	\$6.49	\$0.00	\$38.89
3	55	\$28.98	\$11.32	\$8.73	\$0.00	\$49.03
4	65	\$34.25	\$11.32	\$10.23	\$0.00	\$55.80
5	75	\$39.52	\$11.32	\$11.72	\$0.00	\$62.56
Notes: ** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr Step4 with lic\$58.50 Step5 with lic\$65.36 Apprentice to Journeyworker Ratio:**						
PNEUMATIC CONTROLS (TEMP.) PIPEFITTERS LOCAL 537	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER LABORERS - ZONE 2	06/01/2017	\$33.40	\$7.60	\$13.50	\$0.00	\$54.50
	12/01/2017	\$34.03	\$7.60	\$13.50	\$0.00	\$55.13
	06/01/2018	\$34.87	\$7.60	\$13.50	\$0.00	\$55.97
	12/01/2018	\$35.71	\$7.60	\$13.50	\$0.00	\$56.81
	06/01/2019	\$36.58	\$7.60	\$13.50	\$0.00	\$57.68
	12/01/2019	\$37.44	\$7.60	\$13.50	\$0.00	\$58.54
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY MIX CONCRETE DRIVERS after 4/30/10 (Drivers Hired After 4/30/2010)TEAMSTERS LOCAL 25c	07/01/2017	\$28.18	\$8.48	\$9.72	\$0.00	\$46.38
READY-MIX CONCRETE DRIVER TEAMSTERS LOCAL 25c	07/01/2017	\$29.48	\$8.48	\$9.72	\$0.00	\$47.68
RECLAIMERS OPERATING ENGINEERS LOCAL 4	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RESIDENTIAL WOOD FRAME (All Other Work) <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	06/01/2016	\$25.32	\$9.80	\$16.82	\$0.00	\$51.94
RESIDENTIAL WOOD FRAME CARPENTER **	04/01/2017	\$26.31	\$7.07	\$7.18	\$0.00	\$40.56
** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	10/01/2017	\$26.93	\$7.07	\$7.18	\$0.00	\$41.18
	04/01/2018	\$27.35	\$7.07	\$7.18	\$0.00	\$41.60
	10/01/2018	\$27.77	\$7.07	\$7.18	\$0.00	\$42.02
	04/01/2019	\$28.20	\$7.07	\$7.18	\$0.00	\$42.45
	10/01/2019	\$28.63	\$7.07	\$7.18	\$0.00	\$42.88

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Apprentice - CARPENTER (Residential Wood Frame) - Zone 2

Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
2	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
3	65	\$17.10	\$7.07	\$7.18	\$0.00	\$31.35
4	70	\$18.42	\$7.07	\$7.18	\$0.00	\$32.67
5	75	\$19.73	\$7.07	\$7.18	\$0.00	\$33.98
6	80	\$21.05	\$7.07	\$7.18	\$0.00	\$35.30
7	85	\$22.36	\$7.07	\$7.18	\$0.00	\$36.61
8	90	\$23.68	\$7.07	\$7.18	\$0.00	\$37.93

Effective Date - 10/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$16.16	\$7.07	\$0.00	\$0.00	\$23.23
2	60	\$16.16	\$7.07	\$0.00	\$0.00	\$23.23
3	65	\$17.50	\$7.07	\$7.18	\$0.00	\$31.75
4	70	\$18.85	\$7.07	\$7.18	\$0.00	\$33.10
5	75	\$20.20	\$7.07	\$7.18	\$0.00	\$34.45
6	80	\$21.54	\$7.07	\$7.18	\$0.00	\$35.79
7	85	\$22.89	\$7.07	\$7.18	\$0.00	\$37.14
8	90	\$24.24	\$7.07	\$7.18	\$0.00	\$38.49

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofing)	08/01/2017	\$41.36	\$11.20	\$14.80	\$0.00	\$67.36
ROOFERS LOCAL 33	02/01/2018	\$42.51	\$11.20	\$14.80	\$0.00	\$68.51
	08/01/2018	\$43.61	\$11.20	\$14.80	\$0.00	\$69.61
	02/01/2019	\$44.76	\$11.20	\$14.80	\$0.00	\$70.76

Apprentice - ROOFER - Local 33

Effective Date - 08/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.68	\$11.20	\$3.44	\$0.00	\$35.32
2	60	\$24.82	\$11.20	\$14.80	\$0.00	\$50.82
3	65	\$26.88	\$11.20	\$14.80	\$0.00	\$52.88
4	75	\$31.02	\$11.20	\$14.80	\$0.00	\$57.02
5	85	\$35.16	\$11.20	\$14.80	\$0.00	\$61.16

Effective Date - 02/01/2018

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.26	\$11.20	\$3.44	\$0.00	\$35.90
2	60	\$25.51	\$11.20	\$14.80	\$0.00	\$51.51
3	65	\$27.63	\$11.20	\$14.80	\$0.00	\$53.63
4	75	\$31.88	\$11.20	\$14.80	\$0.00	\$57.88
5	85	\$36.13	\$11.20	\$14.80	\$0.00	\$62.13

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE	08/01/2017	\$41.61	\$11.20	\$14.80	\$0.00	\$67.61
ROOFERS LOCAL 33	02/01/2018	\$42.76	\$11.20	\$14.80	\$0.00	\$68.76
	08/01/2018	\$43.86	\$11.20	\$14.80	\$0.00	\$69.86
	02/01/2019	\$45.01	\$11.20	\$14.80	\$0.00	\$71.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER	08/01/2017	\$43.83	\$11.45	\$24.03	\$2.38	\$81.69
SHEETMETAL WORKERS LOCAL 17 - A	02/01/2018	\$44.98	\$11.45	\$24.03	\$2.38	\$82.84

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A
Effective Date - 08/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.53	\$11.45	\$5.61	\$0.00	\$34.59
2	40	\$17.53	\$11.45	\$5.61	\$0.00	\$34.59
3	45	\$19.72	\$11.45	\$10.76	\$1.26	\$43.19
4	45	\$19.72	\$11.45	\$10.76	\$1.26	\$43.19
5	50	\$21.92	\$11.45	\$11.71	\$1.35	\$46.43
6	50	\$21.92	\$11.45	\$11.96	\$1.36	\$46.69
7	60	\$26.30	\$11.45	\$13.61	\$1.54	\$52.90
8	65	\$28.49	\$11.45	\$14.56	\$1.64	\$56.14
9	75	\$32.87	\$11.45	\$16.47	\$1.82	\$62.61
10	85	\$37.26	\$11.45	\$17.87	\$2.00	\$68.58

Effective Date - 02/01/2018

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.99	\$11.45	\$5.24	\$0.00	\$34.68
2	40	\$17.99	\$11.45	\$5.24	\$0.00	\$34.68
3	45	\$20.24	\$11.45	\$10.31	\$1.27	\$43.27
4	45	\$20.24	\$11.45	\$10.31	\$1.27	\$43.27
5	50	\$22.49	\$11.45	\$11.21	\$1.37	\$46.52
6	50	\$22.49	\$11.45	\$11.46	\$1.38	\$46.78
7	60	\$26.99	\$11.45	\$13.02	\$1.56	\$53.02
8	65	\$29.24	\$11.45	\$13.93	\$1.67	\$56.29
9	75	\$33.74	\$11.45	\$15.74	\$1.85	\$62.78
10	85	\$38.23	\$11.45	\$17.05	\$2.03	\$68.76

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4
SIGN ERECTOR
PAINTERS LOCAL 35 - ZONE 2

06/01/2013 \$25.81 \$7.07 \$7.05 \$0.00 \$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - SIGN ERECTOR - Local 35 Zone 2

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$12.91	\$7.07	\$0.00	\$0.00	\$19.98
2	55	\$14.20	\$7.07	\$2.45	\$0.00	\$23.72
3	60	\$15.49	\$7.07	\$2.45	\$0.00	\$25.01
4	65	\$16.78	\$7.07	\$2.45	\$0.00	\$26.30
5	70	\$18.07	\$7.07	\$7.05	\$0.00	\$32.19
6	75	\$19.36	\$7.07	\$7.05	\$0.00	\$33.48
7	80	\$20.65	\$7.07	\$7.05	\$0.00	\$34.77
8	85	\$21.94	\$7.07	\$7.05	\$0.00	\$36.06
9	90	\$23.23	\$7.07	\$7.05	\$0.00	\$37.35

Notes:

Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.73	\$10.91	\$10.89	\$0.00	\$54.53
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	03/01/2017	\$56.08	\$8.77	\$17.20	\$0.00	\$82.05

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.63	\$8.52	\$8.70	\$0.00	\$36.85
2	40	\$22.43	\$8.52	\$8.70	\$0.00	\$39.65
3	45	\$25.24	\$8.52	\$8.70	\$0.00	\$42.46
4	50	\$28.04	\$8.52	\$8.70	\$0.00	\$45.26
5	55	\$30.84	\$8.52	\$8.70	\$0.00	\$48.06
6	60	\$33.65	\$8.52	\$10.20	\$0.00	\$52.37
7	65	\$36.45	\$8.52	\$10.20	\$0.00	\$55.17
8	70	\$39.26	\$8.52	\$10.20	\$0.00	\$57.98
9	75	\$42.06	\$8.52	\$10.20	\$0.00	\$60.78
10	80	\$44.86	\$8.52	\$10.20	\$0.00	\$63.58

Notes: Apprentice entered prior 9/30/10:

40/45/50/55/60/65/70/75/80/85

Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
2	40	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
3	45	\$16.31	\$13.00	\$12.54	\$0.00	\$41.85
4	45	\$16.31	\$13.00	\$12.54	\$0.00	\$41.85
5	50	\$18.13	\$13.00	\$12.81	\$0.00	\$43.94
6	55	\$19.94	\$13.00	\$13.09	\$0.00	\$46.03
7	60	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
8	65	\$23.56	\$13.00	\$13.65	\$0.00	\$50.21
9	70	\$25.38	\$13.00	\$13.93	\$0.00	\$52.31
10	75	\$27.19	\$13.00	\$14.21	\$0.00	\$54.40

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
2	40	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
3	45	\$16.63	\$13.00	\$12.55	\$0.00	\$42.18
4	45	\$16.63	\$13.00	\$12.55	\$0.00	\$42.18
5	50	\$18.48	\$13.00	\$12.82	\$0.00	\$44.30
6	55	\$20.33	\$13.00	\$13.10	\$0.00	\$46.43
7	60	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
8	65	\$24.02	\$13.00	\$13.66	\$0.00	\$50.68
9	70	\$25.87	\$13.00	\$13.95	\$0.00	\$52.82
10	75	\$27.72	\$13.00	\$14.22	\$0.00	\$54.94

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2017	\$49.70	\$10.75	\$19.22	\$0.00	\$79.67
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.85	\$10.75	\$19.22	\$0.00	\$54.82
2	60	\$29.82	\$10.75	\$19.22	\$0.00	\$59.79
3	70	\$34.79	\$10.75	\$19.22	\$0.00	\$64.76
4	80	\$39.76	\$10.75	\$19.22	\$0.00	\$69.73
5	90	\$44.73	\$10.75	\$19.22	\$0.00	\$74.70

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$37.70	\$7.60	\$14.35	\$0.00	\$59.65
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.42	\$7.60	\$14.35	\$0.00	\$58.37
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$33.02	\$10.91	\$10.89	\$0.00	\$54.82
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$48.58	\$7.60	\$14.75	\$0.00	\$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$50.58	\$7.60	\$14.75	\$0.00	\$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$40.65	\$7.60	\$14.75	\$0.00	\$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$42.65	\$7.60	\$14.75	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	03/01/2017	\$52.69	\$11.32	\$15.46	\$0.00	\$79.47
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$26.61	\$7.50	\$1.80	\$0.00	\$35.91
	09/03/2017	\$27.14	\$7.75	\$1.81	\$0.00	\$36.70
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$37.70	\$7.50	\$8.87	\$0.00	\$54.07
	09/03/2017	\$38.45	\$7.75	\$9.53	\$0.00	\$55.73
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$31.05	\$7.50	\$8.89	\$0.00	\$47.44
	09/03/2017	\$31.66	\$7.75	\$9.44	\$0.00	\$48.85
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$37.70	\$7.50	\$12.95	\$0.00	\$58.15
	09/03/2017	\$38.45	\$7.75	\$13.61	\$0.00	\$59.81
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$33.26	\$7.50	\$9.63	\$0.00	\$50.39
	09/03/2017	\$33.92	\$7.75	\$10.21	\$0.00	\$51.88
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$19.96	\$7.50	\$1.60	\$0.00	\$29.06
	09/03/2017	\$20.35	\$7.75	\$1.61	\$0.00	\$29.71
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$44.35	\$7.50	\$15.83	\$0.00	\$67.68
	09/03/2017	\$45.23	\$7.75	\$16.61	\$0.00	\$69.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 08/28/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.61	\$7.50	\$3.30	\$0.00	\$37.41
2	65	\$28.83	\$7.50	\$3.36	\$0.00	\$39.69
3	70	\$31.05	\$7.50	\$3.43	\$0.00	\$41.98
4	75	\$33.26	\$7.50	\$5.00	\$0.00	\$45.76
5	80	\$35.48	\$7.50	\$5.06	\$0.00	\$48.04
6	85	\$37.70	\$7.50	\$5.13	\$0.00	\$50.33
7	90	\$39.92	\$7.50	\$7.20	\$0.00	\$54.62

Effective Date - 09/03/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$27.14	\$7.75	\$3.31	\$0.00	\$38.20
2	65	\$29.40	\$7.75	\$3.38	\$0.00	\$40.53
3	70	\$31.66	\$7.75	\$3.45	\$0.00	\$42.86
4	75	\$33.92	\$7.75	\$5.02	\$0.00	\$46.69
5	80	\$36.18	\$7.75	\$5.09	\$0.00	\$49.02
6	85	\$38.45	\$7.75	\$5.15	\$0.00	\$51.35
7	90	\$40.71	\$7.75	\$7.22	\$0.00	\$55.68

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2016	\$28.98	\$4.25	\$3.12	\$0.00	\$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TREE TRIMMER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/31/2016	\$18.51	\$3.55	\$0.00	\$0.00	\$22.06
<p>This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.</p>						
TREE TRIMMER GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/31/2016	\$16.32	\$3.55	\$0.00	\$0.00	\$19.87

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

- ** Multiple ratios are listed in the comment field.
- *** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
- **** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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DIVISION 1 - GENERAL REQUIREMENTS

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SECTION 01010

SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. The Work of this Contract is located in the Town of Natick, MA, at Springvale Water Treatment Facility, located at 1080 Worcester Street (Route 9).
2. The Work of this Contract consists of the installation of a new approximate 31'-0" diameter by 27'-6" height to overflow backwash tank along with the appropriate piping, motor operated valves, and fittings to connect the new tank to the backwash transfer line and drain piping. A separate contact will be issued by Natick for the installation of the backwash transfer piping and electrical work where indicated on the drawings as work "By Others".
3. The backwash tank manufacturer to furnish final foundation and floor reinforcement requirements. If additional reinforcement is required beyond shown on Drawing, Contractor is responsible for furnishing and installing without additional compensation.

END OF SECTION

SECTION 01015

PRICE ADJUSTMENTS FOR SPECIFIC MATERIALS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. In accordance with the requirements of Chapter 30, Section 38A of the General Laws of Massachusetts municipal contracts for water and sewer projects bid under Chapter 30 Section 39M shall include a price adjustment clause for each of the following: fuel, both diesel and gasoline; liquid asphalt; and Portland cement contained in cast-in-place concrete.
1. Payment or Credit shall be applied to the monthly Application for Partial Payment and Application for Final Payment.
 2. Compliance with this provision is required; there is no “opting-in” or “opting-out”
 3. Price adjustments will only be made if the variance is 5% or more. A variance can result in the Period Price being either higher or lower than the Contractor’s Price. Once a 5% difference has been reached, the adjustment will apply.
 4. No adjustment will be paid for work done beyond the extended completion date of any contract unless the Awarding Authority has approved an extension of Contract Time for the Contract.
 5. Should the Contractor fail to submit delivery documentation as specified in this section, the Owner may calculate the price adjustment using alternative methods and include a credit for the Owners additional expense of estimating these values.
- B. This Contract is subject to Price Adjustments based on cost increases and cost decreases for diesel fuel per gallon and gasoline is per gallon. **Price Adjustments** shall be based on monthly price listings as provided by AAA’s Daily Fuel Gauge Report <http://fuelgaugereport.aaa.com>, Massachusetts Average, for diesel fuel and regular grade gasoline.
- C. This Contract is subject to Price Adjustments based on cost increases and cost decreases for liquid asphalt, per ton. **Price Adjustments** shall be based on monthly price listings as provided by ENR Engineering News Record, Construction Economics http://enr.construction.com/economics/current_costs, Material Price Index, Boston, for Asphalt, Paving PG58
- D. This Contract is subject to Price Adjustments based on cost increases and cost decreases for Portland cement, per ton. **Price Adjustments** shall be based on monthly price listings as provided by ENR Engineering News Record, Construction Economics http://enr.construction.com/economics/current_costs, Material Price Index, Boston for Portland cement.

1.2 SPECIAL PROVISIONS

- A. **MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE:** This adjustment will provide for either additional compensation to the Contractor or repayment to the Owner, depending on an increase or decrease in the average price of diesel or gasoline. This adjustment will be based on actual on-site fuel utilized during the Contract.
1. **Base Price:** Base Price of diesel fuel is \$2.550 and regular unleaded gasoline is \$2.354 shall be utilizing the AAA Daily Fuel Gauge Report web site, which includes State Tax.
 2. **Period Price:** Period Price will be the prices listed on AAA website on the first business day of a given month.
 3. **Total Gallons** will be the actual substantiated monthly quantity of fuel used for on-site equipment during the work period from start through the extended time of completion date, reported on a monthly basis.
 4. **The Price Adjustment** will be determined by calculating the price difference between the Base Price (remains constant) and the Period Price (varies monthly), and if that increase or decrease is greater than 5% for that period, the gallons verified for on-site use that period multiplied by the cost difference between the Base Price and the Period Price for that period.
 5. It shall be the Contractor's responsibility to provide a summary with backup receipts at the end of each month, which are to include date of purchase, gallons of fuel, type of fuel and company from which the fuel was purchased.

Example Calculation – Diesel Fuel

Base Price AAA	Period Price AAA	Difference Per Gallon	% Change + Or -	Change > 5%
\$3.50	\$3.75	+ \$0.25	7%	Yes

Contractor's Substantiated Monthly Adjustment

Total Gallons	Difference Per Gallon	Price Adjustment
1000	+ \$0.25	+ \$250.00

- B. **MONTHLY PRICE ADJUSTMENT FOR ASPHALT CEMENT:** The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the project.
1. **Base Price:** Base Price of liquid asphalt is \$395.20 per ton utilizing the ENR Material Price Index.
 2. **Period Price:** Period Price of liquid asphalt will be referenced to the first report of the month listed on the ENR website for a given month.
 3. **Total Tons** will be derived from the actual substantiated tonnage slips for the month(s) material is delivered.

4. The Price Adjustment will be determined by multiplying the price difference between the Base Price (remains constant) and the Period Price (varies monthly) times the number of tons of asphaltic paving placed during each monthly period times the percentage of liquid asphalt content. The calculations will use the midpoint of the specified content range for liquid asphalt (bitumen) content specified by the contract documents for the material delivered.
5. It shall be the Contractor's responsibility to provide a summary with backup tonnage slips at the end of each month, which are to include date of purchase, type of asphaltic paving and company from which the mixture was purchased.

Example Calculation – Asphalt Cement

<u>Base Price</u> <u>ENR</u>	<u>Period Price</u> <u>ENR</u>	<u>Difference</u> <u>Per Ton</u>	<u>% Change</u> <u>+ Or -</u>	<u>Change</u> <u>> 5%</u>
\$415.71	\$392.18	- \$23.53	5.6%	Yes

Contractor's Substantiated Monthly Adjustment

1000 tons of binder course mix at 4.5 to 5.5% liquid asphalt (bitumen) content

<u>Total</u> <u>Tons</u> <u>Mix</u>	<u>Asphalt</u> <u>Content</u> <u>%</u>	<u>Total</u> <u>Tons</u> <u>Asphalt</u>	<u>Difference</u> <u>Per Ton</u>	<u>Price</u> <u>Adjustment</u>
1000	5%	50	- \$23.53	- \$1,176.50

- C. MONTHLY PRICE ADJUSTMENT FOR PORTLAND CEMENT: The Price Adjustment applies only to the actual Portland cement content in the mixture placed on the project.
1. Base Price: Base Price of Portland cement is \$127.05 per ton utilizing the ENR Material Price Index.
 2. Period Price: Period Price of Portland cement will be referenced to the first report of the month on the ENR website for a given month.
 3. Total Tons will be derived from the actual substantiated cubic yardage or tonnage slips for the month(s) material is delivered.
 4. The Price Adjustment will be a separate payment item and will be determined by multiplying the price difference between the Base Price (remains constant) and the Period Price (varies monthly) times the number of cubic yards of concrete mix delivered during each monthly period times the Portland cement content in tons per cubic yard. The calculations will use the minimum Portland cement content specified by the contract documents for the material delivered.
 5. It shall be the Contractor's responsibility to provide a summary with backup delivery slips at the end of each month, which are to include date of purchase, type of concrete mix and company from which the concrete was purchased. Site mixed concrete shall be based upon the weight of the dry product delivered and used, adjusted to Portland cement content if necessary.

Example Calculation – Portland Cement

<u>Base Price</u> <u>ENR</u>	<u>Period Price</u> <u>ENR</u>	<u>Difference</u> <u>Per Ton</u>	<u>% Change</u> <u>+ Or -</u>	<u>Change</u> <u>> 5%</u>
\$95.50	\$110.00	+ \$14.50	15.2%	Yes

Contractor's Substantiated Monthly Adjustment

100 cubic yards of Class A concrete mix at 0.26 tons (520 pounds) of Portland cement per cubic yard

<u>Total</u> <u>Mix</u> <u>CY</u>	<u>Cement</u> <u>Content</u> <u>tons/CY</u>	<u>Total</u> <u>Tons</u> <u>Cement</u>	<u>Difference</u> <u>Per Ton</u>	<u>Price</u> <u>Adjustment</u>
100	.26	26	+ \$14.50	+ \$377

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Purpose: The purpose of this section is to define the method of measurement and payment for each of the unit prices or lump sums listed in the Bid.
 - 1. The Contractor shall thoroughly review the work required for each payment item.
- B. Related Work
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 thru Division 16 of these Specifications.

1.2 PAYMENT ITEMS

Payment Item Number	Description
1.	Mobilization
2.	New Backwash Tank
3.	Site Work
4.	Foundation

1.4 MOBILIZATION (ITEM 1)

- A. Measurement
 - 1. Measurement for payment of mobilization costs shall be on a lump sum basis on 80% once excavation begins and satisfactory completion of the set up at the site including storage yard, 15% at mid-point of construction, and the final 5% upon satisfactory completion of the storage yard cleanup and removal of equipment.
- B. Payment
 - 1. Payment for mobilization shall be made at the lump sum contract price under Bid Item No. 1 in the Agreement. The price shall be full compensation for all costs associated with mobilization including but not limited to bonds and insurance, Contractor administration, transportation of equipment and materials to the construction site, if necessary, paying all costs associated with obtaining land for storage yard, obtaining of all permits, set up of storage yard, maintenance of same, and removal of equipment and materials upon completion of work.

2. It is the Contractor's responsibility for obtaining and maintaining a storage and staging area at no additional cost.

1.5 NEW BACKWASH TANK (ITEM 2)

A. Measurement

1. Measurement for payment for the New Backwash Tank bid item shall be on a lump sum basis for a complete installation.

B. Payment

1. Payment for the New Backwash Tank bid item shall be made at the lump sum price bid under Contract Item No. 2 in the Agreement. The price shall be full compensation for all costs associated with excavation for tank foundation, backfill, compaction, concrete foundation, reinforcement and furnishing and installing tank, appurtenances, sidewall piping, motor operated valves and piping connection in floor.
2. All costs associated with foundation design applicable to proposed tank shall be included in this item.
3. All costs associated with interior tank disinfection shall be included in this item.
4. All costs associated with constructing the tank overflow pipe, and drain manifold to be included in this Item No. 2.
5. All costs associated with loam and seed all areas disturbed during construction shall be included in this Item No. 2.

1.6 SITE WORK (ITEM 3)

A. Measurement

1. Measurement for payment for Site Work shall be on a lump sum basis.

B. Payment

1. Payment for Site Work shall be made at the lump sum price under Bid Item No. 3 in the Agreement. The price shall be full compensation for all costs associated with foundation excavation, site clearing and furnishing and installing ductile iron water piping, and connection to existing piping. Work includes trench excavation, backfill and compaction of water mains, loam and seed all disturbed areas and connecting to existing backwash pipe and fittings. Pipe work shall include excavate backfill and compacting, pipe bedding and furnishing of all equipment, tools and labor necessary for a first class furnishing and installation, as herein specified or reasonably implied.
2. All costs associated with furnishing and installing ordinary borrow and select borrow to be included under this Item.
3. All costs associated with tree stump removal, site clearing, excavation for tank foundation, back filling and compacting around foundation, silt sock and gravel roadway shall be included in this Bid Item No. 3.

1.7 FOUNDATION (ITEM 4)

A. Measurement

1. Measurement for payment for Foundation bid item shall be on a lump sum basis for a complete installation.

B. Payment

1. Payment for Foundation bid item shall be made at the lump sum price bid under Contract Item No. 4 in the Agreement. The price shall be full compensation for all costs associated with furnishing and installing the complete concrete tank foundation and floor including but not limited to concrete forms, rebar, leveling plates, concrete and all other items required for a complete foundation shall be included in this item.
2. All costs associated with concrete testing during construction shall be included under this Item No. 4.

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Comply with procedures described in this Section when applying for progress payment and final payment under the Contract.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contract Sum and the schedule for payments are described in the Form of Agreement.
 - 3. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions.

1.2 QUALITY ASSURANCE

- A. Prior to start of construction, secure the Engineer's approval of the schedule of values required to be submitted under Paragraph 2.05.3 of the General Conditions, and further described in Section 01026 of these specifications.
- B. During progress of the Work, modify the schedule of values as approved by the Engineer to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.
- C. Base requests for payment on the approved schedule of values.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Informal submittal: Unless otherwise directed by the engineer.
 - 1. Make an informal submittal of request for payment by filling in, with erasable pencil, pertinent portions of AIA Document G702, "Application and Certificate for Payment," plus continuation sheet or sheets.
 - 2. Make this preliminary submittal to the Engineer at the end of each month.
 - 3. Revise the informal submittal of request for payment as agreed, between both parties, initialing all copies.

- B. Formal submittal: Unless otherwise directed by the Engineer:
1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment," plus continuation sheet or sheets.
 2. Sign and notarize the Application and Certificate for payment.
 3. Submit the original of the Application and Certificate for Payment, plus eight identical copies of the continuation sheet or sheets, to the Engineer.
 4. The Engineer will compare the formal submittal with the approved informal submittal and, when approved, will sign the Application and Certificate of Payment, will make required copies, and will distribute:
 - a. Two copies to Contractor;
 - b. Three copies to Owner;
 - c. Two copies to Engineer's file

END OF SECTION

SECTION 01036

CHANGES IN CONTRACT WORK, COST OR TIME

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Contractor shall make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in a Written Amendment, Change Order or Work Change Directive, signed by Owner and issued after execution of the Contract, in accordance with the provisions of this Section, Articles 10, 11 and 12 of the General Conditions, and amendments contained in the Supplemental Conditions.
- B. Owner reserves the right to at any time order additions, deletions or revisions in the Work, which shall be authorized by Written Amendment, a Change Order, a Work Change Directive or a Field Order, and Contractor shall promptly proceed with the Work involved.
- C. If Owner or Contractor are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment in the Contract Times that should be allowed as the result of a Work Change Directive, a claim may be made in accordance with the provisions of Article 10 of the General Conditions.
- D. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which is to be performed under the applicable conditions of the Contract Documents, unless otherwise specifically provided.
- E. See a full definition of the above in the General Conditions, Article 1, Definitions.

1.2 QUALITY ASSURANCE

- A. Within Contractor's quality assurance program, Contractor shall include such measures as are needed to assure familiarity of Contractor's staff and employees with these procedures for processing Change Order data.
- B. Contractor shall conduct all Work in a first-class, workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the Work under this section.

1.3 CONTRACT PRICE

- A. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price.
- B. The Contract Price may only be changed by a Change Order or a Written Amendment.

1.4 PROCESS FOR INITIATING AND FINALIZING A CHANGE IN CONTRACT PRICE

- A. Any claim for an adjustment in the Contract Price by either party to the Contract shall be based upon written notice delivered by the party making the claim to the other party and Engineer promptly after the start of the occurrence or event giving rise to the claim, and stating the general nature of the claim.
- B. Notice shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event.
- C. Documentation of the costs for the Work shall be prepared and submitted in accordance with the provisions of Article 11 of the General Conditions and as amended in the Supplementary Conditions of this Contract.
- D. Once the extent of changed Work and compensation amount is finalized in accordance with the provisions of Article 11 of the General Conditions as amended in the Supplementary Conditions, a Change Order Form as included in Section 00810 with the documentation attached shall be prepared by Engineer and submitted to both parties for review and signing.
- E. Contractor's disagreement with the Change Order shall in no way relieve him/her from the responsibility to immediately proceed with the change as indicated in the Change Order, and to seek settlement of the dispute under the pertinent provisions of this Contract.
- F. Any delay in the completion of the Work associated with a disagreement in the amount of the Change Order shall not constitute a viable reason for granting an extension of time.
- G. No claim for an adjustment in the Contract Price shall be valid unless it is submitted in accordance with the provisions above and those of Article 11 of the General Conditions as amended in the Supplementary Conditions of this Contract.

1.5 PROCESS FOR INITIATING AND FINALIZING A CHANGE IN CONTRACT TIME

- A. Any claim for an adjustment in the Contract Time shall be made by a Change Order or Written Amendment, shall be based upon written notice delivered by the party making the claim to the other party and Engineer promptly after the start of the occurrence or event giving rise to the claim, and stating the general nature of the claim.
- B. Notice shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.
- C. Once the extent of changed Contract Time, if any, is prepared in accordance with the provisions of Article 12 of the General Conditions, a Change Order shall be prepared for review and signing by both parties.
- D. Contractor's disagreement with the refusal to grant a requested extension in the Contract Time shall in no way relieve him/her from the responsibility to proceed immediately with the Work, and to seek settlement of the dispute under the pertinent provisions of this Contract. Any delay in the completion of the Work shall not constitute a viable reason for granting an extension of time.
- E. No claim for an adjustment in the Contract Time shall be valid if it is not submitted in accordance with the provisions above, as well as those of Article 12 of the General Conditions as supplemented in the Supplementary Conditions of this Contract.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
 - 1. Establishing and maintaining lines and levels.
 - 2. Structural design of shores, forms, and similar items provided by the Contractor as part of his means and methods of construction.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional requirements for field engineering also may be described in other sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PROCEDURES

- A. In addition to procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
 - 1. Locate and protect control points before starting work on the site.
 - 2. Preserve permanent reference points during progress of the Work.
 - 3. Verification of all reference points. If a discrepancy is found, promptly notify Engineer.
 - 4. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of changes in the Work.

1.4 SURVEY REQUIREMENTS

- A. Contractor shall establish a minimum of two permanent benchmarks on site, reference to data established by survey control points.

- B. Contractor to establish and maintain elevation lines and levels. Locate and lay out by instrumentation and similar appropriate means:
1. Site improvements, including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 2. Grid or axis for structures.
 3. Controlling lines and levels required for mechanical and electrical trades.

END OF SECTION

SECTION 01092

ABBREVIATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Listing of abbreviations: The listing of abbreviations in this Specification Section represent the Standard Organization named.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications:
 - 2. All related Specification Sections shall be used in conjunction with this Section.

1.2 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the Standard, except when more stringent requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids.
- C. See Article 3, par 3.3 of the General Conditions.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 LISTING OF STANDARD ORGANIZATIONS AND THEIR ABBREVIATIONS:

AA	- Aluminum Association
AAN	- American Association of Nurserymen
AASHTO	- American Association of State Highway and Transportation Officials
ACI	- American Concrete Institute
ADC	- Air Diffusion Council
AGA	- American Gas Association
AHDGA	- American Hot Dip Galvanizers Association
AI	- Asphalt Institute
AIA	- American Institute of Architects
AISC	- American Institute of Steel Construction
AISI	- American Iron and Steel Institute
ANSI	- American National Standards Institute
APA	- American Plywood Association

API	- American Petroleum Institute
ASCE	- American Society of Civil Engineers
ASHRAE	- American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	- American Society of Mechanical Engineers
ASTM	- American Society of Testing and Materials
AWPA	- American Wood Preservers Association
AWS	- American Welding Society
AWWA	- American Water Works Association
BIA	- Brick Institute of America
CRSI	- Concrete Reinforcing Steel Institute
CSA	- Canadian Standards Association
DEP	- Department of Environmental Protection
DHI	- Door and Hardware Institute
DIPRA	- Ductile Iron Pipe Research Association
EJCDC	- Engineers Joint Contract Documents Committee
EPA	- Environmental Protection Agency
FM	- Factory Mutual System
Fed. Spec.	- Federal Specification
HI	- Hydraulic Institute
IEEE	- Institute of Electrical and Electronics Engineers
ISA	- Instrument Society of America
MIA	- Masonry Institute of America
MIL	- Military Specification
MSBC	- Massachusetts State Building Code
MSS	- Manufacturers Standardization Society of the Valve and Fitting Industry
NAAMM	- National Association of Architectural Metal Manufacturers
NCMA	- National Concrete Masonry Association
NEC	- National Electrical Code
NEMA	- National Electrical Manufacturers Association
NFPA	- National Fire Protection Association
NRCA	- National Roofing Contractors Association
OSHA	- Occupational Safety and Health Administration
PCA	- Portland Cement Association
PCI	- Prestressed Concrete Institute
PPI	- Plastic Pipe Institute
PS	- Product Standard of the National Bureau of Standards
SDI	- Steel Door Institute
SIGMA	- Sealed Insulating Glass Manufacturers
SMACNA	- Sheet Metal and Air Conditioning Contractors National Association
SPI	- Society of the Plastics Industry
SSPC	- Steel Structures Painting Council
TCA	- Tile Council of America
TPI	- Truss Plate Institute
UL	- Underwriters Laboratories

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 QUALITY ASSURANCE

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of project meetings regarding items to be added to the agenda.
- B. Minutes:
 - 1. The Engineer will compile minutes of each project meeting, and will furnish copies to the Contractor and required copies to the Owner.
 - 2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS - No products are required in this Section.

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

- A. Except as noted below for Pre-construction Meeting, project meetings will be held bi-weekly if work progress warrants.
- B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

- A. The Engineer will establish meeting location. To the maximum extent practicable, meetings will be held at the job site.

3.3 PRE-CONSTRUCTION MEETING

- A. Pre-construction Meeting will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed.
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Engineer will advise other interested parties, including the Owner, and request their attendance.
- B. Minimum agenda: Data will be distributed and discussed on at least the following items:
 - 1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and Engineer.
 - 2. Channels and procedures for communications.
 - 3. Construction schedule, including sequence of critical work.
 - 4. Contract Documents, including distribution of required copies of original Documents and revisions.
 - 5. Processing of Shop Drawings and other data submitted to the Engineer for review.
 - 6. Processing of Bulletins, field decisions, and Change Orders.
 - 7. Rules and regulations governing performance of the Work; and
 - 8. Procedures for security, quality control, housekeeping, and related matters.

3.4 PROJECT MEETINGS

- A. Attendance:
 - 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
 - 2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.
- B. Minimum agenda:
 - 1. Review, revise as necessary, and approve minutes of previous meetings.

2. Review progress of the Work since last meeting, including status of submittals for approval.
3. Identify problems which impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

C. Revisions to minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled as priority portions of "old business" at the next regularly scheduled meeting.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SUMMARY

- A. To assure adequate planning and execution of the Work to insure it is completed within the number of calendar days allowed in the Contract, and to assist the Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.
- B. Comply with General Conditions Section 2.05 regarding Preliminary Schedules, General Conditions Section 6.04 regarding Progress Schedules, General Conditions Section 12.02 regarding adherence to schedules and General Conditions Section 15.02 regarding failure to adhere to schedules.
- C. The Construction period shall be that as indicated in the Agreement Section of this Contract.
- D. In calculating any period of time referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday, or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.
- E. For purposes of this Contract, a calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

1.2 QUALITY ASSURANCE

- A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, and in preparing and issuing periodic reports as required below.
- B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Engineer.
- C. Reliance upon the approved schedule: The construction schedule as approved by the Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
- D. Should any activity not be completed within 10 days after the stated scheduled date, the Engineer may request the reason for the delay in schedule from the Contractor. The Contractor shall supply the requested information and the steps which he intends to take to get back on schedule.

- E. It is expressly understood and agreed that failure by the Engineer to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.
- F. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Preliminary analysis: Within ten calendar days after the Contractor has received the Owner's Notice to Proceed, submit one electronic file copy of a preliminary construction schedule prepared in accordance with Part 2 of this Section.
- C. Construction schedule: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one electronic copy and four copies of a construction schedule prepared in accordance with Part 3 of this Section.
- D. Periodic reports: On the first working day of every month following the submittal described in Paragraph 1.3 C. above, submit an electronic copy and four prints of the updated construction schedule.

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS

- A. Graphically show by bar-chart, or other means acceptable to the Engineer, the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
- B. Include, but do not necessarily limit indicated activities to:
 - 1. Project mobilization;
 - 2. Submittal and approval of Shop Drawings and Sample;
 - 3. Procurement of equipment and critical materials;
 - 4. Fabrication of special material and equipment, and its installation and testing;
 - 5. Final cleanup;
 - 6. Final inspecting and testing; and
 - 7. All activities by the Engineer that effect progress, required dates for completion, or both, for all and each part of the Work.

PART 3 - EXECUTION

3.1 PRELIMINARY ANALYSIS

- A. Contents: Show all activities of the Contractor under this Work for the period between receipt of Notice to Proceed and submittal of construction schedule.
- B. Show the Contractor's general approach to remainder of the Work.
- C. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.

3.2 CONSTRUCTION SCHEDULE

- A. Within 30 calendar days from receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Engineer, review contents of the proposed construction schedule, and make all revisions agreed upon.
- B. The construction shall be updated monthly by the Contractor to represent progress of each activity.

3.3 PERIODIC REPORTS

- A. As required under Paragraph 3.2 B. above, update the approved construction schedule.
- B. Indicate "actual" progress in percent completion for each activity;
- C. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.4 REVISIONS

- A. Make only those revisions to approved construction schedule as are approved in advance by the Engineer.

END OF SECTION

SECTION 01340

SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the Contract Document requirements.
- B. Work not included:
 - 1. Submittals not required under this Contract will not be reviewed by the Engineer.
 - 2. The Contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Engineer unless specifically called for within the Contract Documents.

1.2 QUALITY ASSURANCE

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for its conformity in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.
- B. Substitutions:
 - 1. The Contract is based on the standards of quality established in the Contract Documents.
 - 2. Substitutions will be considered only when they meet those standards of quality.
 - 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved in writing for this Work by the Engineer.
- C. "Or equal":
 - 1. Where the phrase "or equal," or "or equal as approved by the Engineer", occurs in the Contract Documents see SC - 6.05 of the General Conditions.
 - 2. The decision of the Engineer shall be final.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

PART 2 - SUBMITTALS

2.1 SHOP DRAWINGS

- A. Make submittals of Shop Drawings, samples, substitution requests, and other items in accordance with the provisions of this Section.
- B. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- C. Types of prints required:
 - 1. Submit Shop Drawings in the form of six blackline prints of each sheet.
 - 2. Blueprints will not be acceptable.
- D. Review comments of the Engineer will be shown on the blackline print when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for his purposes.

2.2 MANUFACTURERS' LITERATURE

- A. Where contents of submitted literature from manufacturers includes data for more than one size, model, or other, clearly indicates which portion of the contents is being submitted for review.

2.3 SAMPLES

- A. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of submittals" below.
- B. Number of Samples required:
 - 1. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus one which will be retained by the Engineer.
 - 2. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Engineer.

2.4 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Engineer for selection.

PART 3 - EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

- A. Consecutively number all submittals.
 - 1. When material is submitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
 - 2. On resubmittals, cite the original submittal number and date for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Engineer for his review upon request.

3.2 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

3.3 TIMING OF SUBMITTALS

- A. Make submittals in accordance with the schedule listed under the submittal paragraph of each Section of this document which requires submittals. The materials and equipment that need to be included in the submittals are listed but not limited to those indicated in the submittal paragraph of each section of the document
- B. In scheduling, allow at least twenty (20) working days for review by the Engineer following his receipt of the submittal.

3.4 ENGINEER'S REVIEW

- A. Review by the Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
- B. REVISIONS:
 - 1. Make revisions required by the Engineer.
 - 2. If the Contractor considers any required revision to be a change, he shall so notify the Engineer as provided for in Paragraph 10.5 of the General Conditions.
 - 3. Make only those revisions directed or approved by the Engineer.

4. Revise previous submittal drawings or data and resubmit, as specified for the initial submittal.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide temporary facilities and controls needed for the Work including, but not necessarily limited to:
 - 1. Sanitary facilities;
 - 2. Enclosures such as tarpaulins, barricades, and canopies;
 - 3. Temporary fencing of the construction site;
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.
 - 3. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2 PRODUCT HANDLING

- A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

PART 2 - PRODUCTS

2.1 SANITARY FACILITIES

- A. Sanitary conveniences, properly screened from public observation, for the use of all persons employed on the work and beginning with the first persons engaged in preliminary operations, shall be provided and maintained by the Contractor in sufficient numbers through the completion of the Work.

2.2 WEATHER PROTECTION

- A. Shall mean the temporary protection of that work adversely affected by moisture, wind and cold by covering, enclosing and/or heating. This protection shall provide adequate working areas during the months of November through March and be consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations. The Contractor shall furnish and install all "weather protection" material and be responsible for all costs, including heating required to maintain a minimum temperature of 40° F at the working surface. This provision does not supersede any specific requirements for methods of construction and/or curing of materials.

Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices.

The total cost of all weather protection inclusive of all materials, labor, equipment and incidentals required shall be included in the contract price. The cost shall include all work required to furnish, maintain and remove all temporary enclosures and temporary heating systems required for weather protection.

PART 3 - EXECUTION

3.1 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Engineer.

END OF SECTION

SECTION 01505

MOBILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Includes:
 - 1. Ordering and receipt of all materials, neat stockpiling of such materials, delivery and setup of all construction equipment, and cleanup of stockpile area upon completion of construction.
- B. Related Work
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 thru Divisions 16 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. None required under this Section.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610

PART 2 - PRODUCTS -Not Used

PART 3 - EXECUTION

3.1 STORAGE AREA

- A. It shall be the Contractor's sole responsibility to maintain area at the site necessary to provide suitable and adequate storage space for tools, materials and equipment during the progress of the Work if existing project sites are not adequate. The storage or marshalling area shall in no way obstruct or interfere with water treatment plant operations or vehicular movement. The storage area shall be kept in a neat and orderly fashion at all times and shall not be allowed to become a public nuisance.
- B. The Contractor shall remove all excess materials, stockpiles, and equipment from storage sites, sweep rake and generally dress area to condition satisfactory to the Owner upon completion of Contract.

3.2 EQUIPMENT

- A. The Contractor shall transport all equipment to the site and set up operations, to a condition satisfactory to proceed with the intended construction, and upon completion, remove same.

3.3 PROJECT MAINTENANCE

- A. The Contractor shall properly maintain the project and storage area during the life of the Contract, and upon completion of work, dismantle storage area and provide general cleanup along the project site.

END OF SECTION

SECTION 01610

PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.
- C. Only new materials and equipment shall be incorporated into the Work.

1.2 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 MANUFACTURERS' RECOMMENDATIONS

- A. Except as otherwise approved by the Engineer, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.4 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality, and other pertinent information.

1.5 PROTECTION

- A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.
- B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.
- C. Mechanical equipment subject to damage by the atmosphere if stored outdoors, even though covered by canvass, shall be stored in a building with a controlled environment. The building may be a temporary structure on the site or a building off location.

1.6 REPAIRS AND REPLACEMENTS

- A. In event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide an orderly and efficient transfer of the completed Work to the Owner.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. "Substantial Completion" is defined in Par. 1.45 of the General Conditions.

1.2 QUALITY ASSURANCE

- A. Prior to requesting inspection by the Engineer, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PROCEDURES

- A. Substantial Completion:
 - 1. Within a reasonable time after receipt of the request to inspect, the Engineer will inspect to determine status of completion.
 - 2. Should the Engineer determine that the work is not substantially complete:
 - a. The Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. Remedy the deficiencies and notify the Engineer when ready for reinspection.
 - c. The Engineer will reinspect the Work.
 - 3. When Owner concurs that the Work is substantially complete:
 - a. The Owner will prepare a "Certificate of Substantial Completion", on AIA Form G704, accompanied by the Contractor's list of items to be completed, as verified by the Engineer.
 - b. The Engineer will submit the Certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

- B. Final Completion:
1. Verify that the Work is complete.
 2. Certify that:
 - a. Contract Documents have been reviewed
 - b. Work has been inspected for compliance with the Contract Documents;
 - c. Work has been completed in accordance with the Contract Documents;
 - d. Equipment and systems have been tested as required, and are operational;
 - e. Work is completed and ready for final inspection.
 3. The Engineer will make an inspection to verify status of completion.
 4. Should the Owner determine that the Work is incomplete or defective:
 - a. The Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.
 - b. Remedy the deficiencies promptly and notify the Engineer when ready for reinspection.
 5. When the engineer determines that the Work is acceptable under the Contract Documents, he will request the Contractor to make closeout submittals.
- C. Closeout submittals include, but are not necessarily limited to:
1. Operation and maintenance manuals for items so listed in pertinent other sections of these Specifications, and for other items when so directed by the Engineer;
 2. Warranties and bonds;
 3. Spare parts and materials extra stock;
 4. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
 - a. Certificates of Inspection;
 - b. Certificates of Occupancy;
 5. Certificates of Insurance for products and completed operations;
 6. Evidence of payment and release of liens;
 7. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.

1.4 INSTRUCTION

- A. Instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the Work.

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General:

1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
 - a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
 - a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Engineer, may be injurious to the finish floor material.

3.2 FINAL CLEANING

- A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.
- C. Site:
 - 1. Unless otherwise specifically directed by the Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
 - 2. Completely remove resultant debris.
- D. Structures:
 - 1. Exterior:
 - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
 - d. In the event of stubborn stains not removable with water, the Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.
 - 2. Interior:
 - a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed material from adjacent surfaces.
 - c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
 - 3. Glass: Clean inside and outside.
 - 4. Polished surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.
- E. Schedule final cleaning as approved by the Engineer to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY

- A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Engineer in accordance with the General Conditions of the Contract.

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Work included: To aid the continued instruction of operating and maintenance personnel, and to provide a positive source of information regarding products incorporated into the Work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Required contents of submittals also may be amplified in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section, and skilled in technical writing to the extent needed for communicating the essential data.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Submit one (1) copy of a preliminary draft of the proposed Manual or Manuals to the Engineer for review and comments.
- C. Unless otherwise directed in other Sections, or in writing by the Engineer, submit three (3) copies of the final Manual to the Engineer prior to indoctrination of operation and maintenance personnel.

PART 2 - PRODUCTS

2.1 INSTRUCTION MANUALS

- A. Where instruction Manuals are required to be submitted under other Sections of these Specifications, prepare in accordance with the provisions of this Section.
- B. Format:
1. Size: 8-1/2" x 11"
 2. Paper: White bond, at least 20 lb weight
 3. Text: Neatly typed
 4. Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but fold to fit within the Manual and provide a drawing pocket inside rear cover or bind in with text.
 5. Flysheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in color.
 6. Tabs: Provide tab sheets with section labels to identify contents of section. Tabs to be attached to heavy-duty paper designed with an attached label holder.
 7. Binding: Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside the Manual; 3-ring binders will be acceptable; all binding is subject to the Engineer's approval.
 8. Measurements: Provide all measurements in U.S. standard units such as feet-and-inches, lbs, and cfm; where items may be expected to be measured within ten years in accordance with metric formulae, provide additional measurements in the "International System of Units" (SI).
- C. Provide front and back covers for each Manual, using durable material approved by the Engineer, and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS

(name and address of Work)
(name of Contractor)
(general subject of this Manual)
(space for signature of)
(the Engineer, and approval date)

- D. Contents: Include at least the following:
1. Neatly typewritten index near the front of the Manual, giving immediate information as to location within the Manual of all emergency information regarding the installation.
 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly, and reassembly.
 3. Complete nomenclature of all parts of the equipment.
 4. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
 5. Copy of all guarantees and warranties issued.
 6. Manufacturers' bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
 7. Such other data as required in pertinent other Sections of these Specifications.

PART 3 - EXECUTION

3.1 INSTRUCTION MANUALS

- A. Preliminary:
1. Prepare a preliminary draft of each proposed Manual.
 2. Show general arrangement, nature of contents in each portion, probable number of drawings and their size, and proposed method of binding and covering.
 3. Secure the Engineer's approval prior to proceeding.
- B. Final: Complete the Manuals in strict accordance with the approved preliminary drafts and the Engineer's review comments.
- C. Revisions:
1. Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with the Engineer.
 2. If the Contractor is required by the Engineer to revise previously approved Manuals, compensation will be made as provided for under "Changes" in the General Conditions.

END OF SECTION

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DIVISION 2 - SITE WORK

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SECTION 02110

CLEARING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Clear and grub the site as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02275 Environmental Controls

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Flag limits of clearing.

3.2 PROTECTION

- A. Protect existing facilities.
- B. Protect trees and shrubs indicated to remain, by providing a fence around the tree or shrub at its drip line.

- C. All areas not designated to be cleared shall be protected from damage. Clearing operations shall be conducted so that cut trees are felled within the property boundaries and existing trees, designated to remain, are protected from damage.
- D. Protect control points, benchmarks and existing work from damage.
- E. Maintain access to the site at all times.

3.3 CLEARING

- A. Within the area to be cleared:
 - 1. Fell trees and brush.
 - 2. Chip all wood.
 - 3. Remove all stumps.
 - 4. Clean out roots 1-inch in diameter and larger to a depth of at least 12-inches below the existing ground surface.

3.4 CONSERVATION OF TOPSOIL

- A. After the area has been cleared of vegetation, strip the existing topsoil.
- B. Stockpile in an area clear of new construction.
- C. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
 - 1. Maintain stockpile free from debris and trash.
 - 2. Keep the topsoil damp to prevent dust.

3.5 REMOVAL AND DISPOSAL

- A. All debris cleared and grubbed from the site shall be removed from the site. Dispose of in accordance with all local and Commonwealth of Massachusetts regulations.
- B. Burning or burial of cleared and grubbed material on the site shall not be permitted.

3.6 UTILITIES

- A. Coordinate with utility companies and agencies as required.

END OF SECTION

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Excavate, backfill, compact, and grade the site to the requirements of the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02227 Rock Removal
 - 3. Section 02275 Environmental Controls

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

PART 2 - PRODUCTS

2.1 SOIL

- A. Fill material
 - 1. The soil to be used for grading shall be obtained from the site cuts or a designated borrow area.
 - 2. Do not permit rocks having a dimension greater than 3 inches in the upper 12 inches of fill or embankment.

2.2 TOPSOIL

- A. Where shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region. The soil shall be capable of sustaining healthy plant life, reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 2 inches in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provisions of Section 01050.

3.3 PROCEDURES

- A. Utilities
 1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
 2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 3. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer.
 4. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.
- B. Protection of persons and property:
 1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 2. Operate warning lights during hours from dusk to dawn each day.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

- C. Dewatering
 - 1. Remove all water encountered during trench and substructure work to an approved location by pumps, drains or other approved methods.
 - 2. Keep excavations and site construction area free from standing water.
- D. Use means necessary to prevent dust from becoming a nuisance to the public.
- E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

- A. Perform excavating within the limits of the Work to the lines, grades, and elevations shown on the Drawings.
- B. Satisfactory excavated materials:
 - 1. Transport to, and place in, fill or embankment areas within the limits of the Work.
- C. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- D. Ditches and gutters:
 - 1. Cut accurately to the cross sections, grades, and elevations shown.
 - 2. Maintain excavations free from leaves, sticks, trash, and other debris until completion of the Work.
 - 3. Dispose of excavated materials as required by the Contract Documents.
- E. Unauthorized excavation:
 - 1. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions.
- F. Ground surface preparation:
 - 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from the ground surface prior to placement of fills.
 - 2. Plow, strip, or break up surfaces steeper than one vertical to four horizontal, so that fill material will bond with existing surfaces.
 - 3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
 - 4. At exposed soils in areas to be paved, scarify to a minimum depth of six (6) inches, and recompact at a moisture content that will permit proper compaction as specified for fill.

3.5 GRADING

A. General

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section have a minimum radius of approximately eight (8) feet, unless adjacent construction will not permit such a transition or if such a transition defeats positive control of drainage.

B. Grading outside structure lines:

1. Grade areas adjacent to structure to achieve drainage away from the structures, and to prevent ponding.
2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 feet above or below the required sub-grade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 feet above or below the required sub-grade elevation.

3.6 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density specified for each area.

B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the soils engineer.

1. Lawn and unpaved areas:
 - a. Compact the top eight (8) inches of sub-grade and each layer of fill material or backfill material at 90% of maximum density.
 - b. Compact the upper twelve (12) inches of filled areas, or natural soils exposed by excavating, at 85% of maximum density.
2. Walks:
 - a. Compact the top eight (8) inches of sub-grade and each layer of fill material or backfill material at 90% of maximum density.
3. Pavements:
 - a. Compact the top eight (8) inches of sub-grade and each layer of fill material or backfill material at 95% of maximum density for cohesive soil material.

C. Moisture control:

1. Where sub-grade or layer of soil material must be moisture conditioned before compacting, uniformly apply water to surface of sub-grade or layer of soil material. Prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the soils engineer.

3.7 MAINTENANCE

A. Protection of newly graded areas:

1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
2. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Excavate, backfill, and compact for structures on the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 01050 Field Engineering
 - 3. Section 02210 Site Grading
 - 4. Section 02221 Trenching, Backfilling and Compacting
 - 5. Section 02227 Rock Removal

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. Complying with requirements of governmental agencies having jurisdiction.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

1.4 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Material list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to provide compliance with specified requirements including the following:
 - a. Sieve analysis of structural fill material
 - b. Testing laboratory reference

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill and backfill materials:

1. **ORDINARY FILL:** Shall consist of a friable material and contain no objects greater than 6 inches in diameter, contain no more than 30 percent by weight finer than the No. 200 sieve, and be free of trash, ice, snow, tree stumps and roots. Excavated material from on-site sources and which meets these specifications may be used for Ordinary Fill.
2. **SCREENED GRAVEL:** Shall consist of a hard gravel, free from ice and snow, roots, sods, rubbish and other deleterious or organic matter. When spread and compacted, it shall provide a firm, stable base. The screened gravel shall conform to the following gradation requirements.

<u>Sieve Size</u>	<u>Percent Passing</u>
5/8"	100
1/2"	40 - 100
3/8"	15 - 45
#10	0 - 5

3. **STRUCTURAL FILL:** Shall consist of hard durable sand and gravel, be free from ice and snow, roots, sods, rubbish and other deleterious or organic matter. Maximum stone size shall be 4 inches (greatest dimension). In addition, it shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Maximum</u>	<u>Minimum</u>
4"	-	100
1"	100	60
No. 4	100	25
No. 16	85	10
No. 50	40	4
No. 200	5	-

4. CRUSHED STONE: Shall consist of durable crushed stone or durable crushed gravel stone, washed, free from ice and snow, stone dust, sand clay, loam, or other deleterious material. The crushed stone shall be uniformly blended and conform to the following:

<u>Sieve Size</u>	<u>Percent Passing</u>
5/8"	100
1/2"	85 - 100
3/8"	15 - 45
#4	0 - 15
#8	0 - 5

5. STONE BASE: Shall consist of crushed stone specified elsewhere in this Section mixed at a 1:1 ratio with stone crusher tailings or stone dust.

2.2 TOPSOIL

- A. Where and if shown on the Drawings or otherwise required, provide screened topsoil consisting of friable, fertile soil of loamy character, capable of sustaining healthy plant life, and reasonably free from subsoil.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.
- C. Topsoil from the site or brought in from other places shall be screened before being spread.

2.3 SAND

- A. Sand shall conform to the requirements for Concrete Sand as specified in Section 03300.

2.4 RIPRAP

- A. Provide riprap for slope protection and discharge swale outlet if required by Drawings which is sound, durable rock and is approximately rectangular in shape.
- B. Round stones or stones of soft composition will not be acceptable.
- C. Each stone shall have a minimum weight of twenty (20) lbs. (discharge swale outlet and slope protection) or as indicated on the Drawings.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
 - 1. Establishing and maintaining lines and grades.
 - 2. Staking of structures.

3.3 PROCEDURES

- A. Underground Facilities:
 - 1. Unless shown to be removed, protect active underground facilities shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
 - 2. If active underground facilities are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 - 3. If existing underground facilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer.
 - 4. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.
- B. Protection of persons and property:
 - 1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
 - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 - 3. Protect structures, underground facilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
- C. Dewatering:
 - 1. The Contractor shall continually provide and maintain the proper equipment and facilities to control all water entering the excavations. He shall keep the excavations dry to have an undisturbed subgrade, until the structures and underground facilities have been completed, to an extent that will not allow them to be damaged by allowing the water levels to return to their normal levels.
 - 2. The Contractor shall be fully responsible and liable for all damages which might result from the failure of his dewatering system.
 - 3. Silting basins shall be provided.

- 4. Under no circumstances place fill, or install underground facilities in excavations containing water.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

- A. Perform excavating within the limits of the Work to the lines, grades, and elevations indicated and specified herein.
- B. Satisfactory excavated materials:
 - 1. Transport to, and place in, fill or embankment areas within the limits of the Work.
- C. Unsatisfactory materials:
 - 1. Excavate to a distance below grade as directed by the Engineer, and replace with satisfactory materials.
- D. Surplus materials:
 - 1. Upon completion of backfilling and grading of the site, all excess gravel and loam to be stockpiled at site and shall become the property of the Owner. All other material to become the property of the Contractor.
- E. Excavation of rock: See Section 02227 - Rock Removal
- F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- G. Borrow:
 - 1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the Engineer.
- H. Unauthorized excavation:
 - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from Engineer.
 - 2. Under footings, foundations, or retaining walls:
 - a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the Engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
 - 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations.

- I. Excavating for structures:
 - 1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and removing concrete forms from the work, installation of services, other construction required, and for inspection.
 - 2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
 - a. Excavate by hand tools to final grade just before concrete is placed.
 - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
 - 3. Excavate for footings and foundations only after general site excavating, filling and grading are complete.
- J. Cold weather protection:
 - 1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.5 FILLING AND BACKFILLING

- A. General:
 - 1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
 - 2. In excavations:
 - a. Use satisfactory excavated or borrow material.
 - 3. Under asphalt pavements:
 - a. See Section 02513.
 - 4. Under structures:
 - a. Use structural fill compacted to 95% maximum density or as noted on Drawings.
 - 5. Under Concrete Swail:
 - a. Use Process Gravel
- B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
 - 1. Acceptance of construction below finish grade including, where applicable, damp-proofing and waterproofing.
 - 2. Inspecting, testing, approving, and recording locations of underground facilities.
 - 3. Removing concrete formwork.
 - 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
 - 5. Removing trash and debris.
 - 6. Placement of horizontal bracing on horizontally supported walls.
- C. Placing and compacting:
 - 1. Place backfill and fill materials in layers not more than 8 inches in loose depth.
 - 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 - 3. Compact each layer to required percentage of maximum density for area.

4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift
7. Topsoil shall be placed to a rolled depth of 6 inches.

3.6 GRADING

- A. See Section 02210.

3.7 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1556.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the Engineer.
1. Structures Other Than Water Tank:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum density.
 2. Lawn and unpaved areas:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 - b. Compact the upper 12" of filled areas, or natural soils exposed by excavating, at 85% of maximum density.
 3. Concrete Swail:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 4. Pavements:
 - a. Compact the top 12" of subgrade and each layer of fill material or backfill material at 95% of maximum density for cohesive soil material.
- C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

3.8 PLACING RIPRAP

- A. Riprap shall be placed, if required by Drawings, at the locations shown on the Drawings.
 - 1. Riprap shall be hand placed so as to provide a flat surface or an even plane.
 - 2. Voids between rocks are to be filled solid with smaller rocks while maintaining an even plane.
 - 3. Larger rocks are to be placed at the toe of slope to provide support for the portion going up the slope.

3.9 FIELD QUALITY CONTROL

- A. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing under the provisions of Section 01410 of these Specifications.

3.10 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion, and keep from trash and weeds.
 - 2. Repair and reestablish grades in settled, eroded, and rutted areas.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: The Contractor shall furnish all excavation and backfilling required for the Work, including site mobilization and demobilization, furnishing, fences or barriers, barrels, barricades, excavation in earth and rock for all structures and pipe lines, removal and disposal of all unsuitable material, provide required process gravel and select borrow where ordered, disposal of surplus material, shoring, bracing and sheeting, backfilling, compaction and maintenance of backfill material, protection of existing above and below ground facilities, protection of existing pavements, repairing of broken or disturbed water, sewer or storm drain piping and structures caused by the Contractor's operations, and all other incidental work necessary to provide the space for the construction of the Work of this Contract, in accordance with the Contract Documents.
- B. Related work:
 - 1. Section 02668 Water Piping, Valves and Fittings and Appurtenances

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment appropriate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. Comply with all the requirements of the Local and State regulatory agencies which pertain to this Section.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

1.4 COORDINATION

- A. Coordinate the work of this Section in a manner to minimize the impact upon the local businesses and residents.

1.4 COORDINATION

- A. Coordinate the work of this Section in a manner to minimize the impact upon the local businesses and residents.
- B. Coordinate the work of this Section with suppliers, trades and any public agencies which may affect or be affected by the work of this Section to insure the uninterrupted completion of this work, including but not limited to the Fire and Police Departments, School Bus Company, US Postal Service, Highway Department, Rubbage Disposal Service, etc.

1.5 PERMITS

- A. The Contractor shall obtain a roadway opening permit and trench permit for all work and notify the responsible Public Works Department at least seven (7) days before any excavation takes place within the roadway.

1.6 CLASSIFICATION OF EXCAVATION

- A. All excavation shall be classified as either earth or rock. Rock excavation shall be solid ledge rock, concrete, stone masonry or boulders one (1) cubic yard or more in volume. All other materials excavated shall be classified as earth.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill and backfill materials:
 - 1. Ordinary Borrow: Shall be a friable material consisting of stone, sand and silt with no objects larger than 7-inches in diameter and no more than 30 percent by weight finer than No. 200 sieve, and be free of pavement, trash, loam, ice, snow, tree stumps and roots. This material must be conducive to proper compaction by the methods to be utilized under this Contract. Excavated trench material from on-site sources which meets these specifications in the Owner's opinion shall be used for Ordinary Borrow trench refill.
 - 2. Select Borrow: Shall be a friable material consisting of a nature of stone, sand and silt with no objects larger than 3 inches in diameter and no more than 30 percent by weight finer than No. 200 sieve, and be free of pavement, trash, loam, ice, snow, tree stumps and roots. This material must be conducive to proper compaction by the methods to be utilized under this Contract. Excavated trench material from on-site sources which meets these specifications in the Owner's opinion shall be used for Select Borrow trench refill.

3. Process Gravel: Shall consist of hard durable sand and gravel, be free from ice and snow, roots, sods, rubbish and other deleterious or organic matter. Maximum stone size shall be 3" (greatest dimension). In addition, it shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Maximum</u>	<u>Minimum</u>
3"	-	100
1 1/2"	100	70
1/4"	85	50
No. 4	60	30
No. 200	12	-

- a. Representative soil and sieve analysis shall be performed to verify that the materials comply with the above Specifications and shall be repeated throughout the project when observed changes in materials occur or contamination with other materials is observed.

4. Sand Borrow: Shall consist of clean inert, hard, durable grains of quartz or other durable rock, free from pavement, trash, loam, ice, snow, tree stumps and roots, with no objects larger than 1 inch in diameter and no more than 10 percent by weight finer than No. 200 sieve. This material must be conducive to proper compaction by the methods to be utilized under this Contract. In addition, it shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Maximum</u>	<u>Minimum</u>
1"	-	100
1/2"	100	85
No. 4	100	60
No. 16	80	35
No. 50	55	10
No. 200	10	0

- a. Excavated material from on-site sources which meets these specifications in the Owner's opinion shall be used as Sand Borrow refill.

5. Crushed Stone: Shall consist of durable crushed stone or durable crushed gravel stone, washed, free from ice and snow, stone dust, sand, clay, loam, or other deleterious material. The crushed stone shall be uniformly blended and conform to the following:

<u>Sieve Size</u>	<u>Percent Passing</u>
5/8"	100
1/2"	85 - 100
3/8"	15 - 45
No. 4	0 - 15

6. Rip Rap: Provide rip rap for slope protection (where specified on the Drawings) which is sound durable rock and is angular in shape.
 - a. Stone size shall be based on a D50-10-inch average mix, i.e., 50% shall be greater than 10-inch and 50% will be smaller than 10-inches. Generally, the large stones shall be 1.5 greater in width and 2.25 greater in depth than the average 10-inch size specified.
 - b. Rip rap shall be placed on a layer of filter or geotextile fabric specified elsewhere in this Section.
 - c. Voids of the rip rap should be filled or chinked with the 50% of the smaller rock of the D50 mix and $\frac{3}{4}$ -inch crushed stone.

PART 3 - EXECUTION

3.1 TRENCH EXCAVATION

- A. The Contractor shall make all excavation in earth and in rock, necessary or incidental to the proposed construction under the terms of this Contract and as herein specified or indicated on the Contract Drawings.
 1. All trench excavation shall be accomplished by open cut method, except as may be otherwise expressly permitted by the Owner, or as otherwise stipulated in the Contract.
 2. All excavation shall be made in such manner and to such widths as will give ample room for properly installing, constructing and inspecting pipelines and structures they are to contain. If this cannot be accomplished, alternate means of compacting around these zones must be demonstrated to the satisfaction of the Engineer.
 3. The Contractor shall be responsible for notifying Dig Safe, the Natick Department of Public Works and the Owner for field markouts of all utilities, and the Contractor shall plan ahead in the layout of the water mains and services to avoid these utilities wherever possible.
 4. Test pits may be required ahead of construction to insure that the new water main will align properly with the existing piping and fittings at the new connection.
 5. The width of trenches shall be sufficient to allow thorough compacting of the refill adjacent to the lower quarters of the pipe. At pipe joints such additional width and depth shall be excavated as is necessary to give ample room for properly making and inspecting the pipe joints.
 6. Bottom of trenches in earth shall be excavated reasonably flat and to a depth sufficient to allow the bottom of the water main pipe barrel to rest on relatively undisturbed earth. Blocking is not required under straight lengths of pipe, but the Contractor shall excavate bell holes, by hand, to receive the bell end of the pipe, and to insure that the pipe will be suitably bedded.
 7. If rock is encountered, bottom of trenches shall be excavated to a smooth bottom free of major projections, providing a minimum of twelve (12) inches clearance with bottom and sides of pipe, refilled with compacted Select Borrow.

8. Bracing and support of all trench excavation shall meet all requirements of local and State ordinances and OSHA regulations. Sheeting and bracing, or the use of steel support box shall be used where required to maintain a safe working condition and provide protection from collapse of the trench walls and undermining of existing pavement, damage to the pipe line appurtenances installed under this Contract, and existing underground facilities.
9. Excavation in close proximity to the edge of existing pavements and curbing shall be controlled to minimize damage or disturbance to the pavement and curbing system.

3.2 UNSUITABLE MATERIAL

- A. All pipes and structures are to be laid on stable foundation. If material at grade is determined to be unsuitable by the Engineer, the Contractor shall excavate a further depth and/or width, and refill with an approved material. Refill material shall be process gravel or crushed stone as determined by the Owner. Payment width limits shall be the same as specified for trench excavation, unless an additional width of trench is ordered by the Engineer.
 1. Any excavation in excess of the amount ordered by the Engineer shall be backfilled and compacted with an approved granular material, at the Contractors expense.

3.3 ROCK REMOVAL

- A. See Specification Section 02227.

3.4 BACKFILLING AND COMPACTING

- A. Backfill shall be placed in uniform 12-inch layers. Each layer of select borrow shall be graded relatively level and thoroughly compacted to a 95% dry density by tamping or vibrating with hand or mechanical compacting equipment around the pipe to 8-inches above the pipe. The remainder of the backfill shall be placed in 12-inch layers, graded relatively level and compacted with hydraulic rammers or other satisfactory compaction equipment.
 1. Care shall be taken to compact the backfill materials throughout the full width of the excavation and beneath all pipes and around all structures.
 2. The backfilling of trenches shall proceed as soon as the laying of the pipe(s) or installation of the structure(s) will allow. Compaction of initial backfill over the pipe shall be accomplished so as not to cause damage to the underlying pipe. Equipment used for compacting in this zone shall be by use of small vibratory plate compactor making at least three passes.
 3. The remainder of backfill to 18-inches below the surface in paved areas and to 6-inches below the surface in landscaped/shoulder areas) shall be ordinary borrow placed in twelve (12) inch layers, leveled and mechanically compacted with hydraulic rammers, tamping rollers, sheep foot rollers, pneumatic tire rollers or vibratory rollers which are conducive to the material being compacted.

4. The top 6-inches of trench refill in landscaped/shoulder areas shall be loam installed in accordance with Section 02490, or process gravel, as ordered by the Owner.
5. When ordered by Owner, the Contractor shall place controlled density fill from 8-inches over pipe to the roadway surface to be protected with steel plates until cured, and to be later excavated to the depth of the asphaltic concrete to be placed.
6. Safety at the construction site shall entirely be the responsibility of the Contractor. Prior to the end of each day, the Contractor shall backfill the trench or plate the open area, and move the equipment off the road on each ay.
7. All ordinary borrow for trench backfilling shall be obtained from the excavated trench material at the site, or excess material from other construction sites within this Contract if possible. If this material is not available, the Contractor shall furnish same under the appropriate contract item.
8. All rock and boulders shall be kept separate from the excavated earth and properly disposed of by the Contractor. No excavated rock or boulders shall be used as backfill in the pipe trench.
9. All excavated pavements shall be kept separate from the excavated earth and properly disposed of by the Contractor. No excavated pavements shall be used as backfill in the pipe trenches.
10. If undermining of the roadway occurs during excavation, the overhanging section of the road will be removed in order that adequate compaction as specified herein can be accomplished. After backfill and compaction is achieved, the remaining edge of road at the trench will be cut back 12-inches to straight lines parallel to the trench before final trench paving is undertaken.

3.5 SURPLUS MATERIAL

- A. Upon completion of the backfilling of the trenches, if there is surplus of gravel or loam which cannot be utilized at other sites within this Contract, material shall become the property of the Owner. All other surplus material shall become the property of the Contractor.

3.6 LOAMED AND GRASSED AREAS

- A. Loamed and grassed areas which are disturbed by the Contractors operation shall be restored to a condition comparable or better than originally found. Replacement loam shall be installed to a 6-inch minimum depth.

3.7 PROTECTION OF PROPERTY

- A. The Contractor shall exercise extreme caution while working close to existing underground facilities, curb and sidewalks, asphaltic concrete and concrete pavement, highway guard, utility poles, signs, mail boxes, shrubs, trees, walls, lawns, and other property adjacent to the construction.
 1. Contractor shall replace any and all property which was damaged or destroyed as a result of his operations or because of his failure to protect them in a manner which would prevent damage.

2. Property which has been damaged and replaced shall be equal in quality and workmanship to the damaged property and shall be subject to the approval of the property Owner.
3. Branches which interfere with construction may be removed, only upon approval of the Owner.
 - a. Limbs and branches shall be trimmed off neatly and cleanly, close to the trunk of the tree or to its main branch.

3.8 CLEANUP

- A. Cleanup shall be divided into two phases, initial and final.
 1. Initial cleanup shall closely be daily and shall include, but not be limited to, picking up of all surplus equipment and materials and picking of trash.
 2. Final cleanup shall be completed at the time when all tank and piping work is installed and Contractor shall remove all surplus construction materials and temporary structures, and restore all areas disturbed by his operations to a condition at least equal to condition prior to construction and to the satisfaction of the Engineer.

END OF SECTION

SECTION 02225

FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: In the performance of the work of this Contract, the Contractor shall take all the preventative measures to insure the safety of all the underground facilities encountered.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specific requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 UNDERGROUND FACILITIES

- A. It shall be the Contractors responsibility to contact "Dig Safe," (1-800-344-7233) and any other utility company not covered under "Dig Safe", for accurate field locations prior to construction, so that the underground facility may be avoided during the operation of the excavating equipment.
 - 1. The Contractor shall familiarize himself/herself with Massachusetts General Law, Chapter 82, Section 40.
- B. It shall be the Contractors responsibility to contact all local utility departments, including but not limited to those existing such as the water and sewer departments, the public works department, the highway department, the local electric department, etc.
- C. Underground Facilities include but are not limited to all pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other facilities or attachments, and any casements containing such facilities which have been installed underground to furnish any of the following services or materials.
 - 1. Drinking Water
 - 2. Wastewater
 - 3. Storm Water
 - 4. Electricity
 - 5. Gases
 - 6. Steam
 - 7. Liquid Petroleum Products

8. Telephone
9. Communications
10. Cable Television
11. Traffic Control
12. Fire Prevention
13. Security
14. Irrigation

- D. Municipal Underground Facilities shall include all underground facilities owned or controlled by a Municipal Department or entity, such as a City, Town or District water or sewer department, electric department, department of public works, or other similar department.
- E. Private Underground Facilities shall include all underground facilities not owned or controlled by a Municipal Department or entity, such as private water or sewer services, electric systems, gas or liquid petroleum systems, telephone and communication systems, cable television systems, irrigation systems, fire prevention and security systems, traffic control system and other similar private systems.

1.4 PROTECTION OF UNDERGROUND FACILITIES

- A. All underground facilities including but not limited to water pipes and services, gas pipes, electric, telephone and cable conduits and conductors, sewers and drains which are uncovered by the excavation and which do not, in the opinion of the Owner and Engineer, require to be changed in location, shall be carefully supported and protected from injury by the Contractor. The Contractor shall be responsible for notifying all underground facility companies of actual damage, suspected disturbance, or any other condition associated with said underground facility, which could remotely result in a leak, break or disturbance to service, or other occurrence which could precipitate a danger or inconvenience to the public in the future.
1. The Contractor shall make arrangements with the individual agencies and departments for accurate field locations of all Underground Facilities within the construction area, prior to excavation.
 2. If the Contractor causes damage to any of the Municipal Underground Facilities during his/her construction process, and the locations supplied by the various departments were reasonably accurate, it shall be the Contractor's responsibility to make the necessary repairs to the satisfaction of that particular department. The Contractor may make arrangements for the repair work to be done with the authorized representative of said Municipal Underground Facility, with all costs for repair work to be paid for or directly invoiced to the Contractor.
 3. For this Contract, the terminology "reasonably accurate" shall mean within a distance of four (4) feet, in any direction, from the location mark supplied by the particular Underground Facility Company or department.

4. If damage is done to these specific Municipal Underground Facilities by the Contractor, and the actual location in the ground was beyond the "reasonably accurate" limits as marked and provided, in the opinion of the Owner and Engineer, and that the Contractor took the necessary precautions knowing that an Underground Facility existed within the area, the repair work will either be completed by the appropriate department, or by the Contractor, in which case the additional work will be paid for under a Change Order.
5. If damage is done to Private Underground Facilities, the Contractor shall immediately notify the utility company or owner and provide all assistance as required.

1.5 PROTECTION OF UTILITY POLES

- A. The Contractor shall be responsible for making all arrangements with the appropriate utility company for protection and temporary support of utility poles as needed during construction. The Contractor shall be responsible for any costs associated thereto.

END OF SECTION

SECTION 02227

ROCK REMOVAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Remove all rock encountered while excavating for structures, roadways, or facility trenches as required by the Contract Documents.
 - 1. Rock removal is not anticipated on this project. However, if rock is encountered per definition in this section, Contractor will be reimbursed through a change order for removal and disposal costs.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02221 Trenching, Backfilling and Compacting

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

1.3 DEFINITIONS

- A. Rock excavation: Rock which requires explosives, wedging or an impact hammer for its removal. Concrete which meets the above definition shall be classified as rock.
- B. Boulders, slabs or other single pieces of material encountered which is less than one (1) cubic yard shall not be considered rock.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 NOTIFICATION

- A. When rock is encountered, the material shall be uncovered and the Engineer notified. The Contractor shall provide the Engineer with cross sections of the rock surface. The Engineer shall be present when the cross sections of the rock are made. No payment will be made for any rock removed prior to cross-sectioning as described above.

3.2 LIMITS OF EXCAVATION IN ROCK

- A. Excavation in rock shall be performed, so that no projection shall come within vertical planes 12 inches outside of the structure being built or 12 inches below the bottom of the structure base slab and footings.
- B. In trenches, the rock shall be removed to the limits shown on the typical trench section. Where excavation is carried beyond the above-determined limits, the additional space shall be refilled at the Contractor's expense with concrete or other specified materials.

3.3 BLASTING

- A. Pre-Blast Survey: Prior to any blasting, the Contractor shall submit a pre-blast survey. The survey shall satisfy the insurance requirements of the Contractor and be acceptable to the Contractor's insurance carrier, as well as provide data to assess damages to personal property and real estate due to blasting operations. The survey shall be complete as warranted by the nature of the work.
- B. Take all precautions necessary to warn or protect any individuals exposed to his operations. Such precautions shall include but not be restricted to the following:
 - 1. Present written certificate of insurance showing evidence that his insurance includes coverage for blasting operations before doing any blasting work.
 - 2. Make necessary arrangements as may be required by the applicable Federal, State, County or Municipal codes, rules, regulations and laws, and shall be responsible for compliance.
 - a. The Contractor shall be required to obtain a permit from the local authorities to perform blasting operations. The Engineer shall be notified in writing that such permit has been obtained.
 - 3. Schedules for blasting shall be thoroughly coordinated with the proper authorities, Federal, State and Local. No blasting will be done unless the Contractor has notified all concerned parties that he may blast. The Contractor shall also notify any commercial installation in the immediate area whose operations or instrumentation may be affected by blasting, at least twenty-four (24) hours prior to blasting operations.
 - 4. Seismographic recordings shall be made of all blasting operations on the project by a qualified testing agency hired and coordinated by the Contractor. A copy of these recordings shall be made available to the Owner.

5. Blasting shall be done by experienced powdermen or persons who are licensed or otherwise authorized to use explosives.
6. The Contractor shall be fully responsible for damages caused by his blasting operation.

3.4 DISPOSAL AND REPLACING OF ROCK

- A. Excavated rock shall not be used as trench refill unless processed with other materials to meet specific gradation requirements of fill materials specified in Section 02221 – Trenching, Backfilling and Compacting.
- B. Remove and dispose of all pieces of rock which are not suitable for use in other parts of the work. Rock disposed of by transportation to spoil areas is to be replaced by surplus excavation obtained elsewhere on the site, insofar as it is available.
- C. Contractor shall be responsible for obtaining spoil locations and the removal of all excess rock from the site.
- D. If rock below limits of excavation is shattered by blasting, caused by holes drilled too deep, or too heavy charges of explosives, or any other circumstance due to blasting, and if such shattered rock does not provide suitable foundation, the rock shall be removed and the excavation refilled with process gravel at the expense of the Contractor.

END OF SECTION

SECTION 02275

ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provide environmental controls as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. All related Specification Sections shall be used in conjunction with this Section.

1.2 DEFINITIONS

- A. Resource Areas: Those areas, conditions or features which, when disturbed by construction activities, create an adverse environmental impact. Such areas include, but are not necessarily limited to densely wooded areas, wetland areas, streams, brooks, rivers, and other water crossings and steep slopes.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. The items under this Section that require submittals are listed, but not limited to the following:
 - 1. Filter Sock
 - 2. Catch Basin Curb Sack
- C. Manufacturer's specifications, cut sheets and installation instructions shall be clearly marked with specific product, size, material and other defining characteristics denoted to provide compliance with specified requirements.
- D. The Contractor shall assemble and send six (6) copies of the items listed above to the Engineer in a timely fashion, but in no event later than the date that will ensure receipt by the Engineer within thirty five days of the Contractor's receipt of the Notice to Proceed.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 FILTER SOCK

- A. Filter sock shall be a continuous tubular, 100% cotton fiber knitted mesh netting material filled with compost. For the purposes of specifying the type and quality of product, the Filter Sock described under this Section is based on Filtrex BioSoxx, as manufactured by Filtrex International, LLC, Grafton, Ohio. Products of equal material quality and performance that meet the requirements of this specification may be considered.
 - 1. Minimum diameter Filter Sock shall be 12"

2.2 COMPOSTED MATERIALS

- A. Compost used for the Filter Sock shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
 - 1. pH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost".
 - 2. Particle size – 99% passing a 2" sieve and a minimum of 60% greater than the 3/8" sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification".
 - 3. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
 - 4. Material shall be relatively free (< 1% by dry weight) of inert or foreign man made materials.
 - 5. A sample shall be submitted to the engineer for approval prior to being used and must comply with all local, state and federal regulations.

2.3 FILTER SOCK POSTS

- A. Posts shall be of wood or steel and a minimum of 3 feet long. Wood posts shall be nominal 2" x 2". Steel posts shall be round or U, T, or C-shaped with a minimum weight of 1.3 lbs/FT, and have projections for fastening.
- B. Installed at a downward 45o angle behind the tubing on the wetland side, do not puncture through the tubing.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete installation, as selected by the Contractor, subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SEDIMENTATION AND EROSION CONTROL

- A. Plan and execute all operations, particularly those associated with excavation and backfilling, in such a manner as to minimize the amount of excavated and exposed fill or other foreign material that is washed or otherwise carried beyond the Limits of Work.
- B. Provide filter sock and other materials as necessary for sedimentation and erosion control to limit wash out into streams, brooks and wetlands.
- C. In the event of sedimentation or siltation prevention measures used by the Contractor prove to be inadequate, the Contractor shall adjust his operations to the extent necessary to prevent any such sedimentation or siltation from occurring.

3.2 FILTER SOCK

- A. Filter Sock will be placed at locations indicated on the plans, as directed by the Engineer or Owner. Shall be installed parallel to the base of the slope of other affected areas and perpendicular to sheet flow. In extreme conditions (i.e. 2:1 slopes) or when sheet flows to the area from a parcel above the work zone, a second sock shall be constructed at the top of the slope in order to dissipate flows.
- B. Filter Socks (12" - 18" in diameter) may be used in direct flow situations, within runoff channels not to exceed 3 feet in depth. Filter Socks (18" -24" in diameter) should be used for anything larger.
- C. The Contractor shall maintain the Sock in a functional condition at all times and it shall be routinely inspected.
- D. Where the Filter Sock requires repair, it will be routinely repaired.
- E. The Contractor shall remove sediment collected at the base of the Filter Sock when it reaches .5 of the exposed height of the Sock, or as directed by the Engineer. Alternatively, rather than create a soil disturbing, activity, the Engineer may call for additional Socks to be added at areas of high sedimentation, placed immediately on top of the existing sediment laden Filter Sock.
- F. Contractor is responsible for establishing a working erosion control system and may with approval of the Engineer, work outside the minimum construction requirements as needed.

- G. Where the Filter Sock deteriorates or fails, it will be repaired or replaced with a more effective alternative.
- H. Contractor is required to be a certified Filter Sock Installer. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.
- I. Contractor to remove the filter sock, mulch and stakes in the entirety after grass is established and approval is granted by Owner to remove.

3.3 PROTECTION OF AIR RESOURCES

- A. During the progress of work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water as necessary, so as to minimize the creation and dispersion of dust. If the Owner decides that it is necessary to use calcium chloride for more effective dust control then the Contractor shall furnish and apply the material as directed.
- B. Calcium chloride shall be commercial grade, furnished in 100-pound, 5-ply bags, stored under weatherproof cover and stacked alternately for ventilation. Application for dust control shall be at the rate of about 1/2 pound per square yard per application.
- C. Burning of rubbish and waste material on the site shall not be permitted.

3.4 COMPLIANCE

- A. The construction project shall be in compliance with all Federal, State and Local laws with respect to hazardous materials.
- B. All clean up and disposal operations shall comply with all applicable Federal, State, and Local statutes, regulations and ordinances and anti-pollution laws.
- C. Comply with all requirements of all applicable Federal, State, and Local regulations and all permits issued for the Contract.

END OF SECTION

SECTION 02490

LOAM AND SEED

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Place loam, finish grade, apply lime, fertilizer and seed to all the disturbed lawn areas under the Work of this Contract as specified herein.
- B. Related Work
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for performance of the Work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Complete materials list of items proposed to be provided under this Section.
 - 2. Schedule for seeding and fertilizing.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.
- B. Immediately remove from the site, materials which are not true to name, and do not comply with the specified requirements, and promptly replace materials meeting the specified requirements.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Provide commercial blended 10-20-10 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis.
 - 1. At least 40 percent of the nitrogen in the fertilizer used shall be in slowly available (organic) form.

2.2 LIME

- A. Lime shall be ground limestone containing not less than 85 percent calcium and magnesium carbonates.
 - 1. Shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 90 percent shall pass through a 20-mesh sieve.

2.3 GRASS SEED

- A. General: Provide grass seed which is:
 - 1. Free from noxious weed seeds, and re-cleaned;
 - 2. Grade A recent crop seed;
 - 3. Treated with appropriate fungicide at time of mixing;
 - 4. Delivered to the site in sealed containers with dealer's guaranteed analysis.
- B. Proportions by weight (Level Areas)
 - 1. Chewings Fescue - 60 percent
 - 2. Red Top - 20 percent
 - 3. Kentucky Blue - 20 percent
- C. Proportions by weight (Slopes)
 - 1. Creeping Fescue - 40 percent
 - 2. Perennial Ryegrass - 30 percent
 - 3. Red Clover - 10 percent
 - 4. Winter Rye - 15 percent
- D. Within wetland areas (inside BVW where approved by Owner)
 - 1. New England Erosion Control/Restoration Mix for Detention Basins and Moist as furnished by New England Wetland Plants, Inc., Amherst, MA.

2.4 LOAM

- A. Loam shall be a mixture of sand, silt and clay particles as to exhibit sandy and clay-like properties, in and about equal proportions.
 - 1. Shall be free to stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or litter.
 - 2. Shall be obtained from previously excavated materials, stockpiled for this use, or material furnished by Contractor.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete installation, as selected by the Contractor, subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct all conditions detrimental to timely completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 SPREADING LOAM

- A. Loam shall be placed and prepared by spading or harrowing and raking with iron rakes to a compacted depth of 6-inches.
 - 1. All large lumps, stones, sticks, and roots shall be removed and disposed of by the Contractor.

3.3 SEEDING

- A. Preparation
 - 1. Grade seedbeds, thoroughly removing ridges and depressions, and making areas smooth, continuous, firm planes that ensure proper drainage.
 - 2. Remove soil lumps, rocks, sticks, and other deleterious material.
- B. Lime
 - 1. Apply the approved lime at the rate of 1000 lbs. of ground limestone per 1000 sq. ft. of lawn area. Work into the top 3-4 inches.
- C. Fertilizing
 - 1. Apply the specified fertilizer at the rate of 40 lbs. per 1000 sq. ft. raking lightly into the soil.
- D. Sowing
 - 1. Sow with a seeder designed for the purpose.
 - 2. Sow at the rate of five lbs. per 1000 sq. ft.
 - 3. Promptly after seeding, wet the seedbed thoroughly, and keep all areas moist throughout the germination period.
- E. As soon as seed is sown, it shall be covered with a thin layer of loam and rolled.
- F. Protect seeded areas by erecting temporary fences, barriers, signs and similar protection as necessary to prevent trampling.

3.4 MAINTENANCE

A. The Contractor shall :

1. Keep all seeded and sodded areas watered.
2. Reseed all areas which do not take.
3. Replace any sections which die during guarantee period.
4. Repair any washouts and re-fertilize and reseed .

3.5 GUARANTEE PERIOD

- A. All seeded areas shall be guaranteed by the Contractor for not less than one (1) full year from the date of substantial completion.

END OF SECTION

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DIVISION 3 - CONCRETE

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SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide formwork in accordance with provisions of this Section for cast-in-place concrete as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 03200 Concrete Reinforcement
 - 3. Section 03300 Cast-In-Place Concrete
 - 4. Section 13205 Backwash Water Storage Tank

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design, construction and safety of formwork is the Contractor's responsibility.
- C. Standards: In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit manufacturers' data and installation instructions for proprietary materials including form coatings, ties, and accessories, and manufactured form systems if used.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Except for metal forms, use new materials. Materials may be reused during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.
- B. For footing and foundations, use Douglas Fir boards or planks secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
- C. For studs, wales, and supports, use Standard grade or better Douglas Fir, dimensions as required to support the loads but not less than 2" x 4".
- D. Forms:
 - 1. Exposed exterior and interior concrete surfaces:
 - a. Use 3/4" minimum thickness Douglas Fir plywood, grade B/B, class I, exterior, sanded both sides, complying with PS-1.
 - b. Seal edges and coat both faces with colorless coating which will not affect application of applied finishes.
 - 2. Unexposed concrete surfaces:
 - a. Use 1" x 6" shiplap Douglas Fir boards, surfaced one side and two edges, or 3/4-inch minimum thickness Douglas Fir plywood, grade B/B plyform class I or II, sanded both sides, mill-oiled.
- E. Column forms, if required:
 - 1. For square or rectangular columns, use 2-inch thick Douglas Fir planks or joists, surfaced one side and two edges, or use metal forms.
 - 2. For round columns, use metal forms or patented paper tube forms approved by the Engineer.
 - 3. Construct column forms with tight joints and securely clamped together with steel clamps.

2.2 FORM TIES

- A. The following types of form ties shall be used in the Work:
 - 1. Below grade: Snap-tie with water stop
 - 2. Above grade: Screw-tie with cones
 - 3. All concrete tanks and chambers shall have ties with water stops.

2.3 DESIGN OF FORMWORK

- A. General:
 - 1. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.

2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
4. Design forms and false work to include assumed values of live load, dead load, weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of the structure during construction.
5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
6. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
7. Support form materials by structural members spaced sufficiently close to prevent objectionable deflection.
8. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within the allowable tolerances.
9. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins.
10. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FORM CONSTRUCTION

- A. General:
 1. Construct forms complying with the pertinent Sections of ACI 347 to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
 2. Tolerances as stated in the pertinent Section of ACI 117.
 3. Provide for openings, offsets, keyways, recesses, sleeves, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.
- B. Fabrication:
 1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
 3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
 4. Provide top forms for inclined surfaces.
- C. Forms for exposed concrete:
1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
 2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back the joints with extra studs or girts to maintain true, square intersections.
 3. Use extra studs, wales, and bracing to prevent bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
- D. Corner treatment:
1. Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
 2. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.
- E. Locate control joints as indicated on the Drawings and, where required but not shown on the Drawings, as approved by the Engineer.
- F. Provisions for other trades:
1. Provide openings in concrete formwork to accommodate work of other trades.
 2. Verify size and location of openings, recesses, and chases with the trade requiring such items.
 3. Accurately place and securely support items to be built into the concrete.

3.3 FORM COATINGS

- A. Coat form contact surfaces with form coating compound before reinforcement is placed.
1. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will bond to fresh concrete.
 2. Apply the form coating material in strict accordance with its manufacturer's recommendations.
 3. Insure that no form coatings get on the reinforcement.

3.4 REMOVAL OF FORMS

- A. General:
1. Forms shall not be removed until the concrete has attained a strength of at least 30 percent of its ultimate strength, prescribed by the design and not before reaching the following number of day-degrees, whichever is longer:

<u>FORMS</u>	<u>DAY-DEGREE*</u>
Walls and Vertical Surfaces	120
Beams and Slabs	500

* Day-degree: The total number of days, times - their average daily air temperature at the surface of the concrete.

Example: 4 days an average daily air temperature of 55°F equal 220 day-degrees. Temperatures below 50°F shall not be included.

B. Finished surfaces:

1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged.
2. Release sleeve nuts or clamps, and pull the form ties neatly.
3. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface.
4. Solidly pack form tie holes, rod holes, and similar holes in the concrete. For packing, use the cement grout specified in Section 03300 of these Specifications, flushing the holes with water before packing, screeding off flush, and finishing to match adjacent surfaces.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide concrete reinforcement as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 03100 Concrete Formwork
 - 3. Section 03300 Cast-In-Place Concrete
 - 4. Section 13205 Reuse Water Storage Tank

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with pertinent provisions of the following, except as may be modified herein:
 - 1. ACI 318 Details of Reinforcement
 - 2. CRSI "Manual of Standard Practice." (ACI-315)
- C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Shop Drawings showing details of bars, anchors, and other items, if any, provided under this Section.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.
- B. Delivery and storage:
 - 1. Use necessary precautions to maintain identification after bundles are broken.
 - 2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.
 - 3. Bundles shall be stored off the ground and protected from injurious contaminants.

PART 2 - PRODUCTS

2.1 REINFORCEMENT MATERIALS AND ACCESSORIES

- A. Bars:
 - 1. Provide deformed billet steel bars complying with ASTM A615, using grades shown on the Drawings.
 - 2. Where grades are not shown on the Drawings, use grade 60.
- B. Steel wire:
 - 1. For tie wire, comply with Fed Spec QQ-W-461, annealed steel, black, 16 gage minimum.
- C. Welded wire fabric:
 - 1. Provide welded steel, complying with ASTM A185.
- D. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place:
 - 1. Use wire bar type supports complying with CRSI recommendations, unless otherwise shown on the Drawings.
 - 2. Do not use wood, brick, or other non-complying material.
 - 3. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 4. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with plastic-protected legs.

2.2 FABRICATION

- A. General:
 - 1. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with the CRSI Manual.
 - 2. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.
 - 3. Reinforcement with any of the following defects will not be acceptable.
 - a. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances;

- b. Bends or kinks not shown on the Drawings;
- c. Bars with reduced cross-section due to excessive rusting or other causes.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with the specified standards for detail and method of placing reinforcement and supports, except as may be modified herein.
 - 2. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
 - 3. Position, support, and secure reinforcement against displacement by formwork, construction, and concrete placing operations.
 - 4. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
 - 5. Place reinforcement to obtain minimum coverages for concrete protection.
 - 6. Arrange, space, and securely tie bars and bar supports together with the specified wire.
 - 7. Set tie wires so twisted ends are directed away from exposed concrete surfaces.
 - 8. Place additional reinforcement around all openings.
- B. Install welded wire fabric in as long lengths as practicable, lapping adjoining pieces at least eight (8) inches.
- C. Provide sufficient numbers of supports, and of strength to carry the reinforcement.
- D. Do not place reinforcing bars more than 2" beyond last leg of any continuous bar support.
- E. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- F. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:
 - 1. Concrete cast against and permanently exposed to earth; 3-in.
 - 2. Concrete surfaces in contact with soil, water, sewage, sludge or exposed to the weather; 2-in.
 - 3. Concrete surfaces not in contact with soil, water, sewage, sludge or exposed to the weather.

- a. Beams, girders, columns: principal reinforcement, ties, stirrups or spirals; 1-1/2-inch
- b. Walls and bottom steel of slabs; 3/4-inch
- c. Shells and top steel of slabs; 3/4-inch

3.3 SPLICES

- A. Lap splices:
 - 1. Tie securely with the specified wire to prevent displacement of splices during placement of concrete.
 - 2. Except as otherwise indicated on the Drawings, compression embedment and lap splices shall be 36 diameters, but not less than 12-inches.
- B. Splice devices:
 - 1. Obtain the Engineer's approval prior to using splice devices.
 - 2. Install in accordance with manufacturer's written instructions.
 - 3. Splice in a manner developing at least 125% of the yielding strength of the bar.
- C. Welding: No reinforcing bars shall be welded either during fabrication or erection.
- D. Do not splice bars except at locations shown on the Approved Shop Drawings, except as otherwise specifically approved by the Engineer.

3.4 IN PLACE INSERTION

- A. Notify the Engineer at least 24 hours in advance of any concrete placement so that he may inspect the arrangement of reinforcing steel. Place no concrete until the inspection has been made or waived by the Engineer.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide all the cast-in-place concrete as required by the Contract Documents including but not limited to, form work, reinforcing and finishing, thrust blocking, or other purposes, as directed by the Engineer.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 13205 Reuse Water Storage Tank

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. None required under this Section.

1.4 PRODUCT HANDLING

- A. Bags of cement shall be stored in a dry area which is protected from the weather.

PART 2 - PRODUCTS

2.1 CEMENT

- A. Provide a standard brand of Portland cement complying with ASTM C150, type II, low alkali. Do not change the brand of cement during progress of the Work except as approved in writing by the Engineer.

2.2 AGGREGATES

A. General:

1. Provide hard rock aggregate complying with ASTM C33, with additional attributes as specified herein.

B. Fine aggregate:

1. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specifications C-33, and the following detailed requirements:

<u>Sieve</u>	<u>Retained</u>
No. 4	0.5%
16	25-40
50	70-87
100	93-97

C. Coarse aggregates:

1. Provide coarse aggregate consisting of clean, hard, fine grained, sound crushed rock or washed gravel, conforming to the requirements of ASTM Specification C-33.
2. Use coarse aggregate of the largest practicable size for each condition of placement, subject to the following maximum size limitations:
 - a. 2-inch for plain concrete
1-inch for reinforced sections 10-inches and over in thickness
3/4-inch for reinforced sections less than 10-inch thickness
3. Grade combined aggregates within the following limits:

Sieve Size or Inch Size in Inches:	Percentage by weight passing sieve:					
	1-1/2" aggregate:		1" aggregate:		3/4" aggregate:	
	Min:	Max:	Min:	Max:	Min:	Max:
1-1/2"	95	---	---	---	---	---
1"	75	90	90	100	---	---
3/4"	55	77	70	90	90	100
3/8"	40	55	45	65	60	80
No. 4	30	40	31	47	40	60
No. 8	22	35	23	40	30	45
No. 30	10	20	10	23	13	23
No. 50	2	8	2	10	5	15
No. 100	0	3	0	3	0	5

2.3 WATER

- A. Use only water which is clean and free from deleterious amounts of acid, alkali, salt, and organic matter.

2.4 REINFORCEMENT MATERIALS AND ACCESSORIES

- A. Bars: See Section 03200:
- B. Steel wire: See Section 03200
- C. Welded wire fabric: See Section 03200

PART 3 - EXECUTION

3.1 CONCRETE MIXING

- A. Class A Concrete
 - 1. Class A concrete shall have a minimum compressive strength, at 28 days, of 3500 psi, with a maximum water content of 6.4 gal./100 lbs. and a minimum cement content of 520 lbs./cubic yard.
- B. Class B Concrete
 - 1. Class B concrete shall have a minimum compressive strength at 28 days of 2500 psi, with a maximum water content of 7.4 gal/100 lbs. and a minimum cement content of 430 lbs/cubic yard. Class B concrete may be mixed on site using a 1:2.5:5 mix and made with not less than 4.5 bags of cement per cubic yard.
- C. Ready Mix Concrete
 - 1. Ready mixed concrete shall comply with ASTM C94.

3.2 REINFORCEMENT

- A. Reinforcing shall be placed as shown and specified in the Contract Documents and as required in the design furnished under Section 13205.

3.3 PLACEMENT OF CONCRETE

- A. Concrete shall be carefully placed to ensure dense, compact concrete. Concrete shall be thoroughly spaded or vibrated into position without disturbance of pipelines or other materials.
 - 1. Concrete shall be placed with as little slump as practicable.
 - 2. The pipe shall be securely braced, both vertically and horizontally, if it is to be encased, to prevent flotation.
 - 3. The sides of thrust blocks shall be formed.

4. Concrete shall not be placed over bolts or nuts so as to prevent the removal of the joint glands.
5. Backfill shall not be placed on the concrete until the concrete has set firm.

END OF SECTION

SECTION 03345

CONCRETE FINISHING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide finishes on cast-in-place concrete as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 03300 Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Except as may be modified herein or otherwise directed by the Engineer, comply with ACI 301, "Specifications for Structural Concrete for Buildings."
- C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General:
 - 1. Carefully review the Contract Documents, and determine the location, extent, and type of required concrete finishes.
 - 2. As required for the Work, provide the following materials, or equals approved in advance by the Engineer.
- B. Concrete materials: Comply with pertinent provisions of Section 03300 and 03305, except as may be modified herein.
- C. Liquid bonding agent: "Everbond," manufactured by L&M Construction Chemicals Inc.
- D. Curing and protection paper:
 - 1. Products: To comply with ASTM C171.
 - a. "Sisalkraft, Orange Label"
 - b. Equal products complying with ASTM C171.
 - 2. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as "Sisalkraft, Seekure 896," or equal paper faced with polyethylene film.
- E. Liquid curing agents:
 - 1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.
 - 2. For curing other areas, use "L & M Cure R" manufactured by L&M Construction Chemicals Inc.
- F. Floor Hardener:
 - 1. "Fluohard" manufactured by L&M Construction Chemicals Inc.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING OF FORMED SURFACES

- A. General:
 - 1. After removal of forms, give the concrete surface one or more of the finishes specified below.
- B. As-cast finish:
 - 1. Rough form finish:
 - a. Leave the surfaces with the texture imparted by forms, except patch tie holes and defects.
 - b. Remove fins exceeding 1/4-inch in height.
 - 2. Smooth form finish:
 - a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
 - b. Patch tie holes and defects.
 - c. Remove fins completely.
- C. Rubbed finishes:
 - 1. Provide these finishes only where specifically called for, and then only on a "smooth form finish" base as described above.
 - 2. Grout cleaned finish:
 - a. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
 - b. Do not permit cleaning as the work progresses.
 - c. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
 - d. Substitute white Portland cement for part of the gray Portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
 - e. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes.
 - f. Immediately after applying the grout, scrub the surface vigorously with a carborundum stone to coat the surface and fill all air bubbles and holes.
 - g. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
 - h. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
 - i. Keep the surface damp for at least 36 hours after final rubbing.
- D. Unspecified finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
 - 1. Rough form finish:
 - a. For all concrete surfaces not exposed to public view.
 - 2. Smooth form finish:
 - a. For all concrete surfaces exposed to public view.

3.3 FINISHING SLABS

- A. Finishing tolerance:
1. "Class B:" True plane within 1/4-inch in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.
- B. Floated finish:
1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
 2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
 3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.
 4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.
 5. Re-float the slab immediately to a uniform sandy texture.
- C. Troweled finish:
1. Provide a floated finish as described above, followed by a power troweling.
 - a. Produce initial surface relatively free from defects, but which still may show some trowel marks.
 - b. Provide hand troweling where necessary when a ringing sound is produced as the trowel is moved over the surface.
 - c. Thoroughly consolidate surface by power troweling.
 2. Provide a finished surface free from trowel marks, uniform in texture and appearance, and in a plane of Class B tolerance.
 - a. Concrete to receive vinyl tile - once over steel troweled finish.
 - b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.
- D. Unspecified finish: If the finish of slab surfaces is not specifically called for elsewhere in the Contract Documents, provide the following finishes as applicable:
1. Scratched finish:
 - a. For surfaces scheduled to receive bond-applied cementitious applications.
 2. Floated finish:
 - a. For surfaces intended to receive roofing.
 3. Troweled finish:
 - a. For floors intended as walking surfaces;
 - b. Floors scheduled to receive floor coverings;
 - c. Parking areas.
 4. Non-slip finish:
 - a. Exterior platforms, steps, and landings;

3.4 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
- B. Preservation of moisture:
 - 1. Unless otherwise directed by the Engineer, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing:
 - a. Application of absorptive mats or fabric kept continuously wet;
 - b. Application of waterproof sheet materials specified in Part 2 of this Section;
 - c. Application of other moisture-retaining covering as approved by the Engineer;
 - d. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.
 - 2. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
 - 3. Cure concrete by preserving moisture as specified above for at least seven days.
- C. Temperature, wind, and humidity:
 - 1. Cold weather:
 - a. When mixing, transporting, placing, finishing and curing concrete in cold weather, conform to ACI Standard 306, Cold Weather Concreting.
 - b. Definition. For the purpose of this Specification, "cold-weather" is defined as any combination of low air temperature and high wind velocity which may result in damage to freshly placed concrete from freezing and thawing at an early age. Concrete mixed or placed when the air temperature is below, or expected to fall below 40 degrees F for more than one consecutive day will be considered cold weather concrete, and will require special treatment.
 - c. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
 - d. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
 - 2. Hot weather:
 - a. When mixing, transporting, placing, finishing, and curing concrete in hot weather, comply with ACI 305, Hot Weather Concreting.
 - b. Definition. For the purpose of this specification, "hot weather" is defined as any combination of high air temperature, low relative humidity, and high wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal properties.
 - c. When necessary, provide windbreaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.

3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5 degrees F in any one hour period, or 50 degrees F in any 24 hour period.
- D. Protection from mechanical injury:
1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.
 2. Protect finished concrete surfaces from damage from construction equipment, materials, and methods by application of curing procedures.
 3. Do not load self-supporting structures in such a way as to overstress the concrete.

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SECTION 13205

BACKWASH WATER STORAGE TANK

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish and erect a bolted steel water storage tank, including foundation, tank structure and tank appurtenances as shown on the contract drawings and described herein. In order to maintain the aesthetics of the site and match the existing tank, the approved tank style shall be a bolted steel tank with a gray color.
- B. Work included: Provide cast-in-place reinforced concrete standpipe foundation design in accordance with all appropriate codes of the American Concrete Institute (ACI), and as required to properly support the tank as specified herein.
 - 1. The work shall include the design of a reinforced concrete ring wall and floor slab including but not limited to ACI 301 Specification for Structural Concrete for Buildings and ACI 318 Building Code requirements for Reinforced Concrete for a bolted steel water storage tank.
 - 2. Specific tank dimensions to be approximately 31.0 feet in diameter, overflow height of 27.5-feet, and overflow capacity of 150,000 gallons.
 - 3. Also included is the design of the tank floor slab in accordance with AASHTO H-20 loading, piping and conduit sleeves, contraction joints and expansion joints.
 - 4. The design of all concrete components of the tank is the responsibility of the Contractor.
- C. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Divisions 1 thru 16 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of professional design engineers who are thoroughly experienced in the design and construction of such water storage facilities, including the AWWA D103 current edition and AISC design criteria, the Massachusetts State Building Code, and local Town codes pertaining to such construction, and the appropriate ACI codes.
- B. The Engineer assigned responsibility for design of the foundation shall have a minimum of five years experience in the design of such facilities and be a Registered Structural Professional Engineer in the State of Massachusetts.

1. Soil borings are included in the Appendix to assist in calculation of soil bearing capacity and foundation design.
- C. Design of concrete foundation, specifications for cement and aggregate, and mixing and placing of concrete shall be in compliance with but not limited to ACI Codes 301, 318 and 349, latest revision.
- D. Concrete work shall comply with all applicable portions of ACI 301.
- E. Field and laboratory testing shall be in compliance with Section 01410 of these Specifications.

1.3 QUALIFICATIONS OF TANK SUPPLIER

- A. The bidder shall offer a new tank structure as supplied from a manufacturer specializing in the design, fabrication and erection of stainless steel, bolt together tanks. The manufacturer shall employ a staff of full time design engineers, own and operate its steel fabrication facilities.
- B. For purpose of designating type and quality for work in this Section, the design is based on an Alstor ®Tank Bolted, stainless tank as manufactured by Alstor Canada Inc. of Chesterville, Ontario Canada, and a Statewide Aquastone glass fused bolted steel tank as manufactured by CST Storage, Inc. of DeKalb Il.
- C. Glass fused bolted steel tank as provided by other manufacturers, will be considered for approval by the Engineer. Manufacturers lacking the experience requirement will not be considered. The Owner's decision or judgment on these matters will be final, conclusive and binding.
- D. Strict adherence to the standards of design, fabrication, erection, product quality, and long term performance, established in this Specification will be required by the Owner and Engineer. Glass coated tanks shall be manufactured and glass coated in the United States of America (USA) using USA steel.
- E. Alternate bolted steel glass fused tank contractors must submit the following information at a minimum with the equipment submittal package to be considered as an equal:
 1. Typical structure and foundation drawing(s).
 2. List of tank materials, appurtenances and tank size.
 3. List of ten (10) tanks, of the type proposed, presently in potable water service of equal or greater size and character specified herein, operating satisfactorily for a minimum of five (5) years, including the name and telephone number of Owner and Engineer.

- F. Tank installers shall provide a list of ten (10) bolted stainless, or glass fused steel tanks which are at least five (5) years old in potable water service that have been installed by the same tank erector who will provide and construct the tank(s) for this project. The acceptable tank erector/provider will be by the authorized dealer of the tank manufacturer who has been regularly engaged in the erection of steel tanks for at least five (5) years using their own factory-trained employee/erectors and not sub-contractor installers
- G. Tank Substitutions or “or equal” which cause engineering and Contract changes will be subject to the following. The tank installation as shown on the Plans and as specified herein, is based on the equipment furnished by one manufacturer. A tank which is offered as a substitute to the specific requirements of these Specifications and which differs in detail and arrangement from that shown may require changes in design and construction. All costs which result from such changes in design and construction are to be borne entirely and unconditionally by the Contractor; said costs to include but not limited to structural, piping, mechanical and electrical changes and all engineering costs incurred as a result of the substitution, in the revision of Plans and Specifications, review of design changes by others, preparation of change orders, and any other costs directly resulting from said substitution.

1.4 SUBMITTAL DRAWINGS AND SPECIFICATIONS

- A. Construction shall be governed by the Owner’s drawings and specifications showing general dimensions and construction details, after written approval by the Engineer of detailed erection drawings prepared by the tank contractor. There shall be no deviation from the drawings and specifications, except upon written order from the Engineer.
1. Shop drawings and specification sheets for all materials to be utilized, including but not limited to cement, aggregate, reinforcing steel, sleeves, anchor bolts, and piping.
 2. Design drawings indicating dimensions, classification of concrete and ASTM designation of steel.
 3. Detail drawings indicating placement of accessories such as anchor bolts, piping, and sleeves, and a foundation rollout drawing will be required.
 4. Certification that the design criteria utilizing is in conformance with that as detailed in AWWA D103-09 and AISC.
 5. Reinforcing bending diagrams
 6. Design load calculations including but not limited to tank loads, floor loads, piping loads including building loads, etc.
 7. If cold or hot weather concreting is planned, a submittal is required indicating the provisions to be taken to protect the concrete during cold or hot weather pouring and curing.
 8. Quantity of concrete for each major portion of construction.

- B. The contractor is required to furnish, for the approval of the Engineer and at no increase in contract price, six (6) sets of complete specifications and construction drawings and in electronic format. A complete set of structural calculations shall be provided for the tank structure and foundation. All such submissions shall be stamped by a Licensed Professional Engineer licensed in Massachusetts, as well as, by a Licensed Professional Engineer or Structural Engineer employed on the tank manufacturer's engineering staff. Where the tank manufacturer's P.E. is licensed in Massachusetts, only one stamp is required.
- C. When approved, two sets of such prints and submittal information will be returned to the contractor marked "APPROVED FOR CONSTRUCTION" and these drawings will then govern the work detailed thereon. The approval by the Engineer of the tank supplier's drawings shall be an approval relating only to their general conformity with the bidding drawings and specifications and shall not guarantee detail dimensions and quantities, which remains the bidder's responsibility.
- D. The tank manufacturer and installing contractor's standard published warranty shall be included with submittal information.
- E. The tank manufacturer shall include a standard Operation and Maintenance Manual with submittal information.

1.5 REFERENCES

- A. The following reference specifications shall govern the work with regard to design materials and workmanship where applicable:
 - 1. ASTM A36 Standard specification for structural steel
 - 2. ASTM A307 Specification for carbon steel bolts
 - 3. ASTM A325 Specification for high strength bolts for structural steel joints
 - 4. ASTM A240 Specification for chromium-nickel stainless steel plate and sheet
 - 5. ASTM F593-98 Standard specification for stainless steel bolts
 - 6. ASTM F594-98 Standard specification for stainless steel nuts
 - 7. AISC – 89 Specification for structural steel buildings
 - 8. ANSI/AWWA D103-09 Factory coated bolted steel tanks for water storage
 - 9. ANSI/AWWA D103-09 Section 3, General Design
 - 10. ANSI/AWWA D652-11 Disinfection of water storage facilities
 - 11. ANSI/AWWA D103-09 Section 5, Appurtenances as adapted for stainless steel
 - 12. ANSI/AWWA D103-09 Section 13, Structurally supported aluminum dome
 - 13. ANSI/NSF Standard 61 Drinking water system components

PART 2 - PRODUCTS

2.1 TANK SIZE

- A. The factory bolt together tank shall have the nominal dimensions listed on the Drawings.

2.2 FLOOR ELEVATION

- A. Finished floor elevation shall be set at elevation shown on Contract Drawings.

2.3 TANK DESIGN STANDARDS

- A. The materials, design, fabrication and erection of the bolt together tank shall conform to the ANSI/AWWA D103, latest revision, with the exception of the stainless steel tank.
- B. All materials furnished by the tank manufacturer, which are in contact with the stored water shall be certified and listed by the National Sanitation Foundation (NSF) to meet ANSI/NSF Additives Standard No. 61.

2.4 AWWA DESIGN LOADS

- A. Specific Gravity 1.0.
- B. Wind Loads (AWWA D-103-09)
 - 1. Basic Wind Speed 100 mph
 - 2. Importance Factor 1.15 (I_w)
 - 3. Exposure Category C.
- C. Allowable Soil Bearing Capacity 8,000 psf at a depth of five feet below existing grade.
- D. Snow Load
 - 1. Ground Snow Load 55 PSF
 - 2. Importance Factor 1.2 (I_s)
 - 3. Thermal Factor 1.2" (C_t)
 - 4. Exposure Factor 1.0 (C_e)
- E. Seismic Design
 - 1. Design per AWWA D103-00/IBC 2009 as modified by the 8th Edition of the Massachusetts Code.
 - 2. Map spectral Response
 - a. S_s : 0.270
 - b. S_1 : 0.067
 - 3. Importance Factor of 1.5 based on Category IW (I_g)
 - 4. Site Class: D (Confirmed by Geotechnical report furnished by Owner prior To design submittals)
 - 5. Long Period Transition Period (T_L)

2.5 PLATES AND SHEETS

- A. Plates and sheets used in the construction of a stainless steel tank shell, and roof shall be 304 stainless steel.
- B. Plates and sheets used in the construction of a glass fused tank shell and roof shall be carbon steel.

2.6 ROLLED STRUCTURAL SHAPES

- A. Material shall conform to minimum standards of ASTM A36 or AISI 1010.

2.7 HORIZONTAL WIND STIFFENERS

- A. Design requirements for intermediate horizontal wind stiffeners shall be of the “web truss” design with extended tail to create multiple layers of stiffener, permitting wind loads to distribute around tank.
- B. Web truss stiffeners shall be of steel with hot dipped galvanized coating.
- C. Rolled steel angle stiffeners are not permitted for intermediate stiffeners.

2.8 BOLT FASTENERS

- A. Bolts used in tank lap joints for stainless steel tanks shall be stainless steel ½- 13 UNC-2A rolled thread. Bolts for glass fused tanks shall be zinc plated per ASTM B695.
 - 1. Lap joint bolts shall be installed such that the head portion is located inside the tank and the washer and nut are on the exterior.
 - 2. Lap joint bolts shall be properly selected such that threaded portions will not be exposed in the “shear plane” between tank sheets.
 - 3. Bolt lengths shall be selected to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after tightening is not acceptable.
 - 4. Lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during tightening.

2.9 SEALANT

- A. The lap joint sealant shall be a one-component moisture cured polyurethane compound.
 - 1. The sealant shall be used to seal lap joints and bolt connections and to isolate dissimilar metals.
 - 2. The sealant shall cure to a rubber-like consistency and have excellent adhesion, have low shrinkage, and be suitable for interior and exterior exposure.
 - 3. Neoprene gaskets and tape type sealer shall not be used.
 - 4. The sealant shall be NSF61 certified. Certification of sealant must be provided.

2.10 APPURTENANCES

- A. The appurtenances shall be installed as shown on the Engineer's Drawing and as detailed in these Specifications.
1. Roof Vent
 - a. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal, the resulting interior pressure of vacuum will not exceed 0.5" water column.
 - b. The overflow pipe shall not be considered to be a tank vent.
 - c. The vent shall be constructed such that the hood can be unbolted and used as a secondary roof access.
 - d. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (1/2-inch) opening. An insect screen of 23 to 25 mesh polyester monofilament shall be provided and designed to open should be screen become plugged by ice formation.
 2. Roof Hatch
 - a. A roof hatch shall be installed in the tank roof on a minimum 4" high curb.
 - b. The hatch opening shall have a minimum dimension of 24-inch and the cover shall overlap the curb and hinged with provisions made for locking.
 - c. The hatch material shall be galvanized steel or stainless steel.
 - d. The hatch shall be located near the outside tank ladder.
 3. Outside Tank Ladder
 - a. An outside ladder with safety cage shall be 6-feet above the level of tank bottom and at the location designated.
 - b. Outside ladder and cage shall meet OSHA requirements.
 - c. The ladder shall be fabricated from AA alloy 6061-T4 (rungs) AA alloy 6061-T6 (side rails) aluminum and the cage material shall be galvanized steel.
 4. Access Manway
 - a. Two (2) 24-inch diameter manways shall be provided at locations to be determined by the Engineer.
 - b. The manway shall include a reinforcing frame and cover plate with a hinged support for cover removal.
 - c. The manway material shall be stainless steel or hot dipped galvanized.
 5. Inlet/Outlet Connections
 - a. Inlet and outlet connections shall conform to the sizes and locations specified on the Drawings.
 - b. Where connections are shown to pass through tank panels, they shall be field located and utilize an interior and exterior assembly.
 - c. Joint sealant shall be applied to any cut panel edges or bolt connections.

- d. Inlet and outlet connections shall be stainless steel, or of other materials approved by Engineer.
 - e. See section 02668 for ductile iron pipe requirements.
6. Overflow Pipe
- a. The overflow pipe shall conform to the size and location specified on the Engineer's Drawings.
 - b. Overflow pipe shall be Schedule 80 PVC with flange connections.
7. Roof Walkway and Handrails
- a. For tanks with a bolted stainless steel roof, a non-skid roof walkway with handrails shall be provided to allow ready and safe access to the gravity vent.
 - b. The walkway and handrails shall be galvanized steel and meet OSHA requirements.
8. Identification Nameplate
- a. The manufacturer's nameplate shall list the tank diameter, height, capacity, installation date, storage use and model/serial number.
 - b. The nameplate shall be bolted to the tank shell at an elevation such that it can be viewed from grade.
9. Bolted Roof
- a. The roof shall be constructed of radial sections of bolted steel roof panels as produced by the tank manufacturer with a knuckle formed down that bolts to the upper shell ring.
 - b. The roof panels shall be erected similar to the sidewall panels using the same sealant and bolting techniques.
 - c. The roof shall be self-supporting and shall clear the span of the tank.
10. The roof shall transfer the live and dead loads to the sidewall.
- a. Tank Supernatant Manifold
 - a. See section 15064 for plastic pipe and fittings requirements.
 - b. See section 15100 for valves required for manifold.
 - c. Electrical connections to valves to be completed by others under separate contracts.
11. Cathodic Protection System
- a. A sacrificial anode cathodic protection system is required.
 - b. The system shall be designed by the tank manufacturer to protect the steel substrate and concrete floor rebar.

PART 3 - ERECTION

3.1 FOUNDATION

- A. The tank foundation shall be constructed in accordance with the design drawings complete by the tank manufacturer.

3.2 CONCRETE FLOOR

- A. Concrete Floor:
 - 1. The drawings depict standard reinforcement layout for the floor with an embedded steel starter ring.
 - 2. Final reinforcement layout to be the responsibility of the tank manufacturer.

3.3 STARTER RING

- A. The starter ring shall be leveled and rounded prior to encasement in concrete.
 - 1. Leveling plate assemblies shall be used to secure the starter ring
 - 2. Prior to placement of concrete, butyl rubber and bentonite water stop seals shall be placed on the inside surface of the starter ring below the concrete floor line.

3.4 LAPPED JOINTS

- A. All vertical, horizontal, shell to roof, and shell to bottom plates or sheets shall be field bolted.
 - 1. Sealant shall be used on all joints to ensure liquid tightness. Fillet sealant at all lapped joints to provide a neat and pleasing appearance.

3.5 SIDEWALL

- A. Placing of sealant on each connection may be inspected by the Engineer prior to placement of adjacent member. However, the Engineer's inspection shall not relieve the erector of his responsibility for liquid tightness.

3.6 BOLT INSTALLATION

- A. All bolts on the vertical tank wall shall be installed such that the head portion is located inside the tank, the washer and nut are on the exterior.
- B. All lap joint bolts shall be properly selected such that threaded portions will not be exposed to the "shear plane" between tank sheets.
- C. Bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.
- D. All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.

- E. High density polyethylene co-polymer caps and sealant shall be used to cover the bolts, nuts, and washers exposed on the exterior sidewall of the tank.

3.7 INSPECTION OF THE SHEETS

- A. Inspection of the sheets shall be made after the cleaning process for traces of foreign matter or dents. An assessment and action required to resolve any and all finding shall be provided to the Town and Engineer in a form of visual and written documentation. Any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality or replaced if dented.

3.8 COATING

- A. The stainless steel tank design does not require a coating system.
- B. The glass coating system shall be in accordance with AWWA D103. A three coating system is required with white interior and Light Gray Exterior. A sheet edge encapsulation of 5 mils accordance with ISO 28765 Class 2 or better is required for all rectangular sheet edges.

3.9 APPURTENANCES (PER AWWA D103, SECTION 5)

- A. Pipe Connections
 - 1. Where pipe connections are shown to pass through tank panels, they should be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly and the tank shell reinforcing shall comply with AWWA D103 latest edition. Sealant and rubber gasket shall be applied on any cut panel edges or bolt connections.
 - a. Overflow piping and sidewall piping shall be Schedule 80 polyvinylchloride (PVC).

3.10 FIELD TESTING – HYDROSTATIC

- A. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.
- B. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.
- C. Water required for testing shall be furnished by the Owner, so as to flow into the tank, at a time to be coordinated between the Owner and tank erector at no charge to the tank erector. Disposal of test water to the ground surface shall be the responsibility of the Contractor, and shall not wash silt into any wetland areas.
- D. Labor for tank testing is to be included in the price of the tank.

3.11 DISINFECTION

- A. The tank structure shall be disinfected at the time of testing by chlorination in accordance with AWWA Standard C652 "Disinfection of Water Storage Facilities".
- B. Disinfection shall not take place until tank sealant is fully cured, minimum 10 to 12 days at 73 degrees F.
- C. Acceptable forms of chlorine for disinfection shall be:
 - 2. Liquid chlorine as specified in AWWA C652.
 - 3. Sodium hypochlorite as specified in AWWA C652.
 - 4. Calcium hypochlorite (HTH) is not acceptable.
- D. Acceptable methods of chlorination per AWWA C652:
 - 5. Section 4.1.1.
 - 6. Section 4.1.2 - chemical feed pump only (4.1.2.1).
 - 7. Section 4.3.
- E. Section 4.2 is not acceptable.
- F. Contractor is responsible for bacteriological testing
 - 1. Tank shall be filled from potable water hydrant on site. Contractor to provide all hose and backflow prevention devices.
 - 2. Two (2) samples are to be taken twenty-four (24) hours apart after tank water chlorine residual is below 0.5 ppm.
 - 3. Samples are to be analyzed by a Massachusetts State Certified Laboratory for coliform bacterial and background.
 - 4. Contractor to repeat disinfection if two (2) negative coliform bacteria samples are not obtained and/or the background is over 150.

3.12 WARRANTY

- A. The tank manufacturer shall warrant for a period of five (5) years that the tank sheets will not fail due to corrosion, under normal and proper use, maintenance and operation.

3.13 INSPECTION

- A. On or near the fifth (5th) anniversary date of the initial tank use, at the Owner's request, the tank manufacturer's authorized dealer shall make a visual empty tank inspection of the tank and appurtenances; and the immediate area surrounding the tank. A written summary of this inspection will be filed with the tank owner and the tank manufacturer. The cost of this inspection is included in the bid price. The Owner shall be responsible for getting the tank empty and refilling the tank including disinfection. All confined space entry requirements shall be by the Contractor.

END OF SECTION

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DIVISION 14 - CONVEYING SYSTEMS OMITTED

<u>Section</u>	<u>Subject</u>	<u>Page</u>
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DIVISION 15 - MECHANICAL

<u>Section</u>	<u>Subject</u>	<u>Page</u>
15064	Plastic Pipe and Fittings	15064-1 thru 15064-4
15100	Valves and Appurtenances	15100-1 thru 15100-3

SECTION 15064

PLASTIC PIPE AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: All plastic piping, FRP piping, fittings and appurtenances as required by the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 13206 Backwash Water Storage Tank

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Drawings are diagrammatic and indicate the general arrangement of systems and work included. Information and components shown on isometric but not shown in plan view or vice versa, shall apply or be provided as if shown on both. It is not intended to specify or to show every offset, fitting, or component; however, it is the intent of these Specifications and Drawings that all required components and materials, whether or not indicated or specified, shall be provided in such a manner as to make the entire piping installation fully complete and operational in all respects.
- C. Codes and regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern.

- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements;
 - 3. Shop drawings showing piping layout, methods, and locations of supports and hangers and connections to equipment.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 POLYVINYL CHLORIDE (PVC) PIPE

- A. Plastic pipe shall be manufactured from rigid unplasticized polyvinyl chloride compounds that comply with the pertinent sections of ASTM-D1784 for Class 12454-B.
 - 1. Pipe shall be manufactured in accordance with ASTM-D1785, PVC 1120.
 - 2. Shall be of the sizes shown on the Drawings and shall be Schedule 80.

2.2 POLYVINYL CHLORIDE (PVC) FITTINGS

- A. Socket Type
 - 1. Shall be socket type for solvent welded joints.
 - 2. Shall conform to ASTM-D2467.
 - 3. Joints shall be flanged where shown on the Drawings and have 1/8 inch full face gaskets. Flange nuts and bolts shall be type 304 stainless steel.
 - 4. Fittings, specials, unions, and flanges shall be of the same schedule number as the pipe they are attached to.

2.3 SOLVENT CEMENT

- A. Cement for PVC pipe and fittings:
 - 1. Shall meet or exceed the requirements of ASTM-D2564.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PIPING SYSTEM LAYOUT

- A. Follow the general layout shown on the Drawings in all cases except where other work may interfere.

3.3 INSTALLATION

- A. Polyvinyl Chloride (PVC) Piping Systems.
 - 1. The installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.
 - 2. Joints for plastic pipe shall be solvent welded except flanged or threaded where required. In making solvent welded connections, clean dirt and moisture from pipe and fittings, bevel pipe ends slightly with emery cloth, if necessary, and apply solvent cement of the proper grade. Solvent welded joints shall be made in accordance with ASTM-D2855.
 - 3. Installation of valves and fittings shall be strictly in accordance with manufacturer's instructions. Particular care shall be taken not to over-stress threaded connections. In making solvent weld connections, the solvent shall not be spilled on valves or allowed to run from joints.
- C. Pipe Hanger and Supports:

Concrete inserts for hangers and supports shall be furnished and installed in the concrete as it is placed. The inserts shall be set in accordance with the requirements of the piping layout and the Contractor shall verify these locations from approved piping layout drawings and the structural drawings. Pipe hangers and supports are specified in Section 15094.

 - 1. Do not use supports that clamp in such a manner as to restrict the axial movement of the piping system, due to thermal expansion and contraction.

3.4 TESTING

- A. After a twenty-four (24) hour curing period, piping systems shall be subjected to a hydrostatic pressure test for six (6) hours at a test pressure twenty-five (25) psi above the anticipated maximum working pressure.
 - 1. All leaks shall be repaired and the piping system retested as approved by the Engineer.

3.5 DISINFECTING

- A. All piping in contact with potable water to be disinfected with backwash tank.

END OF SECTION

SECTION 15100

VALVES AND APPURTENANCES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide all valves and appurtenances as required by the Contract Documents for the supernatant manifold valves.
- B. The items of this Section shall include but not be necessarily be limited to:
 - 1. Motor Operated Butterfly Valves
- C. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern.
- C. All of the types of valves and appurtenances shall be products of established firms who are experienced in the manufacture of the particular equipment to be furnished.
- D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements;
 - 3. Shop Drawings and other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Contract Drawings.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. General
 - 1. All valves and appurtenances shall be of the size shown on the Contract Drawings and as far as possible all equipment of the same type shall be from one manufacturer.
 - 2. All valves and appurtenances shall have the name of the manufacturer, flow directional arrows, and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
 - 3. All valves shall open clockwise. Operators shall have arrows cast thereon to indicate the direction of rotation to operate the valve.
- B. Butterfly valves shall meet or exceed the latest requirements of ANSI/AWWA C504 and comply with the following:
 - 1. Shall be series 31 Butterfly Valve manufactured by Bray Controls
 - 2. End flanges shall conform in dimension and drilling to ANSI B16.1, Class 125 cast iron flange.
 - 3. Body: cast iron meeting or exceeding the requirements of ASTM A126, Class B.
 - 4. Shaft: type 304 stainless steel.
 - 5. Disc: To be stainless steel.
 - 6. Seat: ED PM
 - 7. Direction of operation: open clockwise.
 - 8. Operator:
 - a. Electric actuator shall be series 70-121 as manufactured by Bray Controls
 - i. Nominal rotation: 90 degrees
 - ii. 110 VAC

- iii. Manual override with operating handle
- iv. Visual indication: raised dome
- v. Limit/Auxiliary switches: 2 x 16 A SPDT for report back signal
- vi. Duty rating: 30%
- vii. Thermal protection: motor thermostat
- viii. NEMA 4X Enclosure
- ix. Temperature: -4 to 158 degrees F
- x. Finish: Zinc plate, two part polyurethane
- xi. Life: 100,000 operations minimum
- xii. Heater: 25 W, standard

- b. All electric actuators shall be fitted with butterfly valves and tested by valve actuator supplier prior to shipment to site.

C. Ball Valves

- 1. Valve size two (2) inches and smaller shall have screwed or soldered end as required as manufactured by Apollo or an approved equal.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 VALVE INSTALLATION

- A. The valves and appurtenances shall be installed at the locations shown on the Drawings. Valve operators shall be easily accessible and rigidly supported.
 - 1. After installation check valve operation. Valve shall operate smoothly through its entire operating range.
 - 2. Coordinate the work of this Section with the work of other Sections.
 - 3. Electrical connection shall be completed by others under separate contract.

END OF SECTION

APPENDIX INDEX

Borings



Technical Drilling Services, Inc.

P.O. Box 10/2 Peter Drive, Sterling, MA 01564

TEL (978) 422-0005 FAX (978) 422-0006

PENETRATION RESISTANCE				PROPORTIONS USED:	REMARKS:
140 LB. Wt. falling 30" on 2" O.D. Sampler				Trace: 0% to 10%	<ul style="list-style-type: none">The stratification lines represent the approximate boundary between soil types and the transition may be gradual.Water level readings have been made in the drill holes of times and under conditions stated on the boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.
<u>Cohesionless Density (Blows/ft.)</u>		<u>Cohesive Consistency (Blows/ft)</u>		Little: 10% to 20%	
very loose	0-4	very soft	0-2	Some: 20% to 35%	
loose	5-9	soft	2-4	And: 35% to 50%	
medium dense	10-29	medium stiff	5-8		
dense	30-49	stiff	9-15		
very dense	59+	Very stiff	16-30		
		Hard	31+		